PAPER IV

TABLE OF CONTENTS

UNIT ONE: PROFESSIONALISM AND TRENDS IN NURSING

In this unit you will cover nursing as a profession, characteristics of a professional nurse, professional organisations, the Nursing Council of Kenya and the legal aspects of nursing in Kenya. You will also cover disciplines of nursing and professional practice and conclude with a study of trends in nursing practice and the nursing process. It will build on what you have already learnt and it will also serve as revision.
This unit is composed of two sections:
Section One: Professionalism and Trends in Nursing.
Section Two: The Nursing Process.

SECTION ONE: PROFESSIONALISM AND TRENDS IN NURSING

Unit Objectives

By the end of this unit you will be able to:
- Perform professional duties in conformity with the ICN code of ethics
- Demonstrate an understanding of the legal aspects of nursing practice in Kenya
- Display the characteristics of a professional nurse
- Apply the nursing process to provide quality care

Introduction

Welcome to section one of this unit on professionalism and trends in nursing that directly relates to clinical practice.

Objectives

By the end of this section you will be able to:
- Describe trends in nursing
- Describe professionalism
- List the national, regional and international professional organisations and their relationships
- Describe the Nursing Council of Kenya
- List the legal aspects of nursing in Kenya
- Describe the disciplines of nursing in Kenya
- Describe professional practice

Profession

You are already working in the nursing profession, and now you are being trained to become a Kenya Registered Community Health Nurse. On completion of this programme, you will be expected to be proficient in providing general nursing, reproductive health and community health services.
This section of unit one, aims at moulding you to become a professional nurse. You will at all times, whether on or off duty, be expected to display certain professional characteristics. You will begin by defining a profession, a professional nurse and professional nursing practice.

Bailliere's Nurses dictionary defines a profession as a 'calling, vocation requiring specialised knowledge, methods and skills, as well as preparation in an institution of higher learning in the scholarly, scientific and historical principles underlying such methods and skills'. The dictionary further states that members of a profession are committed to continuing study, to enlarging their body of knowledge, to placing service above personal gain and to providing practical services, vital to human society and social welfare. It adds that a profession functions autonomously and is committed to higher standards of achievement and conduct (Baillieres').
You may be familiar with reputable professions such as engineering, law and medicine. All these professions have similar characteristics.

The nursing profession is distinguished by its philosophy of care, full time commitment to human well being, particular blend of knowledge and skills, valuable service to the community and the regulation of its practice.

What are the characteristics of a profession?
Make a note of some of your thoughts on a notepad and then click the link below to check your answer.

Did you think of the following?
A profession:
- *Has a theoretical body of knowledge and skills*
- *Encourages full time commitment to service, establishing standards of practice which are maintained by all members*
- *Exercises self-discipline*
- *Protects the public*
- *Is responsible for the advancement of the profession*

- *Develops its ethics to accommodate new demands and circumstances of the profession*

Professional Nurse

A professional nurse is an individual who has successfully undergone a prescribed nursing training programme, has passed a licensing examination and is registered by the national nursing regulatory body, in our context the Nursing Council of Kenya (NCK).

Characteristics of a Professional Nurse

A professional nurse:

- Displays high standards of performance and integrity in nursing practice
- Seeks constantly to improve her/his technical and interpersonal skills through continuing education and research
- Uses sound judgement and discretion in dealing with patients/clients and their relatives
- Provides holistic care to patients, family and community
- Deals competently with crisis situations
- Puts what is good for professional services to patients ahead of self-interest
- Coordinates and evaluates nursing services in cooperation with members of other health services (collaboration and networking)
- Is not overly concerned with the materialistic aspects of nursing
- Expects to find satisfaction and spiritual values in their work
- Feels responsible for the status of nursing and tries to advance and never to retard it
- Has inner resources to which she/he can turn to, for renewal of faith and courage when weary and discouraged
- Is proud of her/his profession and considers it to be at par with other professions like medicine or law or any other vocation practised for compensation, which at the same time contributes in its own unique way to the welfare of humanity

Personal Attributes

Personal attributes that help a nurse to display professionalism include:

- Good personal appearance with a voice that does not scare patients
- A ready smile, gentle hand, orderly in thought and action
- Emotionally mature, compassionate, dignified, tolerant, friendly, sympathetic and interested in other people

All characteristics are advantageous to the creation of a friendly and conducive environment for the patient's recovery. As a nurse, you must at all times have serenity of mind and self-control to be able to handle a variety of situations and patients.

Remember: A professional nurse at all times displays integrity, commitment and ethical behaviour. They display intelligence, good judgement and handle emergencies well.

A professional nurse is also responsible in professional and social situations.

Personal Grooming

Personal grooming is very important to nurses. Remember, every patient has a mental picture or image of how their nurse should be. The nurse's appearance provides security and hope to a patient.

A nurse's uniform should not be tight or very loose to hinder free movement during an emergency. It must be very clean to prevent cross infection and is to be well pressed. The dress or skirt should be below the knee cap to give allowance for bending. The material should not be 'see-through'.

Female nurses should avoid bright inner wear especially if their uniform is white. The uniform should be well maintained, that is, fallen buttons or torn zippers should be replaced, rips and tears mended and stains removed.

As you are aware, hair is a source of micro-organisms. Female nurses should tie back long hair neatly. Male nurses should have their beards and moustaches neatly shaven. The nurse's cap should be worn neatly and securely.

Shoes should be low-heeled and soft to avoid making excessive noise, which may disturb patients. The nurse should maintain daily care of shoes, socks or stockings in order to prevent cross infection. Nails should be trimmed and coloured nail polish avoided. The freedom to wear jewellery, watches, pens, scissors or handkerchiefs will depend on individual hospital regulations

Remember: The patients have a right to identify the nurse who is providing their care. It is advisable therefore to wear an identification tag at all times showing full names and qualifications.

Nursing Ethics

You are being prepared to practise professional nursing which involves adherence to the code of ethics.

Collin's dictionary defines ethics as:

- Moral principles
- Code of behaviour
- Study of morals

We can further define ethics as morals and philosophical principles that define actions as being either right or wrong. The ethical concepts touch on your practice as you interact with other people, the society, co-workers and the profession.

Remember: The patient is to be at the centre of your practice. Patients have the right to contribute to their own care and as you provide care, always remember to respect the beliefs, values and customs of the patient.

As a professional nurse you are expected to uphold and abide by the code of ethics.

Guidelines

- You should always hold personal information in confidence and use your discretion in sharing this information.
- You should always remember that it is your responsibility to keep abreast with current trends in the nursing profession so as to maintain competence in nursing practice through continuing education.
- Always maintain the highest standards of nursing care possible within the given reality of a specific situation.
- When accepting any responsibilities delegated to you, ensure that you are competent to carry out the assignment.
- Maintain professional standards of personal conduct that reflect credit upon the profession at all times.
- Share with other citizens the responsibility for initiating and supporting action to meet the health and social needs of the public during your practice.
- Sustain a co-operating relationship with co-workers in nursing and other fields.
- Take appropriate action to safeguard the individual when a co-worker or any other person endangers their care.
- You have a major role in determining and implementing desirable standards of nursing practice and nursing education.
- Be active in developing a core of professional knowledge.
- Acting through a professional organisation, you are to participate in establishing and maintaining equitable social and economic working conditions in nursing. This, therefore, means that you are to be a member of your professional association.

Have you heard of the International Council of Nurses Code of Ethics?

The International Council of Nurses (ICN) Code of Ethics was adopted in Mexico City in 1973. It states that the fundamental responsibility of the nurse is to promote health, prevent illness, restore health and alleviate suffering. Moreover, the need for nursing is universal. Inherent in nursing is respect for life, dignity and the rights of man.

Nurses are to provide care to individuals regardless of nationality, race, creed, colour, age, sex, politics or social status. As a nurse you will be providing health care to the individual, family and the community. You will be operating in teams, such as a nursing team which is within a health team.

CODE OF ETHICS (INTERNATIONAL COUNCIL OF NURSES)

Ethical Concepts Applied to Nursing

The fundamental responsibility of the nurse is fourfold; to promote health, to prevent illness, to restore health and to alleviate suffering.

The need for nursing is universal. Inherent in nursing is respect for life, dignity and rights of man. It is unrestricted by considerations of nationality, race, creed, colour, age, sex, politics or social status.

Nurses render health services to the individual, the family and the community and coordinate their services with those of related groups.

Nurses and people

The nurse's primary responsibility is to those people who require nursing care.

The nurse, in providing care, promotes an environment in which the values, customs and spiritual beliefs of the individual are respected.

The nurse holds in confidence personal information and uses judgement in sharing this information.

Nurses and practice

The nurse carries personal responsibility for nurse practice and for maintaining competence by continual learning.

The nurse maintains the highest standards of nursing care possible within the reality of a specific situation.

The nurse uses judgement in relation to individual competence when accepting and delegating responsibilities.

The nurse when acting in professional capacity should at all times maintain standards of personal conduct which reflect credit upon the profession.

Nurse and Co-workers

The nurse sustains a cooperative relationship with co-workers in nursing and other fields.
The nurse takes appropriate action to safeguard the individual when their care is endangered by a co-worker or any other person.

Nurses and the profession

The nurse plays the major role in determining and implementing desirable standards of nursing practice and nursing education.
The nurse is active in developing a core of professional knowledge.
The nurse, acting through the professional organisation, participates in establishing and maintaining equitable social and economic working conditions in nursing.

Code of Ethics as applied to Nursing

Nurses minister to the sick, assume responsibility for creating a physical, social and spiritual environment which will be conducive to recovery and stress the prevention of illness and promotion of health by teaching and example. They render health service to the individual, the family and the community and co-ordinate their services with members of other health professions.

Service to mankind is the primary function of nurses and the reason for the existence of the nursing profession. The need for a nursing service is universal. Professional nursing service is based on human need and is therefore unrestricted by considerations of nationality, race, creed, colour, politics or social status.
Inherent in the code is the fundamental concept that the nurse believes in the essential freedoms of mankind and in the preservation of human life. It is important that all nurses be aware of the Red Cross Principles and of their rights and obligations.
The profession recognises that an international code cannot cover in detail all the activities and relationships of nurses, some of which are conditioned by personal philosophies and beliefs.

1. The fundamental responsibility of the nurse is threefold; to conserve life, to alleviate suffering and to promote health.
2. The nurse shall maintain at all times the highest standards of nursing care and of professional conduct.
3. The nurse must not only be well prepared to practice but shall maintain knowledge and skill at a consistently high level.
4. The religious beliefs of a patient shall be respected.
5. Nurses hold in confidence all personal information entrusted to them.
6. Nurses recognise not only the responsibilities but the limitations of their professional functions, do not recommend or give medical treatment without medical orders except in emergencies, and report such action to a physician as soon as possible.
7. The nurse is under an obligation to carry out the physician's orders intelligently and loyally and to refuse to participate in unethical procedures.
8. The nurse sustains confidence in the physician and other members of the health team; incompetence or unethical conduct of associates should be exposed but only to the proper authority.
9. The nurse is entitled to just remuneration and accepts only such compensation as the contract, actual or implied, provides.
10. Nurses do not permit their names to be used in connection with the advertisement of products or with any other forms of self advertisement.
11. The nurse co-operates with and maintains harmonious relationships with members of other professions and with nursing colleagues.
12. The nurse adheres to standards of personal ethics which reflect credit upon the profession.
13. In personal conduct, nurses should not knowingly disregard the accepted pattern of behaviour of the community in which they live and work.
14. The nurse participates and shares responsibilities with other citizens and other health professions in promoting efforts to meet the health needs of the public – local, state, national and international.

The professional nurse also has to be knowledgeable of what they are practising at the health facility and should acquire the technical skills that will assist in and improve the work performance.
You may be asking yourself, "How does the Code of Nurses affect me during my daily practice?"

The 'Code' incorporates general statements of principle applicable to all circumstances, upon infringement of which a nurse practitioner is liable to disciplinary action or penalty or both. The Code of Ethics embodies the standards by which each nurse practitioner forms a conscience, a capacity for moral reasoning and governs the practice of nursing.

You should also get yourself a copy of the Procedure Manual from the Nursing Council of Kenya, (at a fee) if you do not have one. It will assist you both in your daily work and in the study of this course.

Professional Organisations

Now we are going to discuss some professional nursing organisations which include:

- National Nurses Association of Kenya (NNAK)
- East Central Southern Africa College of Nursing (ECSACON)
- International Council of Nurses (ICN)

Nurses in Kenya, just like any other countries in the world, are members of professional organisations at national, regional and global levels.
In Kenya the professional nursing organisation that has both regional and international recognition is the National Nurses Association of Kenya (NNAK).

The National Nurses Association of Kenya
The National Nurses Association of Kenya (NNAK) is a professional association for nurses, which is registered by the Registrar of Societies as a welfare association.

Membership
Membership of NNAK is open to all nurses who are either registered or enrolled by the Nursing Council of Kenya. Student nurses can join as associate members.

There are two types of membership:

- Life membership
- Ordinary membership

The Association has branches in all provinces. Members in each branch elect a Branch Chairman, Secretary and Treasurer. In turn, these elect national office bearers every two years who comprisethe National Chairman, Vice Chairman, Secretary, Treasurer, Organising Secretary and their respective Vices.

The Association has an Executive Committee which comprises of national office bearers and branch chairmen. Various nursing disciplines are represented as chapters, for example, midwives, operating theatre nurses, mental health and psychiatric nurses, educationists, intensive care nurses and private practice nurses. The headquarters of NNAK is in Nairobi.

NNAK is a member of a regional body known as the East Central Southern Africa College of Nursing (ECSACON) whose offices are situated in Arusha, Tanzania, the Association of Professional Societies of East Africa (APSEA) and the International Council of Nurses (ICN) situated in Geneva.
Additionally, NNAK collaborates with other professional bodies such as the Royal College of Nurses, Royal College of Midwives, the Canadian Nurses Association, American Nurses Association, Kenya Medical Association (KMA), the Association of Kenya Obstetricians/Gynaecologists (KOGS) and other health organisations.

Functions of the National Nurses Association of Kenya
The functions of the National Nurses Association of Kenya are:

- Promoting nursing and maintaining the honour, interest and practice of all aspects of the profession as a whole
- Promoting and maintaining high standards of nursing education
- Stimulating and encouraging nursing research
- Promoting co-operation between this body and other national and international professional bodies
- Promoting good understanding between the Association, central and local governments and all communities
- Acting as a local representative body of the nursing profession
- Supporting a high standard of nursing ethics, conduct and practice which is organised and functions unrestricted by consideration of nationality, race, creed, politics, sex or social status
- Assisting whenever possible members who by reason of adversity or ill health are in need of help
- Arranging and holding periodic meetings of the Association for professional, educational and social purposes
- Circulating such information as may be thought necessary by means of a journal, bulletin or any other method

- Accepting or refusing any gift endowed or bequest made to or acquired by the Association or for the purposes of any specific object connected with the science, art of nursing and executing any charitable or other trusts which may be considered expedient or desirable in the interests of the Association
- Maintaining an up to date list of all members in Section 4 a (i), (ii) and (iv) of the NNAK constitution
- Performing all such other lawful things as may from time to time be conducive to the attainment of furtherance of the above functions. (NNAK Constitution, section 3 1987)

Chapters

The chapters of NNAK include:

- Midwives
- Education
- Theatre Nurses
- Mental Health and Psychiatric Nurses
- General Nurses
- Private Nurse Practitioners
- Paediatric Nurses

National Executive Committee

This is a very large committee comprising the national executives who run the office at the headquarters (the National Chairman, two Vice Chairmen, an Honorary Secretary and the Vice Treasurer, Organising Secretary and the Editor).

Other members are the Branch Chairmen, Chairmen of Chapters, Division of Nursing (MOH) and the Nursing Council of Kenya. Other committees in the NNAK are the Education, Editorial and Finance Committees.

The Division of Nursing, on behalf of the Ministry of Health, deals with employment issues for nurses and sponsorship for higher education. Furthermore, it provides working facilities for nurses, technical know how and supervision. On the other hand, the Nursing Council of Kenya deals with training of nurses, maintenance of standards of nursing education and nursing practice and, additionally, the regulation of nurses' conduct. Finally, NNAK serves as an advocate for the nurses and the community.

The NNAK's activities, as you will note, are geared towards promoting excellence in nursing. There are national activities such as the Florence Nightingale week, Annual General Meetings, branch activities and chapter activities which aim to improve the quality of nursing and reproductive health care.

Finally, there are those activities channelled by ICN/ECSACON through the Ministry of Health. Apart from the discussed activities, there are several meetings conducted at the NNAK, such as quarterly Executive Committee meetings and monthly meetings for the chapters.

The following are just some brief highlights of what you will acquire from the NNAK:

- Updates in knowledge, attitude and skills in nursing and midwifery practice to improve your performance for quality care to patients/clients
- Interactions and the opportunity to share experiences with other nurses
- The formation of links with other organisations
- Advocacy on welfare issues such as better education as well as better remuneration and improved conditions of service

So far we have been discussing your professional body, which is a member of a regional body known as ECSACON. Let us now highlight a few points about this body.

The East Central Southern Africa College of Nursing (ECSACON)

ECSACON is a professional agency of the Commonwealth Regional Health Community (CRHC). Its main objective is to promote and reinforce professional excellence through the development of programmes. It is expected that this will, in turn, strengthen nursing and midwifery practice, education, research, leadership and management to improve service delivery and uplift the quality of health of the communities in the East Central Southern Africa (ECSA) region.

ECSACON is a corporate body of nurses and midwives of member states comprising Botswana, Lesotho, Kenya, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe and any other states that will accede to membership of CRHC for the ECSA region.

The membership of the college consists of individual nurses/midwifes and Professional organisations such as:

- National Nurse/Midwifery Association (NNAS/NMAS)
- National Nursing Councils (NNCS)

An individual can become a member once registered by the Nurses Regulatory Body as a nurse/midwife in any of the member states.

Benefits of Membership to ECSACON

The first benefit is knowledge. This knowledge is obtained through the many activities ECSACON conducts, such as quadrennial conferences where nurses from member countries meet and share research finding on topics of national interests in health. They exchange information on various topical issues on nursing, midwifery and health, mapping the way forward for excellence in nursing/midwifery, education and practice.
Interacting with nurses from the region is a benefit on its own. Apart from this, ECSACON has conducted many projects, for example, on research, leadership and management, advocacy and so on.
Members are also provided with reading materials through the CNR or Nursing Council.

Members also have rights and privileges .
ECSACON - Membership Rights and Privileges

The membership rights and privileges of ECSACON are:

- Voting and speaking at the ECSACON meetings
- Nominating candidates for ECSACON elections and Standing Committees
- Participating in ECSACON conferences, workshops, seminars and other professional activities as appropriately promoted by ECSACON
- Nominating candidates for ECSACON fellowships and awards
- Receiving professional guidance and assistance from ECSACON
- Receiving from or through ECSACON documents and periodic information about activities and news about nursing worldwide
- Having their professional articles of regional and international interest published in ECSACON newsletter/journal/ magazines
- Enjoying benefits established by ECSACON

International Council of Nurses (ICN)

The International Council of Nurses is a federation of nurses' associations (NNAS) in 122 countries. It was founded in 1899. ICN was the first health professionals' organisations to be formed and remains the largest among international organisations relating to the provision of health care. It is operated by nurses for nurses.

The Secretariat of the ICN is based in Geneva and consists of a president, a chief executive and members. ICN works to ensure quality nursing and sound health policies for all. It strives for the advancement of nursing knowledge and the presence of a worldwide respected nursing profession and a competent, satisfied nursing workforce.
The ICN has goals and core values that guide its activities..

Goals
The **goals** of ICN are to influence health and nursing globally and strengthen national nurses associations.

Values
The **values** of ICN are to encourage visionary leadership, inclusiveness, flexibility and partnership among all member states and the achievement of excellence in nursing/midwifery education and practice.

Vision
The ICN states that its **vision** is to unite all nurses within the ICN to speak with one voice as advocates of all that ICN serves; to acknowledge that a human being has the right to preventive and curative care; to spearhead the health care progress and shape health policy around the world through enhancing nurses' expertise, strength, their numbers, alignment of their efforts and collaboration with the public and other health professionals. The ICN mission statement is derived from this vision.

Mission
The ICN's **mission** is to lead societies to better health and to promote healthy lifestyles, workplaces and communities; to support strategies which alleviate poverty, pollution and other causes of illness, while incorporating science and advanced technology in the provision of compassionate and ethical caring; to shape nursing education in accordance with values, policies, standards and conditions that free nurses to practise to the full extent of their education and abilities within multi-disciplinary health teams.

Philosophy

The ICN **philosophy** entails commitment to caring, advocating on behalf of patients, and helping people help themselves. ICN ensures that the nursing profession is highly valued, appropriately utilised, recognised, rewarded and represented throughout the healthcare system.

You have now gone through the ICN vision, mission and philosophy. You should have identified some crucial themes such as the role of the nurse as:

- Provider of nursing care and health services
- Policy maker
- Collaborator with the public and other health professionals

Health is a universal right of every human being regardless of the social status. You have to encompass teamwork within multi-disciplinary teams.

Finally, you have to keep abreast by incorporating science and technology into the health delivery services in nursing practice. You will now study trends in nursing.

Historical Background

Historically the nursing practice in Kenya, just like anywhere else in the world, was performed on a tradition that sick people received care from female family members in their own homes. Therefore, it can be said that the family is the oldest and the most used health care delivery service in the world. Currently this approach to care provision is known as 'family nursing'.

Florence Nightingale (1869) stated: *"…it has been said and written scores of times that every woman makes a good nurse, but I believe, on the contrary, that the elements of nursing are all but unknown...".* She further stated: *"It is well known that nursing exists to serve the society."*

As social conditions and health care needs change, the nurses' roles and nursing practices continue to alter in response to these changes. Florence Nightingale is the founder of professional nursing. She initiated formal nursing training using a curriculum replacing apprenticeship.

Western medicine in Kenya was introduced with the arrival of missionaries in 1895. Doctors and nurses were brought from Britain and Europe. They trained dressers and assistants on the job. Later on they began to conduct basic training in missionary hospitals.

In 1949, a nurses, midwives and health visitors council was formed by an ordinance. In 1950, formal nursing training at enrolled and registered levels was started. The practice of nursing followed a medical model. The patient was nursed as fragments of diseased body parts using task allocation.

Task Allocation/Job Assignment

This method of dividing duties was based on the industrial concept of division of labour. The patient was fragmented into a series of jobs assigned to different nurses of different grades. Thus a hierarchy of tasks and staff was created for patients. This resulted in a fragmentation and lack of continuity of care, with patients subordinated to the system rather than being central to it.

You may recall a practice in the wards whereby the most junior nurse was assigned sluice rooms, others observations, wound dressings, drug administration, specimen collection, theatre cases, doctors round and so on.

In the 1950s, nurse leaders in North America began to recognise that the development of nursing knowledge and practice must run simultaneously with research. Florence Nightingale in 1859 wrote that nursing was more than the administration of medicine and application of poultices. This shows that Florence Nightingale had recognised that nursing needed a combination of both intellectual and practical skills.

In the 1960s to 1980s, many developments and changes in nursing took place stemming from the professional desire for innovation and change in practice. The nurses' leaders felt that the patient was alienated from their own care, and that there was a need for improvements in nursing. Nurse leaders began trying to demonstrate that nursing was a profession with its own unique body of knowledge.

Virginia Henderson (1966) delineates the unique functions of the nurse as follows:

"…to assist the individual, sick or well, in the performance of those activities contributing to health or its recovery (or to peaceful death) that he would perform unaided if he had the necessary strength, will, knowledge. And to do this in such a way as to help him gain independence as rapidlyas possible."

In the search for a unique body of knowledge, nurse theorists were using scientific methods to describe, explain and predict nursing practice and its outcomes. You must be wondering how these developments were reflected on nursing in Kenya?

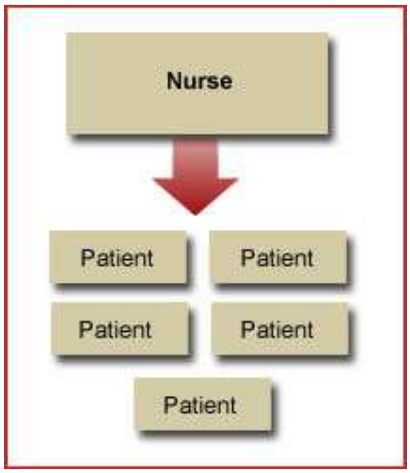
In the 1960s and 1970s task allocation was exclusively practised in the context of hospital nursing. Task assignment is still practised when there is shortage of staff. During the said period, however, lots of changes took place in the health delivery system in Kenya.

Politically, independence was attained in 1963. The KANU manifesto declared its intention to fight what it saw as the three greatest enemies of development: poverty, illiteracy and disease. Within this context, health care had to be made available to the community. This led to the introduction of community health nursing training (KECHN) in 1966 at MTC Kisumu.
Midwifery training had already been introduced in the 1950's at enrolled level, and at registered level in 1965. At the same time, expatriate nurses who were administrators of nursing services, and nursing educators were leaving the country at independence. In anticipation of gaps in training and skills, a Diploma in Advanced Nursing was started in 1968 at the University of Nairobi to prepare Nurse Educators and administrators.
The shift to community health nursing was to provide preventive and promotive health care service delivery.
Florence Nightingale (1867), states in her private notes, *"my vision …is that the ultimate destination of all nursing is the care of the sick in their own homes …I look to the abolition of all hospitals and workhouse infirmaries. But it is no use to talk about the year 2000."*
Do you think this was a prediction of the global Primary Health Care Concept of 'Health for all by the year 2000'?

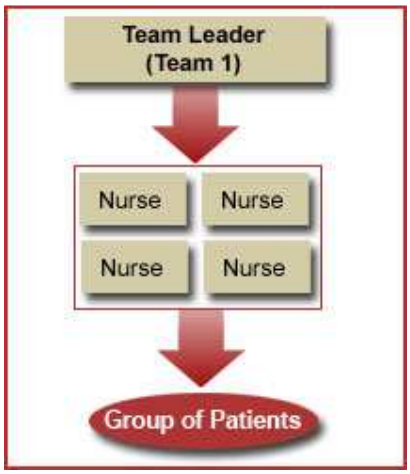
What is Health?
Many people think that health is the absence of illness but the World Health Organisation (WHO) in 1946 defined health as a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity. The health delivery services in the 1970's laid great emphasis on community-based health care in the implementation of Primary Health care concept (WHO, 1978).
Nurse leaders worldwide became dissatisfied with the task allocation method of organising patient care as it alienated the patient from the nursing care.
Nurses felt that there should be accountability of the care being given with a view to improving the quality of care.
Therefore, in the 1980's nurses started moving away from 'tasks' to individualised nursing care. This move away from a pre-occupation with tasks to a focus on patients led to the introduction of a nursing process that provided a systematic method for individualised nursing.
The progression of these systems started with patient allocation to team nursing and then primary nursing

The Nursing Process
The nursing process was introduced in the 1970s in North America and 1980s in Britain. In 1977, the United Kingdom Central Council (UKCC) recognised the nursing process and decreed that the care of patients should be studied and practised in the sequence of the nursing process. (Dickinson,1982).
The British nurses viewed this type of introduction with suspicion, since it was done in haste, adopting a top-down approach and coercive change strategy that led to misunderstandings and difficulties. The same trend was visible in Kenya in the late 1970s, bringing confusion to the nurses in the clinical practices who, up to now, assumed that the nursing process is an assessment tool for nursing students and not a guideline for patient care
The argument most nurses present is that good nurses have always used the nursing process even though they did not analyse what they were doing in terms of a process or steps and did not document the information in an orderly and comprehensive manner.
Thus, the nursing process is wholly feasible in the context of practice, which is organised on the basis of patient allocation, team nursing or primary nursing. Assessing, planning, implementing and evaluating are embedded in everyday nursing practice.

Patient Centred Systems of Organising Nursing Care
Patient Allocation
Each nurse is allocated a small number of patients (up to six) to look after during a whole work shift.



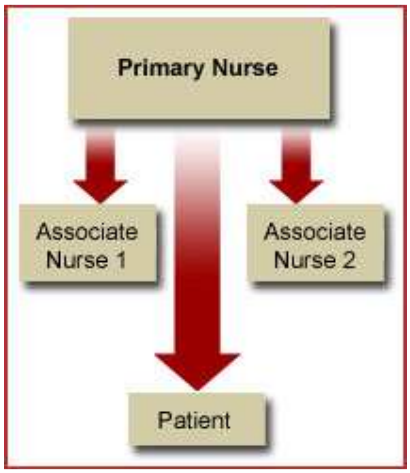
Team Nursing
As you probably know, the nursing staff in a ward is divided into teams, each team taking responsibility for the total care of a subgroup of the patients.



Primary Nursing

This is a patient-centred nursing system. One nurse
(the primary nurse) assumes individual responsibility for a particular patient. Theoretically this responsibility extends over the entire period the patient requires nursing although in practice there has to be delegation to other nurses (the associate nurses) during periods of absence from the ward. The potential benefits of primary nursing for patients are continuity of care and cover.

The concept of primary nursing responds to the directive
of putting patients first and it embodies the ideals of individualised nursing. Therefore, if nurses are to accomplish the goals of nursing as defined by the nursing leader, nursing must have a body of theoretical knowledge on which to base its practice. This will be achieved through conducting nursing researches at the clinical sites.



Nursing Models

A nursing model as defined by Riehl & Roy (1980) is a systematically constructed, scientifically based and logically related set of concepts of nursing practice together with the theoretical bases of these concepts and the values required for their use by the practitioner. Models are developed carefully and methodically, usually as a result of prolonged research and may involve many months or years of observing nursing practice and thinking about why nursing is carried out.

Fawcett (1984) quoted Reilly (1975) who said:

"We all have a private image (concept) of nursing practice. In turn this private image influences our interpretations of data, our decisions and our actions. But can a discipline continue to develop when its members hold so many differing private images? The proponents of conceptual models of practice are seeking to make us aware of private images so that we can begin to identify commodities in our perception of the nature of practice…"

Conceptual models for nursing are, therefore, the formal presentation of private images of nursing. They consist of many concepts, which identify the essential components of the disciplines. They show relationships between the concepts and may introduce already established theories from other disciplines, which are applicable for nursing.

The Values of Nursing Models

A model can be useful for nursing practice, education, management and research. In nursing practice, a model provides a framework for what a nurse does and how they do it.

In nursing education, a model provides a framework, which organises the curriculum, the knowledge, skills and approaches, which are necessary for learning and practice.

In management, a model can outline the common goals to be achieved. In research, a model provides guidance about what should be studied in order to extend nursing knowledge and thus improve knowledge.

Various models have already been developed. They include Orem's self-care model (Orem 1971), which model depicts nursing as assisting individuals to their optimal level of self-care.

Roy (1970) centred her model on the concept of adaptation. Rogers (1970) focused on the concept of environment and the nursing of a client (patient) interacting with the environment.

The various models have the following in common:

- Person
- Health
- Nursing activities/process
- Environment

Theories of Nursing

What is a Theory?

A theory is a generalised explanation of a phenomenon. Nursing theories have been developed from other disciplines such as psychology, sociology, education and biological sciences. You may wish to understand the importance of a theory. Theory underpins research. It also provides a way of explaining the meaning of research findings, or a language for the communication of nursing knowledge.

Nursing practice can, therefore, be explored and explained through the use of common concepts, for example, pain, grief, stress, quality of care.

Patients and practitioners have to share the findings of research for the knowledge base to grow and to be utilised. From these discussion concepts, models and nursing theories are interlinked and they form the basis of professional nursing practice.

The Nursing Council of Kenya

The Nursing Council of Kenya was established by the Nurses Act, Chapter 257 of the laws of Kenya. The Council is a corporate body having perpetual succession and a common seal with power to sue and be sued and to purchase, hold, manage and dispose of land and other property and to enter into such contracts, as it may consider necessary or expedient.

On the other hand, the Nurses Act, Chapter 257 of the laws of Kenya was enacted as an Act of Parliament to make provision for the training, registration, enrolment and licensing of nurses, to regulate their conduct and to ensure their maximum participation in the health care of the community and for connected purposes (Nurses Act 1985).

The membership of the council consists of:

Two ex-officials...	...the Director of Medical Services and the Chief Nursing officer.
One person...	...responsible for education.
Two persons...	...representing religious organisations providing health services in Kenya.
Two persons...	...representing nursing associations (one from NNAK and one from KEPNA (Kenya Progressive Nurses Association).
Four persons...	...nominated by the outgoing council to represent: General Nursing, Midwifery and Community Health Nursing.
Eleven elected members...	...who may be involved in clinical practice, nursing education and administration. They must be registered nurses as follows: Three registered nurses, three midwives, three community health nurses and two psychiatric nurses.

The functions of the Nursing Council are carried out through committees, that is, the Full Council and six standing committees

Functions of the Nursing Council

The functions of the Nursing Council are:

- Establishing and improving of all branches of the nursing profession in all their aspects and to safeguard the interest of all nurses
- Establishing and improving the standards of professional nursing and of health care within the community
- Prescribing and regulating syllabuses of instruction and courses of training for persons seeking registration or enrolment under the Act
- Recommending to the Minister institutions to be approved for the training of persons seeking registration or enrolment under the Act
- Prescribing and conducting examinations for persons seeking registration or enrolment under the Act.
- Prescribing badges, insignia or uniforms to be worn by persons registered, licensed or enrolled under the Act
- Regarding the conduct of person registered, licensed or enrolled under the act, and to take such disciplinary measures as may be necessary to

maintain a proper standard of conduct among such persons

- Regarding the standards for nursing care, qualified staff, facilities, conditions and environment of health institutions
- Directing and supervising the compilation and maintenance of registers, rolls and records required to be kept under sections 12, 14 and 16
- Advising the Minister on matters concerning all aspects of nursing

The Full Council

This is composed of the 22 members of the council. The main functions of the full council is to make decisions and to ratify the decisions of the six standing committees. The council meets every three months.

The Standing Committees

The Standing Committees meet every three months except the Registration and Education Standing Committees which meet monthly. They meet to discuss issues under their mandate. You shall now look at the roles of the various committees.

.

The Education Standing Committee

The committee deals with all issues that relate to nursing education such as:

- Designing nursing programmes, syllabus and national curriculum according to the health needs of the community
- Scrutiny of institutional curriculum to see whether they meet the minimum standards for producing a safe practitioner
- Formulating training materials like education policies, guidelines and procedures and log books for recording clinical practice learning
- Monitoring students during training for example discontinuations, readmissions and discipline cases.
- Dealing with examinations. This includes setting examinations, packaging and dispatch of examinations to training institutions, administration of examinations and receipt of examination scripts in liaison with the training institutions. It also involves the marking of examination scripts, moderation of examination results and presenting the results to various committees and Full Council. The Council ratifies the examination results. Examination results are then released to the individual candidates, training institutions and provincial nursing officers.
- Approving training institutions and monitoring the institutions to ensure that standards of nursing education are maintained. Areas being monitored include:
  - Facilities in the school of nursing and clinical area
  - Approved teacher/student ratio of 1:10
  - Adequate clinical area staff
  - Adequate bed occupancy at a minimum of 60%
  - Facilitating continuing education for nurses
  - Guiding nurses and their supervisors on what the nurses must know to be able to offer updated quality care to patients and clients

The Standards and Ethics Committee

This committee deals with:

- Initiation and maintenance of standards of nursing education and nursing practice
- Coordinates council visits to health institutions for the purposes of monitoring the quality of nursing education or quality of care being offered to patients and clients respectively
- Coordinates research sub-committee meetings which facilitate research and surveys related to nursing practice and nursing education

Registration and Licensing Standing Committee

The Registration and Licensing Standing Committee meets every month. It deals with the registration, enrolment and licensing of nurses for nursing practice. This is applicable to those trained in Kenya and those trained outside Kenya.

Kenyan law states that nurses are not allowed to practise nursing prior to registration, enrolment or licensing by the Nursing Council. This Committee also licenses nurses for private practice and processes licensing for practice and retention of nurses in the registers, rolls and records.

Investigations Standing Committee

This committee investigates all cases of professional misconduct, negligence, malpractice and impropriety. This is to establish whether the alleged crime has been committed and whether the nurse has a case to answer or not. A recommendation is then made to the Full Council which in turn institutes disciplinary proceedings.

Finance Standing Committee

This committee deals with all financial issues of the Council in relation to income and expenditure.

Disciplinary Committee
This is a Standing Committee which deals with disciplinary cases recommended by the investigations standing committee. It is independent of the Full Council.
Members are drawn from experienced nurses practising general nursing, midwifery, community health nursing, mental health and psychiatric nursing, the legal advisor and a representative of the Chief Nursing Officer. The registrar is the secretary.

The Nursing Council Secretariat
All activities of the Nursing Council are coordinated by the Secretariat. The Nursing Council Secretariat conducts the day to day activities of the Council.
The Secretariat is composed of council officers and council staff.

The **council officers** who are the registrar, education officers, examination officers, registration officers and standards and ethics officers are currently employees of the Ministry of Health deployed to work at the council.
They coordinate various Standing Committees and Subcommittees as discussed earlier. As a practising nurse you may be familiar with the offences under the 257 Act.
The **council staff** includes the accountant, accounts assistant, secretaries, copy typists, records clerk, driver and supportive staff who are employees of the Council.

Nursing Council Elections
The Nursing Council of Kenya conducts elections of council members every three years. All registered nurses are eligible to vie for representation of various disciplines for example general nurses, midwives, community health nurses and mental health and psychiatric nurses.
The nurses may be practising either in clinical practice, nursing education or leadership and management. The procedures to be followed are at the back pages of the Nurses Act. For more information you can always contact the Registrars' office.

Legal Aspects of Nursing in Kenya
As a nurse you are liable to the national laws as well as professional ethics related to your practice. You have already studied the functions of the Nursing Council and the Disciplinary Committee.

Examples of Offences

NEGLIGENCE
You will be charged with this offence if you do not provide the expected care to a patient or client in the field you were trained in.

MISCONDUCT
Misconduct includes stealing drugs or hospital property, forgery or fraud, coming on duty while drunk, fighting while on duty or use of abusive language.

MALPRACTICE
Remember you are a trained nurse. If you provide substandard care to patients you will be charged of malpractice. In addition, if you also perform procedures that are out of your scope of practice you may be charged with malpractice.

IMPROPRIIETY
As a nurse the profession binds you to conduct yourself professionally while on duty or off duty.
If you fight in a bar or anywhere or conduct yourself unprofessionally you will have discredited or shamed the nursing profession and will, therefore, be liable to be charged with impropriety.

Other Laws Related to Nursing Practice
The following are some of the laws that are relevant to nursing practitioner

The Public Health Act (cap 242)
This Act is commonly referred to as the mother Act among the Acts of Health Professionals.
It describes the health delivery services in the country.

The Public Health Act (cap 242)
This Act is commonly referred to as the mother Act among the Acts of Health Professionals.
It describes the health delivery services in the country.

Pharmacy and Poisons Act (Cap 244)
You should be familiar with this law because of drug prescription and administration.

Medical Practitioners and Dentists Act Cap (253)
In your community health nursing practice or private nurse practice you will be expected to diagnose and treat minor ailments, this encroaches on this law.

Narcotic Drugs and Psychotropic Substances (Control) Act 1994
While dealing with the dangerous drugs, you will be required to be familiar with this law.
This also applies to dealing with drug misuse and abuse.

Mental Health Act Cap (248)
You have been exposed to mental health and psychiatric nursing.
You will interact with such patients in your practice as a general nurse, midwife and community health nurse.

Other Laws Related to Nursing Practice
Medical Laboratory Technicians and Technologists Act (1999)
You will be taking body specimens from patients and clients.
You should therefore be familiar with this law.

Clinical Medicine Act
This law is related to the medical Practitioners and Dentists Act because of diagnosing and treating minor ailments.

Food, Drugs and Chemicals Act
You will be dealing with the nutritional status of the patient. In addition, you are one of the food handlers in the hospital. Familiarise yourself with the law.

Children and Young Persons Act
In your practice you will be interacting with babies, children, adolescents and teenagers. This may be in wards, departments, clinics, maternity, school health and the community. Remember children have rights which you must recognise.
You may be the provider of the health services, advocate or advisor of other health professionals in your multidisciplinary teams. You may have heard of the African Charter on the Rights and Welfare of the Child which was adapted by the 26th ordinary session of the Assembly of Heads of State and Government of the OAU, Addis Ababa, Ethiopia - July 1990.

African Charter on the Rights and Welfare of the Child

- Any custom, tradition, cultural or religious practice that is inconsistent with the rights, duties and obligations should be discouraged.
- Enjoyment of rights and freedoms is recognised and guaranteed irrespective of race, ethnic group, colour, sex, language, relation, political or other opinion, national and social origin of the child's parents or legal guardians. This includes fortune, birth or status.
- Best interests of the child should be the primary consideration.
- The right to life is inherent and should be protected by law. Death sentence should not be pronounced for crimes committed by the child.
- Right from birth to a name. The child should be registered immediately after birth, and has a right to acquire a nationality.
- Freedom of expression.
- Freedom of association.
- Freedom of thought, conscience and religion.
- Protection of privacy.
- Right to education.
- Right to rest and leisure, to engage in play and recreation and cultural activities appropriate to the age of the child and to participate freely in cultural life and the arts.
- A mentally or physically disabled child has the right to special measures of protection in keeping with his physical and moral needs under conditions which ensure his dignity, promote his self reliance and active participation in the community.
- Right to enjoy the best attainable state of physical, mental and spiritual health.
- Protection from all forms of economic exploitation and from performing any work that is likely to be hazardous or to interfere with the child's physical, mental, spiritual, moral or social development.
- Protection from all forms of torture, inhuman or degrading treatment, especially physical or mental injury or abuse, neglect or maltreatment including sexual abuse while in the care of a parent, legal guardian, or school authority or any other person who has the care of the child.

As a nurse you are expected to:

- Provide necessary support for the child and for those who care for the child.
- Identify children suffering from abuse and torture.
- Report or refer for investigation, treatment and follow up of cases of child abuse and neglect.

Get yourself a copy of the Children and Young Persons Act from the Government printers.

Workman's Compensation Act
You should familiarise yourself with this law. It outlines what you should do in cases of accidents during practice, with specific focus on how to go about applying for compensation of the damages caused as a result of the accident. This will assist you to advise others

Bill of Rights
In the process of the provision of health care, both the patients and the nurse have a Bill of Rights. You will study them separately.

The Patient's Bill of Rights
Earlier in the unit we discussed that health care is a right to every individual in this country. You should always remember that as you provide care to the patient, they have a right to:

- Considerate and respectful care.
- Obtain complete information concerning their treatment, progress and prognosis of the disease/condition. In certain situations the patients may not be in a reasonable condition to understand or it may be medically inadvisable to give particular information. Therefore, an appropriate person should be given the information on their behalf.
- Know by name the person caring for them.
- Receive information necessary for them to give informed consent prior to the commencement of any procedure and/or treatment except for emergencies. The information given should include specific procedures and/or treatment, the medical risks involved, probable duration of incapacitation, where alternative significant medical care or treatment exist, or when the patient requests for information concerning medical alternatives, they have the right to such information. The patients also have the right to know the name of the person providing the treatment.
- Refuse treatment to the extent permitted by law but must be informed of the medical consequences of their action.
- Privacy concerning their care. Those persons not directly involved in the care must get permission from the patient in order to be present.
- Confidentiality with regard to all communication and records pertaining to their care.
- Expect that a hospital within its capacity can make reasonable response to the patient's request for service. The hospital must provide evaluation service and/or referral as determined by the urgency of condition. When medically permissible, patients may be transferred to another health facility only after they have received adequate information and explanation concerning the need for and alternatives to such a transfer. The receiving health institution must first have accepted the transfer for the patients.
- Obtain information as to any relationship of their hospital to other healthcare facilities and education institution in so far as their care is concerned.
- Obtain information regarding the existence of any professional relationship among individuals by name who are treating them.
- Be advised if the hospital proposes to engage in or perform human experimentation affecting their care or treatment. Patients have the right to refuse to participate in such research.
- Expect reasonable continuity of care and have the right to know in advance appointment times and doctors availability.
- Question and receive an explanation of their bill regardless of source of payment (Note - some medical practitioners may unnecessarily inflate the bill if the patient is insured).
- Know what hospital rules and regulations apply to his/her conduct as a patient.

Remember that all these must be followed with an overriding concern for the patient and above all the recognition of his/her dignity as a human being. Success in achieving this recognition assures success in the defence of the rights of the patient.

Nurses Bill of Rights
You as a nurse have many rights. You are entitled to human rights, and the rights of a worker.
As a worker you have the right to a safe environment, adequate working tools and supplies, right to risk allowance, right to professional autonomy and the right to opportunities for further education, promotion and career development.

Code of Regulations
As an employee you must acquaint yourself with the code of regulations of the organisation you have joined. If you are employed by the government of Kenya, then it is worthy to familiarise yourself with the government code of regulations which contains:

- Organisation of government and procedures or conduct of government business
- The Public Service Commission

- Correspondence; Publication and Printing
- Terms and conditions of employment
- Annual staff appraisal reports
- Rules of conduct
- Salaries, increments and seniority
- Advances, allowances, transport, housing, medical privileges, leave, examinations and courses of training etc

You are now aware that the Nursing Council of Kenya is responsible for the provision of quality care to patients and clients. This is why it is a requirement by the Council that all nurses in the country update their knowledge and skills through continuing education and professional development.
You are now able to differentiate between the National Nurses Association of Kenya and the Nursing Council of Kenya

Disciplines of Nursing in Kenya

You have studied the legal aspects of nursing and the Nursing Council of Kenya. You will now look at professional nursing which will start with the disciplines of nursing in Kenya.
The disciplines of nursing include:

- General Nursing
- Midwifery
- Community Health Nursing
- Mental Health and Psychiatric Nursing
- Nurse Anaesthetist
- Ophthalmic Nursing
- Paediatric Nursing

Professional Nursing Practice

You may have come across many people who think and consider nursing to be a series of practical tasks carried out by nurses and who believe that anybody can become a nurse. This interpretation does not take into account the thinking processes involved in the complex activities of assessing, planning, implementation and evaluation of the care given, nor does it acknowledge the knowledge and attitudes which must be acquired for implementing individualised nursing in various circumstances and for patients/clients from different age groups and backgrounds.
Despite Nightingale's early recognition of the need for a combination of intellectual and practical skills, nursing has concentrated for a very long time on the practical level rather than developing simultaneously a theoretical perspective on which to base its practice.

Clinical Practice

A professional nurse in clinical practice provides clinical nursing in general nursing, midwifery and community health nursing practice. You are familiar with various definitions of nursing.
For the purposes of this section, the operational definition is:
Nursing is an art and science which aims at professional excellence in the provision of holistic care that is compassionate, culturally and socially sensitive to patients and clients.
Clinical nursing practice has three major roles: Provider, Advocate and Researcher.

Provider Role in Clinical Practice

The provider role entails all those actions you will accomplish when meeting the nursing and healthcare needs of individuals, families and significant others using the nursing process. You are also expected to collaborate with other members of the nursing team and multidisciplinary teams in your practice. As you are executing the provider role you will also be playing the leadership role, which at various levels involves behavioural components such as deciding, relating, influencing and facilitating.
Each of these components is directed toward change, using the process of effective communication. As a leader, you will be expected to utilise interpersonal relations to effect change in the behaviour of those you relate with. You will be in leadership positions in a variety of circumstances such as assisting an individual patient or family to make change in their health related behaviours. It also involves assisting groups or communities to alter their health practices, or groups of nurses or other health professionals to effect the actions of patients or communities in achieving desirable health behaviours.
Another role in clinical practice is advocacy...

Advocacy Role in Clinical Practice

In clinical practice you are expected to play the role of a patients' advocate. This role involves: anticipating and meeting the requirements of a patient who is unable to meet their own needs. You are to be aware of the patients' needs and to communicate them to other health professionals involved in the care.
You will be expected to coordinate the activities of all persons involved in the provision of health care. As a provider of care and a patient's advocate you should aim at providing quality care to your patients and clients. This can be enhanced through getting involved in nursing research

Research Role in Clinical Practice

There are various definitions of research. The core issues are emphasised in relation to generating knowledge in a systematic and scientific way. Developing nursing knowledge was initially more recognised by nurse educators than clinical practice nurses.

Meley (1991) in her account of the development of theoretical nursing describes how North American nurses in the 1950's recognised that without ongoing research, nursing would remain stagnant, and nursing research would not develop with the advantage of theoretical understanding. Research activities and theory development began to grow in the 1950's initially in North America but gradually spread to other parts of the world.

You should note that you have valuable contributions to make towards operational research at your clinical site. It is, therefore, your responsibility to make those contributions.

Characteristics of a Professional Nurse

A professional nurse:

- Displays high standards of performance and integrity in nursing practice
- Seeks constantly to improve her/his technical and interpersonal skills through continuing education and research
- Uses sound judgement and discretion in dealing with patients/clients and their relatives
- Provides holistic care to patients, family and community
- Deals competently with crisis situations
- Puts what is good for professional services to patients ahead of self-interest
- Coordinates and evaluates nursing services in cooperation with members of other health services (collaboration and networking)
- Is not overly concerned with the materialistic aspects of nursing
- Expects to find satisfaction and spiritual values in their work
- Feels responsible for the status of nursing and tries to advance and never to retard it
- Has inner resources to which she/he can turn to, for renewal of faith and courage when weary and discouraged
- Is proud of her/his profession and considers it to be at par with other professions like medicine or law or any other vocation practised for compensation, which at the same time contributes in its own unique way to the welfare of humanity

How can you make those contributions?

You must constantly be on the alert of nursing problems and important questions about your nursing practice. This can serve as the basis of articulating research problem areas. Since you are directly involved in providing care, you are often in the best position to identify such questions and problems.

You have a responsibility to become actively involved in research studies.

How can you be involved in research?

You are already in one way or another involved in research through the massive data you collect from day to day. Your shortcoming is that you do not know how to utilise the data. In this course you will learn about data collection and interpretation of the data to other health care professionals or to patients and their families. The details will be covered in module four.

What you need to remember now is that you must be continually aware of studies that are directly related to your areas of clinical practice. You must share the findings with your colleagues and utilise them in an attempt to improve patients' care.

Remember, when research studies are not made available to other nurses, the impact of the findings on nursing practice is diminished. You should be aware that the future of nursing science depends on active involvement of nurses in the implementation and utilisation of nursing research.

Nurses must develop curiosity about nursing practice. Their belief in the worth of nursing practice is emphasised by the acceptance of the research role and responsibility.

Nursing Education

There are several aspects of nursing education. In Kenya there are nursing programmes regulated by the Nursing Council of Kenya and continuing nursing education conducted at areas of practice. We will start by looking at the basic programmes.

Basic Programmes

There are three levels of nursing programmes.

Degree Programmes

The five universities offering bachelor in nursing for school leavers are:

- University of Eastern Africa, Baraton which started in 1988

- University of Nairobi which started in March 1992
- Moi University which started in September 1998
- KENYATTA University
- Kenya Methodist University (KRCHN - BScN upgrading)

Other programmes offering first degrees in nursing for registered nurses are conducted at KMTC Nairobi in collaboration with the University of Dundee, Scotland; the Aga Khan University Kenya Campus and the American World University.
Egerton University, Tropical Institute of Community Health in Kisumu has also shown an interest in offering such courses.

Diploma Programmes
There are two basic programmes in Kenya: the Kenya Registered Nursing (KRN) and Kenya Registered Community Health Nursing (KRCHN).
KRN is being conducted at the Nairobi Hospital and Mater hospital in Nairobi. KRCHN is being conducted by many schools of nursing sponsored by the government, mission and private organisations.

Certificate Programmes
The only certificate nursing programme that is currently in place is the Kenya Enrolled Community Health Nursing which is being conducted by the government, mission and private institutions.

Basic Programmes
All these programmes are tailored in such a way that there is an integration of general nursing, midwifery, community health nursing, mental health and psychiatric nursing.
Apart from the basic programmes there are post-basic programmes at diploma and certificate levels covering midwifery, community health nursing and mental health and psychiatric nursing, nurse anaesthetist, ophthalmic nursing and paediatric nursing.
Institutions offering higher education at master's level for nurses are:

- University of Nairobi offering Masters in Nursing
- Kenyatta University offering Masters in Public Health and Epidemiology
- KMTC offering Masters in Medical Education and Masters in Nursing in collaboration with University of Dundee

Other places which also admit nurses for a master's degree are Moi University and University of Nairobi. All the tutors or lecturers teaching in these programmes are practising in nursing education.
The Nursing Council of Kenya is advocating that all nurses update their knowledge and skills through continuing education conducted in workshops, seminars and case presentations or on the job training. The main aim is the provision of quality care to patients and to keep abreast with scientific and technological developments.
You read earlier that nursing research can be conducted in the clinical area. You can now add to that. that research is also conducted in nursing education to improve its quality.

SECTION 2: THE NURSING PROCESS

Introduction
This second section will introduce you to professionalism and the nursing process. It will build on what you have already learnt and it will also serve as revision.

Objectives
By the end of this section you will be able to:

- Define the nursing process
- Describe the rationale of using the nursing process
- List the steps of the nursing process

Definition of the Nursing Process

The nursing process is a technique which scientifically attempts to solve problems created by the patient's illness and to meet the health care and nursing needs of patients.

Rationale for Using the Nursing Process
The nursing process introduces a concept of objective measurement into nursing management at the bed side. It compels you as the nurse to look more closely at the problems as the patient sees them rather than as you assume the problems to be. Furthermore, it defines what the nursing role is all about and creates a boundary within which you can safely practise clinical skills.
The nursing process establishes nurse-patient relationship on a firm basis because it is objective and is a total care technique. The care plan, being related to one individual, gives you as a nurse greater professional job satisfaction. The nursing process, apart from being practical, is also a research tool since you can collect data that is retrospective, current and prospective.

With regards to patients problems, how do you define a problem?
A problem is any condition or situation which requires nursing intervention for the patient to regain a state of health or towards a peaceful death.
In learning the art of applying the nursing process, you are applying science which is the skilled art of making the well and the sick more comfortable and to feel well cared for.
You may have already used the nursing process. As a reminder, however, the steps are:
1. Assessment
2. Planning
3. Implementation
4. Evaluation

Assessment

Assessment starts with your very first encounter with the patient.
It involves a systematic collection of data conducted on a patient, done to determine their health status and to identify any actual or potential health problems in order to formulate a nursing diagnosis, this becomes the basis of the nursing care plan. A sensitive and continuous nursing assessment by means of nursing history and health assessment is essential in maintaining awareness of the nursing care that a patient receives.
The nursing history is taken for the purposes of determining the patient's state of illness. It also provides you as a nurse with the opportunity to collect the data and to convey interest, support and understanding to the patient.
The skill used in obtaining history is interviewing. An interview is a dialogue between patients and you as their nurse, which is a very personal experience.

Interviewing is a process that requires wisdom, judgement, tact and experience. It involves a sensitive direction of a conversation with patients in order to obtain information about them.

Your approach to the patient will largely determine the amount and quality of information that you will receive.
Achieving a relationship of mutual trust and respect will require the ability to communicate a sincere interest in the patient.
You must make the patient as comfortable as possible and offer privacy for the interview.
The skills involved in interviewing a patient include:
- Listening and questioning
- Observing and interpreting
- Synthesising
- Incorporating what is learnt into a plan of care

The Process of Interviewing
The process of interviewing involves:
- Talking and listening to the patient
- Allowing the patient to tell their story in their own way
- Looking for the main area of concern
- Giving the patient time, without interruption, to tell you why they are seeking help
- Being attentive not only to the patient's verbal expression but also to their non-verbal behaviour which may be displayed in the form of gestures, postures and facial expressions
- Anticipating the patients' anxieties and trying to relieve them
- Making relevant enquiries
- Ensuring that the client feels that they are being understood

The Process of Interviewing
Health facilities have developed their own interview guides but what is important is to conduct a thorough assessment of the patient with regard to their basic human needs and their state of wellness or illness.

A variety of models can serve as the framework for the assessment of basic needs. These include Functional Health Patterns (Gordon:1982), Maslow's Hierarchy of Needs and Eriksson's Eight Stages of Human Development.
Assessment of the total needs of the patient includes their physical, psychological, emotional, intellectual, developmental, social, cultural and spiritual needs.

Health Assessment
How would you conduct a health assessment?
The health assessment of the patient may be carried out prior to, during or following the nursing history, depending on the patient's physical and emotional state, their response to their illness and hospitalisation, and the immediate priorities of their illness situation.

What is the purpose of health assessment?
The purpose of the health assessment is to identify the parameters of physical, psychological and emotional function that include a nursing need that exists. The

techniques and skills that are utilised in conducting the health assessment include:

- Use of the senses of sight, touch, hearing and smell
- Use of appropriate interview skills and techniques
- Physical examination
- Techniques and strategies for assessing behaviours and role changes

The Physical Examination

You have been performing physical examinations on patients in various situations.

A physical examination is designed to determine the patient's assets which may serve to compensate for their limitations. Therefore, to accomplish the purposes of the physical examination, you must be skilled in the techniques of inspection, palpation, percussion and auscultation.

You must also have a sound basic knowledge of anatomy and physiology and of the symptomatology of the disease process with which the patient presents.

You must learn to observe with the 'seeing' eyes, hear with the 'hearing' ears, feel with 'feeling' hands and interpret the findings of the examination

At the completion of the nursing history and health assessment, you should inform the patient how the data will be used, the conclusions that will be drawn, and the fact that they and their family or significant others will be involved in developing the plan for care. By the termination of the assessment they should know who you are as their nurse and how they can communicate with you.

You are familiar with performing a physical examination which is usually carried out following the health history. In order to facilitate the data collection process, the assessment is performed in well lit, warm area. The patient is undressed and draped appropriately so that only the area to be examined is exposed.

The physical and psychological comfort of the patient is considered at all times. If a particular manoeuvre may cause discomfort, an explanation of what to expect precedes that part of examination. Fingernails are kept short to avoid injuring the patient. The examination is to be performed in an organised and systematic manner. This encourages cooperation and trust on the part of the patient.

The patient's health history provides you with a complete health profile that guides all aspects of the physical assessment. In addition, it helps you to focus on body organs and systems that are of particular concern to the patient.

The basic tools of the physical examination are the human senses of vision, hearing, touch and smell. These human tools may be augmented by special man-made appliances, for example, stethoscope and ophthalmoscope.

The first fundamental process in physical examination is inspection, and the power to observe must be cultivated.

A general inspection is carried out at the first contact with the patient

While creating rapport by introducing yourself to the patient, shaking their hand and talking to them, many impressions register in this exchange, and numerous valuable observations can be made.

For example, age can be assessed, the general appearance whether thin or fat, anxious or depressed, body structure normal or deformed, posture and stature, body movements, nutritional status, speech pattern and body temperature. The physical examination requires a systematic approach of a head to toe and is accompanied by:

- Taking vital signs such as temperature, pulse, respiration and blood pressure
- Measuring height, weight, fluid intake and output
- Auscultating for body sounds of the lungs, the navel and other organs using stethoscope
- Palpating soft areas of the body to check for solid masses, abnormal rigidity or tenderness

You will review physical examination again when you study the clinical diagnosis.

Nursing Diagnosis

After the completion of the nursing history and the health assessment, you should analyse, synthesise and summarise the data collected and determine the patient's need for nursing care. You should also identify the actual or potential health problems responsive to resolution by nursing actions as nursing diagnosis.

When developing the nursing diagnosis for a particular patient, you must first identify the commonalities among the assessment data you have collected. These common features lead to the categorisation of related data that reveals the problem that needs nursing intervention. Therefore, the patient's nursing problem is defined as the nursing diagnosis.

Remember that nursing diagnosis is not medical diagnosis or medical treatment or diagnostic studies. Nursing diagnoses are the patient's actual or potential problems that are

enumerable to resolution by nursing actions. Nursing diagnoses that are succinctly stated in terms of the specific problems of the patient will guide you to develop a nursing care plan.

Recording the Nursing Diagnosis
You should record the patient's nursing diagnosis in the nursing care plan as well as in the patient problem list.
A problem is defined as anything that concerns the patient, endangers their health, requires management and concerns any member of the health care team.
You have already gone through the assessment steps of the nursing process by looking at the data collection methods, that is, interview, observation, physical examination and taking vital observations.

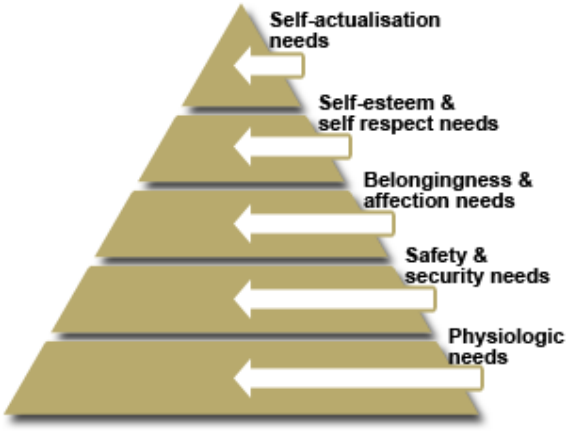
Remember you will be required to utilise communication, interpersonal and client-provider skills in conducting the assessment, collecting and analysing data using subjective and making objective observations and performing the necessary physical examination. This is followed by formulating a nursing or medical diagnosis to clarify client's needs.
Then comes arranging the client's needs accordingly in order of priority, and forming partnership with clients in assessing their care needs and determining appropriate intervention strategies to address them.

Planning
Once you identify the nursing diagnosis, the next step is to develop the planning components of the nursing process. This phase involves:

- Setting priorities to the nursing diagnoses specifying immediate, intermediate and long term goals of nursing action
- Identifying specific nursing interventions, appropriate for attaining goals.
- Identifying interdependent interventions
- Documenting the nursing diagnosis, goals, nursing interventions and expected outcomes on the nursing care plan

During this phase of the nursing process, it is your responsibility to communicate with the appropriate persons any assessment data indicative of health needs that can be met by other members of the health care team.

Setting Priorities
Setting priorities for the nursing diagnoses should be a process of collaboration between you and the patient or their family members. Consideration must be given to the urgency of the problem, with the most crucial problems receiving the highest priority.
Maslow's hierarchy of needs provides a useful framework for the determination of priority problems. The use of this hierarchy requires that high priorities be given to physical needs. After the priorities of the physical needs are met, subsequent priorities are reassigned according to the urgency of needs at other levels of the hierarchy.



Establishing Goals for Nursing Action
After establishing the priorities of the nursing diagnosis, identify the immediate, intermediate and long-term goals and the nursing actions appropriate for the attainment of your goals. You should include the patients and the family in the establishment of the goals for the nursing actions.

- **Immediate Goals** Immediate goals address existing problems.
- **Intermediate Goals** Intermediate goals address the potential problems likely to occur in the near future.
- **Long Term Goals** Long term goals require longer periods of time for their accomplishment. This usually involves prevention of complications and further health problems, health education and rehabilitation.

You should involve the patient and the family in decision-making about the nursing interventions to meet the goals. Involvement of the patient and the family in the planning of nursing interventions promotes their cooperation in the implementation of the nursing care.

The identification of appropriate nursing interventions and their related goals depends on your recognition of the strengths and potential of the patient and the family; his understanding of the patho-physiological alterations that he experiences and his sensitivity to his emotional, psychological and intellectual response to his state of illness.
In addition, your knowledge of nursing, your clinical experience and awareness of available supporting resources influence the validity of the nursing interventions that you identify as appropriate in resolving the patient's nursing diagnosis.

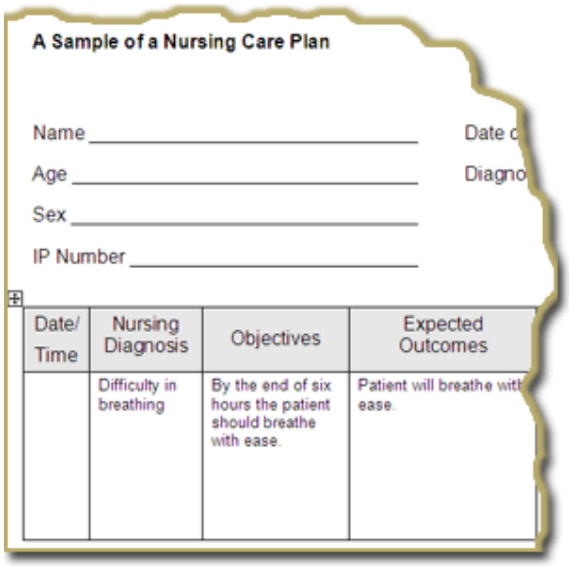
Establishing Expected Outcomes
You should state the expected outcomes of the nursing interactions.
These outcomes should be stated in terms of the patient's behaviour. They should be realistic and measurable.

What you should realise is that:

- The outcomes that define the expected behaviour of the patient will serve as the basis for evaluation of the effectiveness of the nursing interventions.
- The critical time periods provide a time frame for determining effectiveness of the nursing interventions and existence of a need for additional or altered nursing care.

Formulating the Nursing Care Plan
The nursing care plan serves to communicate the following information to all members of the nursing team:

- The nursing diagnosis and priorities
- The goals of the nursing intervention
- The nursing interventions which are expressed in the form of nursing orders
- The expected outcomes which identify the expected behavioural responses of the patient
- The critical time periods within which each outcome must be met



A Sample of a Nursing Care Plan

Name _____ Date c

Age _____ Diagno

Sex _____

IP Number _____

Date/ Time	Nursing Diagnosis	Objectives	Expected Outcomes
	Difficulty in breathing	By the end of six hours the patient should breathe with ease.	Patient will breathe with ease.

You must write down the precise behaviour expected in the nursing care plan. It should be written in a systematic manner that facilitates its use by all nursing personnel. You should provide space in the care plan for the documentation of the patient's response in the nursing interventions and the outcomes.
The nursing care plan is subject to change as the patients problems change or as the priorities of the problem and resolution of the problems shift and as additional information about the patient's state of health is collected.
As you implement nursing interventions, the patient's responses are evaluated and documented and the care plan changed accordingly. A well-developed and continuously updated nursing care plan is the greatest assistance to the patient, since their nursing diagnosis will be resolved and their needs will be met.

A Sample of a Nursing Care Plan

Name _____ Date of Admission _____
Age _____ Diagnosis _____
Sex _____
IP Number

Date/ Time	Nursing Diagnosis	Objectives	Expected Outcomes	Nursing Actions	Rationale	Evaluation
	Difficulty in breathing	By the end of six hours the patient should breathe with ease.	Patient will breathe with ease.	Observe rate of respiration and chest expansion. Provide oxygen therapy. Prop up patient in bed. Administer prescribed medication.	To open up air passages, ease congestion in the lungs, and restore normal breathing	Is comfortable while breathing. No evidence of cyanosis or heart failure. Is breathing well and looks relaxed.

Implementation

Implementation of the nursing process follows the formulation of the nursing care plan. Implementation refers to carrying out the proposed plan of care. You should assume responsibility for the nursing team, or other members of the health care team as appropriate. You are to coordinate the activities of all persons involved in the implementation.

Keep in mind that:

- The nursing care plan serves as the basis for implementation.
- The immediate, intermediate and long-term goals are used as a focus for the implementation of the designed nursing interventions.
- While implementing nursing care, you are to continually assess the patient and their response to the nursing care.
- Alterations are made in the care plan as the patient's condition, problems, and responses change, and priorities are thus reassigned.

Implementation includes all of the nursing interventions that are directed toward resolution of the patient's diagnosis and meeting their health needs.

Nursing interventions include:

- Hygienic care
- Promotion of physical and psychological comfort
- Support of respiratory and elimination functions
- Facilitation of the ingestion of food, fluids and nutrients
- Environmental management health teaching
- Promotion of a therapeutic relationship

You should use judgement and decision-making skills in the selection of nursing interventions that are based on physiological principles. You will also need to integrate and apply your knowledge of physiology. All nursing interventions are patient-focused and goal directed. They are based on scientific principles. You should implement them with compassion, confidence and willingness to understand the patient's problems.

Delegating Nursing Action

You may delegate certain specific actions to other members of the nursing team. When delegating, you must:

- Know the capabilities and limitations of the members of the nursing team.
- Select the most appropriate person to implement and supervise the performance of the actions.
- You should provide the nursing team members with all information that is needed to perform the actions in such a way that the patient remains at all times the focus of the actions.
- You should communicate verbally and in writing to the appropriate persons the coordination and continuity of care, information about the patient's responses to their care and any changes that must be made in the plan of care. This is because

many members of the nursing team and health care team are involved in the patient's care. Continuous updating of the care plan is of paramount importance in ensuring coordination and continuity of care.

Recording Outcomes

The implementation phase of the nursing process is concluded when the nursing interventions have been completed and the patient's responses to them have been recorded. You should concisely and objectively make the recordings.

The recordings should:

- Relate to the nursing diagnosis
- Describe the nursing interventions and the patient's response to the interventions
- Include any additional pertinent data

You can make good evaluation after accurate recording. Documentation of information therefore provides the basis for the measurement of the patient's behavioural response to the nursing intervention.

Evaluation

Evaluation is the final component to the nursing process. It is directed towards determining the patient's response to the nursing intervention and the extent to which the goals have been achieved.

The nursing care plan, therefore, provides the basis for evaluating the nursing diagnosis, goals, and nursing interventions. Expected outcomes provide the specific guidelines that dictate the focus of evaluation.

What is the rationale for using the Nursing Process

Did you think of the following?

- ***Introduces a concept of objective measurement into nursing management at the bed side.***
- ***Compels the nurse to look more closely at the problems as the patient sees them, rather that assuming them.***
- ***Defines what the nursing role is all about and creates a boundary within which to safely practice clinical skills.***
- ***Establishes nurse patient relationship on a firm basis because it is objective and is a total technique.***
- ***Is a research tool for collecting retrospective, current and prospective data***

UNIT TWO: FUNDAMENTALS IN NURSING PRACTICE

This second unit of the first module lays down principles, concepts and basic procedures to be applied in clinical practice. Most of the content is based on what you have already learnt during your Kenya Enrolled Community Health Nursing course.

This unit is composed of four sections:

Section One: Concept of Infection Prevention and Control.
Section Two: Basic Nursing Procedures.
Section Three: Diagnosis and Treatment of Minor Illnesses.
Section Four: The Principles of Safe Drug Use.

Unit Objectives

By the end of this unit you will be able to:

- Describe the concept of infection prevention and control
- Describe basic nursing procedures
- Diagnose and treat minor illnesses
- Describe the principles of safe drug use

SECTION 1: INFECTION PREVENTION AND CONTROL

In this first section you will cover the concept of Infection Prevention and Control.
The focus of infection prevention is to minimise the risk of transmitting infections to patients, service providers, supportive staff, house keeping personnel and members of the community.
The goal of infection prevention is to minimise post procedure infections in patients and prevent transmission of life threatening infections to patients, service providers, auxiliary staff and members of the community (AVSC 1999).

Objectives

By the end of this section you will be able to:

- State an overview of infectious diseases
- Describe the disease transmission cycle and those at risk of infection
- List some standard precautions
- List common antiseptics, disinfectants and aseptic techniques
- Describe the use and disposal of needles and other sharps
- Describe the processing of instruments and other items
- Describe decontamination and sterilisation
- Describe the storage of sterile equipment
- Describe housekeeping and waste disposal

The Concept of Infectious Diseases

Over the past few decades Kenya has experienced a drastic change in the pattern of infectiousdiseases. Some of those that had been eradicated are re-emerging, and new ones are being identified. There have also been sporadic outbreaks of diseases such as cholera, measles, the plague, and yellow fever. New viruses such as the Hepatitis B and C have become increasingly common. The situation has been made worse by the fact that some micro-organisms are rapidly developing resistance to common antibiotics. Hospital acquired infections are on the increase. This drug resistance, combined with the high HIV/AIDS prevalence, makes infection prevention and control extremely important
The World Health Organisation WHO (1996) observes that millions of people all over the world suffer and even die of hospital acquired infections which have become known as nosocomial infections.
These hospital acquired diseases range from trivial to life threatening conditions such as septicaemia. It is thought that this spread may be due to the advance in medicine that exposes patients to more surgical and medical invasive procedures which increase the risk of infection. It is important to note that shortage of resources may have contributed to some nosocomial infections.

Globally the most frequent infections are: surgical wounds infection, lower respiratory tract and urinary tract infections. The emergence of highly infectious diseases such as the Viral Haemorrhagic Fevers (VHF) also increases the risk of hospital acquired infection.
Health care facilities are ideal settings for the transmission of infections because the invasive procedures routinely performed on patients have the potential of introducing micro-organisms into the body.

Who is at Risk of Infection?

The service providers in health care facilities are at high risk because they constantly perform procedures that expose them to infections. They can easily spread an infection they have contracted at the health facility to their families because of poor infection prevention practices.

The community is also at risk of infections if they come into contact with medical waste such as contaminated sharps, dressings, tissue and chemical waste that have been inappropriately disposed

Everyone who works at a health care facility is potentially at risk of infections.

The Disease Transmission Cycle

Infectious agents survive, grow or multiply in a reservoir and then leave the reservoir through a place of exit by a modeof transmission.

The infectious agents then enter the susceptible host through a place of entry.

Micro-organisms are normally present on people's skin, respiratory, intestinal and genital tracts. These micro-organisms are called normal flora. Micro-organisms not normally found on or in the human body are associated with disease and are known as pathogens.

All micro-organisms can cause infection or disease.

This happens when:

- The normal flora are introduced into an area of the body in which they are not normally found
- Pathogens are introduced into the body
- Micro-organisms are introduced into the body of a person who is immuno-compromised and thus susceptible to infections

The mode of transmission is the easiest point at which to break the disease transmission cycle. In a health care facility, this can be accomplished by following appropriate infection prevention practices, such as washing the hands before and after procedures, practising aseptic technique and correctly processing instruments

Transmission of Infection in the Health Care Setting

In the health care setting infection can be transmitted:

- When the health care worker's skin is pierced or cut by contaminated needles or other sharp instruments
- When the health care worker's broken skin (cuts, scratches, rashes, chapped skin, fungal infections) comes into contact with the patient's blood or other body fluids
- When the patient's blood or other body fluids are splashed on the healthcare worker's mucous membranes (eyes, nose, mouth)

All cases of transmission of Hepatitis B and HIV from patients to health care workers have occurred through accidents such as needle stick injuries.

Furthermore, as a health worker you can spread infections from one patient to another and from patients to yourself, your family and the community.

Infectious diseases could be minimised or eliminated by adhering to medical principles and practices that reduce cross infection in healthcare settings. The spread of most infections can be controlled by observing basic infection prevention control guidelines and proper and adequate treatment of primary cases.

The WHO's guidelines demand that you should treat all patients as potentially infectious. Furthermore, WHO stipulates proper precaution and use of correct and appropriate protective gear when dealing with or handling blood and blood products, body fluids or contaminated equipment.

According to WHO guidelines, you should:

- Observe and maintain good personal hygiene and wear appropriate attire.
- Be vaccinated against vaccine preventable conditions, especially if you are working in high risk areas.
- If you work in vulnerable areas, for example areas where you handle cooked food, you should be periodically screened for certain diseases, such as typhoid.
- If you are suffering from infectious conditions and you are working with susceptible patients, for example, in an operating room, special care baby unit, or the ICU burns unit, you should be re-deployed until you are cleared of the infection.

Having looked at the overview of infection prevention and control, you will now look at it in some more detail.

How can you spread infections from one patient to another or to your family and community?

- ***If you do not wash your hands before and after contact with patients, or when you do not wash your hands before leaving the health facility and then touch members of your family or household items***
- ***When you use surgical instruments, such as needles, syringes and other equipment that have not been processed properly***
- ***When medical waste is not disposed of properly, members of the community may come into contact with that waste***

- ***When you contaminate your clothing or hair in the course of rendering care to patients***
- ***When you contract infections and spread them to some members of your family, they will in turn spread them to other members of the family, who in turn will spread them to others in the community***

Definition

The focus of infection prevention is to the utilisation of procedures and techniques in the surveillance investigation and compilation of statistical data in order to minimise the spread of infection.

Goal

The goal of infection prevention is to minimise post procedure infections in patients and prevent transmission of life threatening infections to patients, service providers, auxiliary staff and members of the community (AVSC 1999).

Infection Prevention Practices

Adherence to appropriate infection prevention practices breaks the cycle of spreading infections at the mode of transmission stage.
This will:

- Prevent post procedure infections
- Result in high quality, safe services
- Prevent infections in service providers and supportive staff
- Protect the community from infections that originate in health care facilities
- Prevent the spread of micro-organisms that are resistant to antibiotics
- Lower the cost of health care services

Standard Precautions

Standard precautions are a set of clinical practice recommendations designed to help minimise the risk of exposure to infectious materials, such as blood and other body fluids by both patients and staff. They help break the disease transmission cycle at the mode of transmission step.
A standard procedure is a procedure that should be followed routinely at all times. It should apply to every patient regardless of their presumed infection status. This is because you will not be able to tell who is infected with viruses such as HIV or hepatitis. Even the infected persons themselves may not know that they are infected. You should therefore follow the standard precautions when dealing with every patient.
You will now cover these precautions in more detail.

Hand Washing

Washing your hands before and after contact with each patient is the single most effective method of preventing/decreasing transfer of micro-organisms between you and the patients within a health facility. This method is easy to follow and is an inexpensive procedure. The purpose of hand washing is to remove soil, organic material and transient micro-organisms from the skin.

Think of five appropriate times for washing your hands whilst at work.

- Immediately after arriving at work
- Before examining each patient
- After examining each patient
- After touching accidentally any instrument or object that might be contaminated with blood or other body fluids
- After touching mucous membranes, e.g. eyes, nose, mouth
- After un-gloving since hands can be contaminated if gloves contain invisible holes or tears
- After using the toilet or latrine
- Before eating
- Before leaving work at the end of the day

The three elements that are essential for effective hand washing are:

- Soap
- Running water
- Friction

Four types of hand washing

Routine hand washing using plain soap and running water

Routine hand washing removes transient micro-organisms and soil, blood or other organic material from the hands. This method is appropriate in most situations and the hands should be washed as frequently as possible

Hand washing with antiseptic and running water

In this method, transient micro-organisms and soil are removed.

It kills or inhibits the growth of resident micro-organisms. Moreover, it may reduce the risk of infections in high risk situations, such as:

- When there is heavy microbial contamination
- Before performing invasive procedures such as vein punctures and other aseptic procedures
- Before contact with patients who have immune defects, for example, patients with burns, leukaemia etc.

Alcohol hand rub

Alcohol hand rub kills or inhibits the growth of most transient and resident micro-organisms but does not remove all micro-organisms or soil. It can be used when hand washing with soap and running water is not possible as long as hands are not visibly soiled with dirt, blood or other organic material.

Surgical hand scrub

Scrubbing with antiseptic before beginning surgical procedures will help prevent the growth of micro-organisms for a period of time.

It will also reduce the risk of infections to the patient if the gloves are damaged.

Policy Statement

1. Patients and family members shall be instructed in proper hand washing.
2. The patient's hands shall be washed before eating, after toileting and when soiled.
3. The health care facility approved soap shall be used for routine hand washing.
4. Repeat hand washing shall not be done in the same container of water.
5. Hands shall be washed under running water.
6. Hands shall not be dried on personal clothes, wet and soiled towels. Air blow driers are not recommended.
7. Hands shall be washed immediately on arrival at work.
8. Whenever there is a chance of contamination.
9. Before putting on gloves for performing clinical procedures such as insertion of IUD or invasive procedures.
10. Before putting on gloves for performing invasive procedures.
11. Between certain procedures on the same patient where soiling of hands is likely, to avoid cross-contamination of body sites.
12. After contact with items known or considered likely to be contaminated with blood, body fluids, secretions or excretions (e.g. bedpans, urinals, wound dressing), whether or not gloves are worn.
13. After touching blood, body fluids, secretions excretions, exudates from wounds.
14. Before and after gloves are removed.
15. Before medication preparation.
16. Before preparing, handling, serving or eating food and before feeding a patient.
17. After diapering or toileting children.
18. When hands are visibly soiled.
19. After personal body functions such as using the toilet, wiping or blowing one's nose.
20. Before leaving work.

You should wash your hands with antimicrobial soap or an antiseptic solution which should then be followed by good rinsing under running water. This is a more effective method of removing and killing transient micro-organisms.

Vigorously rub soaped hands for 15-30 seconds and then rinse under running water.

Plain water removes 50% of transient micro-organisms, while soap removes 80-90% of micro-organisms.

After washing your hands you should dry them with a clean towel or air dry them.

Be aware that shared towels can become contaminated quickly.

Personal Protective Equipment

These are physical barriers used to prevent transmission of infection to the patient or from the patient to the persons attending them, for example, gloves, gowns, surgical masks and protective eye wear

Gloves

Gloves provide a barrier against potentially infectious micro-organisms in blood, other body fluids, and medical waste, thus lowering the risk of transmitting infections to both health care workers and patients. Gloves also protect against hazardous chemical waste. You should wear gloves whenever you may come into contact with patient's blood and other body fluids, for example, while:

- Providing clinical services
- Handling or cleaning used instruments and other items
- Performing housekeeping activities
- Use a new pair of gloves for each patient! Disposable gloves are used once and then thrown away
- Disposable gloves are preferable to renewable gloves because it is difficult to properly process gloves. Disposable gloves should never be processed or reused

TYPES OF GLOVES

Sterile Surgical Gloves or High Level Disinfected Surgical Gloves

These should be worn during all procedures in which your main aim is to avoid introduction of pathogens into the patient, for example during:

- Surgical procedures
- Insertion of Norplant implants
- Pelvic examination of women in labour

Disposable surgical gloves are recommended for use.

Single use examination gloves

Single use means discard gloves after use. These should be worn for all procedures in which you will be in contact with intact mucous membranes, such as:

- IUCD insertion
- Manual vacuum aspiration
- Pelvic examination

Also where the primary purpose of wearing gloves is to reduce the risk of you being exposed to blood or other body fluids for example:

- When drawing blood
- When working in the laboratory

Gowns and Aprons

These should be made of waterproof material and worn full size to give maximum protection. They should be used when splashing of blood or other body fluids or when any other potentially infectious materials are anticipated, for example during:

- Surgical operations
- While conducting deliveries
- During intubations and sanctioning procedures
- Any other procedure/activities where splashing is anticipated

Masks and Eye Shields

These provide some protection against airborne pathogens and shield against splashes. They should be worn during dental surgery, when conducting deliveries and endoscopies or in any other situations where splashing or spattering is anticipated.

Headgear and Boots

Caps are worn full length to cover the head. Boots and shoe covers should be waterproof and should be cleaned frequently. These should be used in operative procedures.

Appropriate and Adequate Instruments Processing

While tackling this topic we will deal with the following aspects:

- Antiseptics and disinfectants
- Aseptic technique
- Use and disposal of needles and other sharp objects
- Decontamination and preparation of chlorine solutions
- Cleaning instruments and other items
- Sterilisation and storage
- High level disinfection and storage
- Waste disposal

Move on to look at these one by one.

Antiseptics and Disinfectants

An antiseptic is a chemical agent used on the skin and mucous membrane to remove or kill micro-organisms without causing damage or irritation to the skin and mucous membranes. An antiseptic may also prevent the growth and development of micro-organisms.

Antiseptics are not meant to be used on inanimate objects, such as instruments and surfaces (AVSC, 1999). You can use antiseptics for surgical hand scrub, skin preparation as well as cervical and vaginal preparation before a clinical procedure.

Disinfectants are chemical agents used to kill micro-organisms on inanimate objects, such as instruments and surfaces. Disinfectants are not

meant to be used on the skin or mucous membranes (AVSC, 1999).
There are two types of disinfectants: high level and low level.

High Level Disinfectants

High level disinfectants kill bacteria, viruses, fungi and some bacterial endospores. Some high level disinfectants can be used to sterilise equipment and if given sufficient time to act, they are able to destroy bacterial endospores that cause diseases such as tetanus and gas gangrene. Bacterial endospores are difficult to kill because of their protective casing or coating.
High level disinfectants are also used for processing instruments and other items.
Do not soak or store cheatle forceps, scissors, scalpel blades and suture needles in a disinfectant solution for a very long time.
Should you need to sterilise them using high level disinfectant solution, soak them only for a specified time, remove, rinse and store dry.

What you should also note is that micro-organisms can live and multiply in disinfectant solutions which can in turn contaminate the instruments and other items, leading to infections. This topic will be covered in more detail later.

Low Level Disinfectants

Low level disinfectants kill most bacteria and some viruses and fungi but do not kill tuberculosis causing micro-organisms and bacterial endospores. They are used for cleaning surfaces such as floors and countertops. They should not be used for processing instruments and other items.

Common Antiseptics and Disinfectants
You are by now aware that the use of antiseptics and disinfectants may vary from hospital to hospital.

Alcohol (60-90% ethyl or isopropyl)

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Effective against a broad range of micro-organisms.	Kills micro-organisams most rapidly. Most effective in reducing micro-organisms. Effectiveness is only moderately reduced by blood or other organic material.	Has a drying effect on skin. Cannot be used on mucous membranes.	Cannot be used when skin is dirty. Wash the area before applying. Must dry skin completely to be effective. The 60-70% strength is most effective because alcohol must be diluted for optimal killing of micro-organisms, it is less drying to skin, and it is less expensive.

Chlorhexidine gluconate (Hibitane, Hibiclens, Hibiscrub)/Chlorhexidine gluconate with cetrimide (Savlon)

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Effective against a broad range of micro-organisms, but has a minimal effect on tuberculosis and fungi.	Has a good persistent effect; remains effective for at least 6 hours after being applied. Effectiveness is not reduced by blood or other organic material.	On rare occasions products containing chlorhexidine have been reported to cause irritation, especially when used in the genital area. Effectiveness can be reduced by hard water, hand creams and natural soaps.	Recommended antiseptic for surgical hand scrub and skin preparation. Preparations without cetrimide are preferable to those with cetrimide. While products containing chlorhexidine are ideal for surgical hand scrub and skin preparation in general, they may not be the best antiseptics to use in the genital area, vagina and cervix because of the small potential for irritating these areas. Iodophors are a better choice for use in these areas. If iodophor is not available, a product containing chlorhoxidine is the best alternative.

Hexachlorophene (Phisohex)

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Poor effectiveness against most micro-organisms.	Has a good, persistent effect with repeated use which remains effective for at least six hours after being applied.	Potentially toxic to the nervous system. Occasional use is not effective in reducing the number of micro-organisms on the hands. If use of hexachlorophene is discontinued after long-term use, rebound increase of growth bacteria will occur (bacterial whose growth was being inhibited by its use will grow and multiply causing large scale contamination).	Contraindicated for routine use on irritated or broken skin or mucous membranes. Not recommended for use in surgical hand scrub or skin preparation due to its limited capacity to kill micro-organisms.

Iodine, including tincture of iodine (iodine and alcohol)

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Effective against a broad range of micro-organisms.	Fast acting.	Can cause skin irritation. Effectiveness is markedly reduced by blood or other organic material.	Too irritating for routine use in surgical hand scrub or for use on mucous membranes. Because of the potential to cause skin irritation, when used for preparation, iodine must be allowed to dry and then remove from the skin with alcohol.

Iodophors (solutions such as Povidone Iodine e. g. Betadine)

These contain Iodine in a complex form, making them relatively non irritating and non toxic.

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Effective against a broad range of micro-organisms.	Less irritating to the skin than iodine. Can be used on mucous membranes.	Effectiveness is moderately reduced by blood or other organic material.	Recommended antiseptic for surgical hand scrub and client preparation. Best antiseptic for use in the genitalia area, vagina and cervix. Effective 1-2 minutes after application. For optimal effectiveness, wait several minutes after application. Most preparations should be used at full strength. Distinctly different from iodine. Iodophors are sudsy; pure iodine is not.

Para-Chloro-Meta-Xylenol (PCMX, Chloroxylenol, e.g. Dettol)

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Fairly effective against most micro-organisms.	Has a persistent effect over several hours. Activity is only minimally reduced by blood or other organic material.	Less effective than chlorlexidine and iodophors.	Not recommended for routine use. PCMX is available in both antiseptic and disinfectant. Preparations containing alcohol should not be used on mucous membranes. Disinfectant preparations containing PCMX should not be used as antiseptics.

Common High Level Disinfectants

You must have used some high level disinfectants. You will now study the two chemicals most commonly available that are suitable for high level disinfection (HLD) of instruments and other items. These are chlorine and glutaraldehyde.

Chlorine

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Effective against a broad range of micro-organisms including tubercle bacilli. Does not kill all bacterial endospores.	Fast acting. Least expensive disinfectant.	Can be corrosive to metals when in prolonged contact (more than 20 minutes). Can be irritating to the skin, eyes and respiratory tract.	Available in liquid (sodium hypochlorite), powder (calcium hypochlorite) and tablet. (sodium dichloride socyanurate) form. Can be used for decontamination (by soaking for ten minutes) or HLD (by soaking for 20 minutes). Can be used for instruments and other items (but not for laparascopic equipment). Can also be used for disinfection of

			surfaces. Leaves a residue, so instruments and other items must be rinsed thoroughly with boiled water after HLD. A new solution should be prepared daily (or sooner, if it becomes heavily contaminated) since potency is lost over time and after exposure to light.

Glutaraldehyde (Cidex)

Antimicrobial Spectrum	Advantages	Disadvantages	Comments
Effective against a broad range of micro-organisms including tubercle bacilli. Does not kill all bacterial endospores.	Fast acting. Least expensive disinfectant.	Can be corrosive to metals when in prolonged contact (more than 20 minutes). Can be irritating to the skin, eyes and respiratory tract.	Used most commonly to process medical equipment such as laparoscopes which cannot be heat sterilised. Can be used for HLD (by soaking for 20 minutes) and sterilisation (by soaking for ten hours) of instruments and other items. Leaves a residue, instruments and other items must be rinsed thoroughly with boiled water after HLD and with sterile water after sterilisation. A new solution should be prepared every 14 days (or sooner, if it becomes cloudy). Preparations vary, follow the manufacturer's instructi

Common Low Level Disinfectants
Examples of low level disinfectants (LLDs) are phenols (carbolic acid such as phenol, lysol) and quaternary ammonium compounds (berzal conium chloride – zephiron). They are commonly used to disinfect walls, floors and furnishings.
Instruments and items such as cheatle forceps, scissors, scalpel blades and suture needles should not be left soaking indefinitely or stored in a disinfectant solution.

Aseptic Technique

During your nursing practice you have probably been performing several sterile procedures such as:

- Wound dressing
- Administration of an injection
- Removing stitches, staples and clips
- Shortening or removing drains
- Urinary catheterisation
- Surgical asepsis in an operating room

Aseptic can be defined as "free from sepsis or germ free".
A technique is a method or skill used for a particular task or technical proficiency. Other definitions of technique are: art, artistry, craft, proficiency, skill, touch.

Weller, (1996) defines aseptic technique as:

"A method of carrying out sterile procedures so that there is the minimum of risk of introducing infection."
This is achieved by the sterility of equipment and a non touch technique. Brunner and Sudarth (1988) state some basic rules with regards to surgical asepsis as follows:

"Only sterile surfaces or articles may touch other sterile surfaces or articles and remain sterile. In contrast, un-sterile contact at any point renders a sterile area contaminated. If there is any doubt about the sterility of an article or area, it is considered un-sterile."

Also note whatever is sterile for one patient can only be used for that patient. Unused sterile supplies must be discarded or re-sterilised if they are to be used again.
You must pour sterile fluids from a point high enough to prevent accidental touching of the receptacle, but this should not be so high as to produce splashing which causes the fluid to touch an unsterile surface then flow back into the receptacle causing contamination.
The aseptic technique is applied when performing sterile procedures whether in general nursing, midwifery or community health nursing.
The practices performed just before or during a clinical procedure include hand washing, surgical hand scrub, using barriers such as gloves and surgical attire, proper preparation of a patient for clinical procedures, maintaining a sterile field, using good surgical technique and maintaining a safer environment in the surgical/procedure area.
You will now look at some of the components that have not been covered, beginning with proper preparation of a patient for a clinical procedure.

Preparing a Patient for Clinical Procedures
You have already been preparing patients for a variety of clinical procedures. You must have used some of the antiseptic solutions that were covered earlier.

why you use antiseptic solution on the patient's skin, vagina or cervix
Destroy or prevent the growth of micro-organisms." You will realise that it is very important to pay proper attention to the preparation of a patient before a procedure because most surgical site infections result from contamination during surgery. To reduce the risk of infections if you must shave the surgical/procedure site, use antimicrobial soap and water or shave dry. On the other hand, you could shave immediately before the operation, in the operation room or procedure room

Preparing the Skin
Clean the site with soap and water. Wipe the skin in a circular motion, beginning in the centre of the site then moving outwards. Use sterile cotton balls or cotton wool sponges held on sponge forceps. You could use any of the following antiseptics as listed in the preferred order:

- An iodophor (Betadine); then wait for two minutes and wipe off the excess with sterile dry cotton or gauze
- 4% Chlorhexidine (HIbiclens) wipe off excess with sterile, dry cotton or gauze
- 1-3 % iodine, followed by 60-90% alcohol (ethyl or isopropyl) then allow to air dry
- Chlorhexidine with cetrimide (Savlon) wipe off the excess with sterile, dry cotton or gauze

Preparing the vagina and cervix
Apply an appropriate antiseptic (iodophor) to the vagina and cervix before passing instruments into the uterus such as IUD insertion, uterine evacuation. Alcohol based antiseptics should not be used on the vagina, cervix or other mucous membranes because they are damaging to these tissues.

Maintaining a Sterile Field
Think about how you can maintain a sterile field.
You can maintain a sterile field by placing sterile towels and/or surgical drapes around the surgical/procedures site. Other measures include:

- Placing only sterile items within the sterile field
- Opening, dispensing or transferring sterile items without contaminating them
- Considering items located below the level of the draped client to be unsterile
- Not allowing sterile personnel to reach across unsterile areas and touch unsterile items
- Not allowing unsterile personnel to reach across the sterile field or to touch sterile items

Think about how you can maintain a safe environment in the surgical/procedure area.
You are aware that specific rooms have been designed for performing surgical/clinical

procedures and processing instruments and other items.
You often hear of dressing room or treatment room, autoclaving room and so on. In these rooms traffic is controlled. Other activities are minimised or prohibited. This is because the number of people and amount of activity in them influences the number of micro-organisms and the risk of infections. You must therefore:

- Limit the entry of unauthorised individuals to surgical/procedure areas
- Close doors and curtains during all procedures
- Require that personnel in the surgical area wear clean clothes, a mask, a cap and sturdy footwear
- Enclose surgical procedure area to minimise dust and eliminate insects
- Air-condition the room if feasible
- Disinfect and clean examination/operating tables, instrument trolleys, light handles and any other surfaces that may have been contaminated with blood or other body fluids during a procedure before bringing in a new patient into the room

Use and Disposal of Sharps

You are aware that careless disposal of contaminated sharps can cause infections in the health care facility and the community. Make hypodermic needles and other sharps unusable by incinerating them.
Alternatively the risk of infections can be reduced by decontaminating sharps before disposal, and burying them in a pit to make it difficult for others to scavenge them.
Decontamination is performed by soaking instruments and other items immediately after use, in 0.5% Chlorine solution for ten minutes. Decontamination is done in order to kill viruses (such as Hepatitis B, other hepatitis viruses and HIV) and many other micro-organisms, making instruments and other items easier to clean by preventing blood, other body fluids and tissue from drying on them

Disposing of Sharps
Sharps such as needles, scalpels and so on, are to be handled with extreme caution to avoid injuries during use, disposal or reprocessing. Used needles should not be recapped by hand.
If necessary use the single hand "scoop" method. With one hand, hold the syringe and use the needle to "scoop up" the cap. Used needles should not be bent or broken after use.

Do not remove the needle from the syringe by hand. Dispose of the needle and attached syringe in a puncture-resistant sharps disposal container
A sharps disposal container may be a heavy cardboard box or an empty plastic or metal container. At all times obey the following rules:
Section 1:

Infection Prevention and Control

- Dispose of "sharps disposal containers" when they are three quarters full to reduce the chance of injury when disposing of sharps
- Dispose of used sharps immediately after use in designated puncture resistant containers labelled with a biohazard symbol and placed in the area where the items were used, for transport to the incinerator/pit for disposal
- These containers should not be located in areas open to the public
- Discard used syringes and needles as a unit in the designated puncture resistant container
- Hold reusable syringes, needles or sharps in a puncture resistant leak proof container labelled with a biohazard sign for transport to the re-processing area
- Do not pick up a handful of sharp instruments simultaneously
- Exercise caution when rotating instruments in use
- Position sharp end of instruments away from yourself and others
- Do not break, recap or manipulate by hand used needles
- Wear heavy duty/strong utility gloves during decontamination, cleaning and disinfecting instruments
- Contact the supervisor immediately if you are injured by sharps

A sharps disposal container may be a heavy cardboard box or an empty plastic or metal container. At all times obey the following rules:

- Dispose of "sharps disposal containers" when they are three quarters full to reduce the chance of injury when disposing of sharps
- Dispose of used sharps immediately after use in designated puncture resistant containers labelled with a biohazard symbol and placed in the area where the items were used, for transport to the incinerator/pit for disposal
- These containers should not be located in areas open to the public

- Discard used syringes and needles as a unit in the designated puncture resistant container
- Hold reusable syringes, needles or sharps in a puncture resistant leak proof container labelled with a biohazard sign for transport to the re-processing area
- Do not pick up a handful of sharp instruments simultaneously
- Exercise caution when rotating instruments in use
- Position sharp end of instruments away from yourself and others
- Do not break, recap or manipulate by hand used needles
- Wear heavy duty/strong utility gloves during decontamination, cleaning and disinfecting instruments
- Contact the supervisor immediately if you are injured by sharps

Steps for Decontaminating Reusable Hypodermic Needles and Syringes

Take the following steps to decontaminate reusable hypodermic needles and syringes:

1. Drop the needle and syringe into a container of 0.5% chlorine solution, and let them soak for ten minutes.
2. Remove the needle and syringe from the solution, using cheatle forceps or by hand, if hands are protected by utility gloves.
3. Rinse by flushing with clean water, or clean immediately.

Management of Injuries from Needles and Other Sharps

- Wash needle stick cuts with soap and water.
- Flush the nose, mouth or skin with water if splashed with blood or body fluid.
- Irrigate the eyes with water or saline if splashed with body fluid.

Post-exposure Prophylaxis

Post-exposure prophylaxis with drugs can reduce the risk of transmission of some blood borne pathogens. Following exposure to blood or other body fluids, a number of factors have to be considered. These include:

- The infection status of the source patient (the patient whose blood or other body fluids are involved)
- The type of exposure for example: a splash to the skin, or a deep puncture wound by a very bloody needle
- Whether or not the exposed person has been vaccinated against Hepatitis B, how much time has passed since the exposure, the availability of the required drugs or other therapy

The prophylaxis will include:

- For Hepatitis B: Hepatitis immune globulin and Hepatitis B vaccine can reduce the risk of infection after exposure to blood and other body fluids containing the Hepatitis B virus
- For HIV: Several antiretroviral drugs are used either alone or in combination. These include: Zidovudine (AZT, Retrovir), Lamivudine (3TC, Epivir) and Nelfinavir (viracept)
- For Hepatitis C: There is no post exposure prophylaxis available for Hepatitis C

Giving Injections

In order to reduce the risk of transmitting infections between patients, you should always adhere to the following:

- Every time you give an injection, use a new or correctly processed hypodermic needle and syringe.
- Do not change the needle without changing the syringe between patients.
- Reusing the same syringe to give injections to many clients is not a safe practice

While administering intravenous fluids you have the responsibility to avoid the transmission of infections.

You must therefore do the following:

- Unhook the needle or catheter from the IV line and dispose of it in a sharps disposal container
- Throw away any remaining fluid
- Do not use the same IV line and fluid bag/bottle with multiple clients

Use of Multi Dose Vials

Before you fill a syringe from a multiple dose vial:

- Check the vial to be sure there are no leaks or cracks.
- Check the solution to be sure it is not cloudy and that there is no particulate matter in the vial.
- Wipe the top of the vial with a fresh cotton swab soaked with 60-70% alcohol.
- Allow to dry.

To reduce the risk of transmitting infections between patients:

- Always use a sterile needle and syringe every time medication is withdrawn from a multiple dose vial. Reusing the same syringe to give injections to multiple patients, even if the needle is changed is not a safe practice.
- Do not leave a needle inserted in the vial cap for purpose of withdrawing drugs from a multiple dose vial. This provides a direct route for micro-organisms to enter the vial.

Processing of Instruments and Items

You are now going to cover the processing of instruments in more detail. It is important to bear in mind that when you are involved in the processing of instruments and other items, you are at high risk of infection. You therefore need to take appropriate steps to reduce this risk.

You are at risk of exposure to blood or other body fluids when processing instruments and other items.

You are at a risk of exposure if:

- You have open cuts on the hands or forearms
- You have chapped or cracked hands
- You get injuries from needle sticks or other sharp instruments such as scalpels
- There is splashing of blood or other body fluids contained on the instruments or other items onto mucous membranes such as the eyes

The measures you should take to protect yourself when handling instruments and other items focus on:

- Destroying as many micro-organisms as possible early in the process
- Preventing blood and other body fluids from coming in to contact with the skin or membranes

Always wear gloves when handling potentially contaminated instruments and other items

Steps of Processing Instruments and Other Items

Processing instruments and other items involves steps that reduce the risk of transmitting infections from used instruments and other items, to you, other health workers and patients.

These steps are decontamination, cleaning and either sterilisation or high level disinfection.

Decontamination

Decontamination is the first step in processing instruments and other items for re-use. Decontamination kills viruses and many micro-organisms, making the instruments and other items safe to handle by the staff who clean them. Decontamination also makes instruments and other items easier to clean by preventing blood, other body fluids and tissue from drying on them. Decontamination is done by soaking instruments and other items immediately after use, in a 0.5% chlorine solution for 10 minutes immediately after use (AVSC, 1999). A container of this solution should be kept in every operating room and procedure room so that used items can be placed directly into the bucke

Prepare a new chlorine solution at the beginning of each day or when the solution looks as though it needs to be changed, such as when it becomes heavily contaminated with blood or other body fluids or becomes cloudy.

Preparing a Chlorine Solution

A chlorine solution can be made from household liquid bleach (sodium hypochlorite), commonly known as JIK, or chlorine compounds available in powder form (calcium hypochlorite, chloramines, or chlorinated lime) or tablet (sodium dichloroisocyanurate) form. This is because of their low cost and wide availability. Chlorine solutions prepared from liquid or powdered bleach are recommended for decontamination.

Why is chlorine the most widely used product for preventing infections in health care settings

- It is a proven and powerful killer of micro-organisms
- It deodorises
- It is economical to use
- It leaves no poisonous residue and is not poisonous to people in the concentrations it is used

Preparing a Chlorine Solution

$$\frac{\%\ \text{Chlorine in liquid bleach}}{\%\ \text{Chlorine desired}} - 1 = \text{total parts of water for each bleach}$$

Example

To make a 0.5% Chlorine Solution from 3.5% bleach:

$$\frac{3.5\%}{0.5\%} - 1 = 7 - 1 = 6 \text{ parts of water in each part of bleach}$$

Therefore, you must add one part bleach to six parts water to make 0.5% chlorine solutions.

'Parts' can be used for any unit of measure, for example, an ounce, a litre, or a gallon or any container used for measuring such as a pint.

Preparing a Dilute Chlorine Solution Using Bleach Powder

If using bleach powder, calculate the ratio of bleach to water by using the following formula:

$$\frac{\text{\% chlorine desired}}{\text{Number of grams of \% chlorine in bleach powder}} = \text{powder for each litre of water}$$

Example

If you need to make a 0.5% chlorine solution from calcium hypochlorite powder containing 35% active chlorine.

Try to calculate how many grams of powder for each litre of water using the formula above.

$$\frac{0.5\%}{35\%} \times 1000 = 0.0143 \times 1000 = 14.3 \text{ grams}$$

Therefore, you must dissolve 14.3 grams of calcium hypochlorite powder in each litre of water used to make 0.5% chlorine solution. When bleach powder is used, the resulting chlorine solution is likely to be cloudy (milky).

Cleaning

This is the second step when processing instruments. It starts by scrubbing with a brush, detergent and water before instruments and other items are sterilised or high level disinfected to remove blood, other body fluids, organic material, tissue, and dirt.

Cleaning greatly reduces the number of micro-organisms including bacteria endospores on instruments and other items.

This is a crucial step in processing instruments and other items.

If cleaning has not been done, sterilisation and high level disinfection (HLD) may not be effective because:

- Micro-organisms trapped in organic material may be protected and survive the sterilisation or HLD process
- Organic material and dirt can make the chemicals used in chemical sterilisation and HLD less effective

Steps of cleaning:

- Wear utility gloves, goggles, a mask and protective eyewear when cleaning instruments and other items.
- Using a soft brush, detergent and water and scrub instrument and other items vigorously to completely remove all blood, other body fluids, tissue and other foreign matter.
- Hold instruments and other items under the surface of the water while scrubbing and cleaning to avoid splashing.
- Disassemble instruments and other items with multiple parts, and be sure to brush in the grooves, teeth and joints of instruments and other items, where organic material can collect and stick.
- Rinse instruments and other items thoroughly with clean running water to remove all detergents.
- Allow instruments and other items to air dry, or dry with a clean towel. Instruments and other items should be dry before chemical high level disinfection to avoid diluting the chemicals, which may decrease their effectiveness. Instruments and other items to be high level disinfected by boiling or steaming do not need to be dried first

Thorough rinsing after cleaning is important, particularly with chemical sterilisation or high level disinfection (HLD), because detergents can reduce the effectiveness of these chemicals.

It is important to dry instruments and other items after cleaning them. The water from instruments and other items dilutes the chemicals used for chemical sterilisation or HLD, making that process ineffective. If instruments and other items will be high level disinfected by boiling or steaming, drying is not necessary.

Use of Detergents

Detergents are important for effective cleaning. Water alone does not remove proteins, oils or grease. When the detergent is dissolved in water it breaks and suspends oil and grease, making them easy to remove by cleaning.

Do not use hand soap for cleaning instruments and other items, because fatty acids contained in the soap will react with the minerals of hard water, leaving a residue or scum that is difficult to remove.

Avoid using steel wool or abrasive cleaners such as Vim or cement as they scratch or pit metal or stainless steel, which results in grooves that can collect micro-organisms. This also increases the potential for corrosion of the instruments.

Sterilisation

This is the process that eliminates all micro-organisms such as bacteria, viruses, fungi and parasites, including bacterial endospores.

Sterilisation is recommended for instruments and other items that come into contact with the bloodstream or tissues under the skin.
Sterilisation can be performed using steam under pressure (autoclaving or moist heat), dry heat
or chemicals.
Boiling and flaming are not effective sterilisation techniques because they do not effectively kill all micro-organisms. The effectiveness of sterilisation depends on:

- The amount and type of micro-organisms
- Absence of organic material (blood, other body fluids and tissues) or other matter such as dirt present on the instrument or other items
- The potential the item has to hide or conceal micro-organisms

You are therefore to clean instruments and other items thoroughly before sterilisation to:

- Reduce the number of micro-organisms
- Eliminate blood, other body fluids, or tissue remains
- Remove contaminants that may collect in joints, grooves and teeth of instruments and other items

Sterilisation is preferable to high level disinfection for instruments and other items that come into contact with the bloodstream and tissues, because it kills micro-organisms including bacterial endospores

You will now move on to cover the three types of sterilisation one by one, starting with steam sterilisation

1. Decontaminate, clean and dry all instruments and other items to be sterilised.
2. Open or unlock all joined instruments and other items, for example, hemostats.
3. Disassemble scissors with sliding or multiple parts to allow steam to reach all surfaces of the item. Do not arrange the instruments and other items tightly together, or wrap gloves into tight balls because steam will not reach all surfaces.
4. Wrap instruments and other items in two layers of paper, cotton or muslin fabric before steam sterilisation. If you are using a drum, make sure the holes are open
5. Arrange all packs, drums or unwrapped items in the chamber of the autoclave in a way that allows steam to circulate freely.
6. Always follow the manufacturer's instructions on how to operate the autoclave but sterilise wrapped items for 30 minutes and unwrapped items for 20 minutes at 121º C (250ºF) and 106 Kpa (15 Ib/in2) pressure.
7. If the autoclave is automatic, the heat will shut off and the pressure will begin to fall once the sterilisation cycle is complete.
8. If the autoclave is not automatic, turn off the heat or remove the autoclave from the heat source after 30 minutes if items are wrapped, or after 20 minutes if items are unwrapped. Wait until the pressure gauge reads "zero" to open the autoclave.
9. Open the lid or door to allow the remaining steam to escape. Leave instrument packs or items in the autoclave until they dry completely.
10. Remove the packs, drums or unwrapped items from the autoclave using sterile pick ups.
11. Place packs or drums on a surface padded with paper or fabric until they are cool to prevent condensation
12. Wait until the packs, drums or items reach room temperature before storing.

Storage of Autoclaved Items
Wrapped Items

Shelf life is the length of time a wrapped sterile item is considered sterile. Shelf life depends on whether or not a contaminating event occurs. Shelf life is affected by a number of factors which include:

- Type of packaging material used
- Cleanliness of the store
- Humidity in the store
- Temperature of the storage area
- Storing the packs on open or closed shelves
- Usage of dust proof covers

Storage time and handling of sterile packs should be kept to a minimum, since the likelihood of handling and contamination increases over time. Place sterile packs in closed cabinets in areas that are not heavily trafficked, have moderate temperature and are dry.

Unwrapped Items

Unwrapped items should be used immediately after removal from the autoclave. They can also be kept in a covered, sterile container for up to one week.

Dry Heat Sterilisation or Hot-Air Oven (Electric Oven)
This is the method of sterilisation that requires heat for a specific period of time.

This method is used for sterilising glass or metal objects because high temperatures are necessary. The steps to be followed in dry heat sterilisation are:

1. Decontamination: clean and dry all instruments and other items to be sterilised.
2. Wrap the instruments and other items using foil or double layered cotton or muslin fabric on a tray or shelf.
3. Put unwrapped instruments and other items on a metal tray or shelf.
4. Place instruments and other items in the oven and heat to the designated temperature. The oven must have a thermometer or temperature gauge
5. Ensure that the designated temperature is reached:

Temperature	Time
170ºC (340ºF)	1 hour
160ºC (320ºF)	2 hours
150ºC (300ºF)	2½ hours
140ºC (285ºF)	3 hours

6. Leave instruments and other items in the oven to cool before removing.
7. When they are cool, remove instruments and other items using sterile pickups.
8. Immediately use unwrapped items.
9. Store wrapped items (storage procedure is as discussed under steam sterilisation).

Chemical Sterilisation

This is the method of sterilisation used for instruments and other items that are heat sensitive or when heat sterilisation is unavailable. Instruments and other items can be sterilised by soaking them in a chemical solution such as glutaraldehyde, followed by rinsing in sterile water.

Glutaraldehyde is irritating to the skin, eyes and respiratory tract. Wear gloves and limit your exposure time. Keep the area well ventilated when using it. Always follow manufacturer's instructions before use

High Level Disinfection (HLD)

This is the process that eliminates all micro-organisms (including bacteria, viruses, fungi and parasites), but does not reliably kill all bacterial endospores which cause tetanus and gas gangrene.

HLD is suitable for instruments and other items that will come into contact with broken skin or intact mucous membranes.

HLD can be performed by boiling, use of chemicals or steaming

High Level Disinfection by Boiling

Steps of HLD by Boiling:

1. Decontaminate and clean all instruments and other items to be high level disinfected.
2. Completely submerge all instruments and other items in the water in the pot or boiler. Open all hinged instruments and other items and dissemble those with sliding or multiple parts. Place any bowls and containers upright, not upside down, and fill with water.
3. Cover the pot or close the lid of the boiler and bring the water to a gentle, rolling boil.
4. When water comes to a rolling boil, start timing for 20 minutes. Use a timer or make sure to record the time that the boiling begins. Do NOT add or remove anything until 20 minutes are over.
5. Lower the heat to keep the water at a gentle rolling boil; too vigorous a boil will cause the instruments to bounce against each other and around the boiler. Lowering the heat at this level of the procedure saves fuel/energy.
6. After 20 minutes remove instruments using dry, high level disinfected cheatle forceps in a sterile (or high level disinfected) container. Protect from dust and insects. Allow to air dry before use or storage. They can only be used within one week provided they are properly stored.

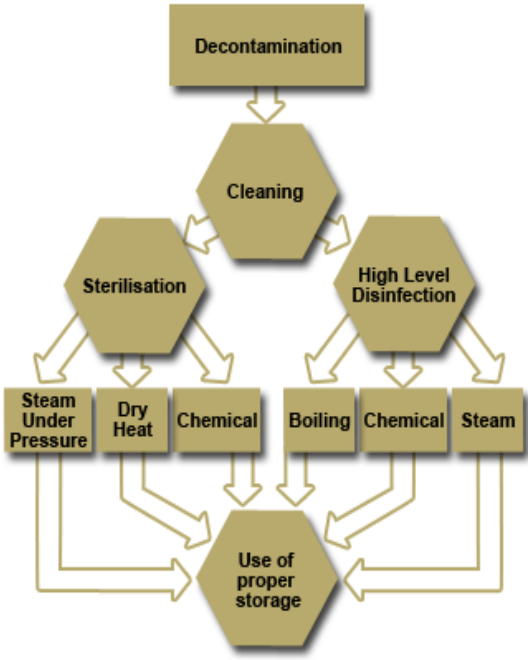
Never leave the instruments in water. They can become contaminated as the water cools down.

High Level Disinfection Using Chemicals

- Instruments and other items must be completely submerged in chemical solution. All hinged instruments must be disassembled.
- Soak for 20 minutes, starting from the time when you dropped the instruments into the chemical.
- Do not add or remove anything once the timing begins.
- Rinse all instruments thoroughly with sterile water before use.

It is important to perform these steps in the appropriate order. Study the graphic illustrating this order.

To avoid contaminating instruments and other items after sterilisation or HLD, proper storage is as critical as properly processing the items.



Housekeeping

You may be wondering why should you learn house keeping and yet you are working in a health facility. Ask yourself, what is housekeeping?
Housekeeping refers to the general cleaning of baths, sinks, wash basins, beds, tables, floors, walls and other service areas.

What is Your Role in Housekeeping?

You are to ensure that a clean environment is achieved. Those charged with the cleaning responsibility remove visible dust and dirt routinely with water and detergent.
When it comes to micro biological control of the health care facility environment it relies on maintenance of smooth, dry and intact surfaces, prompt cleaning of spillage of body fluids, secretions and excretions and prompt removal of these substances from patient treatment areas.
Cleaning and maintenance prevent the build up of soil, dust or other foreign material that can harbour pathogens and support their growth. Cleaning is accomplished with water, detergents and mechanical action. It reduces or eliminates the reservoirs of potential pathogenic micro-organisms.
Warm, soapy water is adequate for cleaning areas not directly involved in patient care such as offices and duty rooms.
A disinfectant is required when cleaning areas with a large number of pathogens such as isolation areas, toilets, surfaces contaminated with infected body fluid spillages or areas where susceptible patients are housed such as operating rooms, the neonatal unit, ICU or burns unit.

Cleaning Routine
The cleaning routine will depend on whether the area has a low risk or high risk of infection.

Low Risk Areas
These are areas such as walls, ceilings and floors. Clean walls and ceilings with water and detergent using a damp cloth.
Ensure routine damp dusting is performed. Always keep surfaces dry. Wipe chairs, lamps, tabletops and counters with a damp cloth, water and detergent.
Clean the floors regularly to keep them clean, using detergent and water, do not use dry brooms to avoid raising dust

High Risk Areas
To clean sinks, use a disinfectant cleaning solution with a cloth or brush, then rinse with clean water.
When cleaning toilets and latrines wear utility gloves and rubber boots. Use a disinfectant cleaning solution, scrub daily or as required with a separate cloth or brush.

Wear rubber gloves when cleaning waste containers. Use a detergent solution, scrub to remove soil and organic material. As a supervisor you may be required to demonstrate what you would wish to be done.

Cleaning Solutions
Solutions used for cleaning in a health facility include

Plain Detergent and Water
This is used for low risk areas and general cleaning tasks. Detergents remove dirt and organic material and dissolve or suspend grease and oil which can then easily be removed
by scrubbing

0.5% Sodium Hypochloride Solution
(disinfectant solution)
Disinfectants rapidly kill or inactivate micro-organisms during the cleaning process. They are also used to decontaminate an area so that it is safer for staff to clean. Other alternative disinfectants containing 5% carbolic acid such as phenol or lysol can be used.

Disinfectant/Detergent Cleaning Solution

This solution contains a disinfectant, a detergent and water. It is used for cleaning areas that may be contaminated with infectious materials.
The solution must contain both a disinfectant and a detergent. Disinfectants rapidly kill or inactivate infectious micro-organisms during the cleaning process. Detergents, on the other hand, remove dirt and organic material, which cannot be done by water or disinfectants alone
Your responsibility will therefore include providing adequate resources such as brooms, dusting cloths, detergents, disinfectants and protective gear for the supportive staff who are charged with the cleaning of the health facility.
You will also need to supervise and guide them appropriately so that the health facility remains clean at all items.

Always wear gloves, preferably heavy utility gloves, and sturdy shoes when cleaning.

Waste Disposal
There are three types of waste found in health care facilities

General Waste
This is non-hazardous waste that poses no risk of injury or infections, for example, uncontaminated paper, boxes, packaging materials, bottles, plastic containers and food-related trash

Medical Waste
This is material generated in the diagnosis, treatment, and/or immunisation of clients. This may include:

- Blood, blood products and other body fluids as well as materials containing fresh or dried blood or body fluids such as bandages and surgical sponges.
- Organic waste such as human tissue, body parts, placentas and products of conception.
- Sharps (used and unused) such as hypodermic and suture needles, scalpel blades, blood tubes, pipettes, and other glass items that have been in contact with potentially infectious materials such as glass slides and cover slips

Hazardous Chemical Waste
This is chemical waste that is potentially toxic or poisonous, for example cleaning products, some disinfectants, cytotoxic drugs, and radioactive compounds.
Disposal of medical and hazardous chemical waste requires special attention in order to maintain a safe and pleasant environment. This is important in order to:

- Minimise the spread of infections and reduce the risk of accidental injury to staff, patients, visitors and the local community
- Help provide an aesthetically pleasing atmosphere
- Reduce odours
- Reduce the chances of attracting insects and animals
- Reduce the likelihood of contaminating the soil or ground water with chemicals or micro-organi

Anyone who handles medical or hazardous chemical waste from the time it is thrown out by a service provider until it reaches the site of disposal is at risk of infections or injury. This includes a large percentage of staff who collect and remove waste, both inside and outside the health care facilities. Those reporting high rates of medical waste related injuries include nurses, midwives, supportive staff, cleaning and maintenance staff. Thus it is advisable that these staff are vaccinated against Hepatitis B.
Members of the community also face exposure to potentially infectious medical waste when contaminated dressings, sharps and other waste are not disposed of properly. Often children while playing risk injury and infections. Lack of proper waste disposal practices also put the community at risk of infections when waste such as syringes and needles are scavenged.

Managing Solid Medical Waste
There are four aspects of medical waste management:

- Sorting
- Handling
- Interim Storage
- Disposal

Sorting
Sorting the waste at the point at which it is generated can greatly reduce the amount that needs special handling, thus reducing risks. Ensure that separate containers are used for disposing of general and medical waste. Use coloured plastic containers/bags, painted drums or labels that can be easily read to help distinguish between general and medical containers. For example, use red containers/plastic bags for medical waste.

Handling
Handle medical waste as little as possible before disposal.
Empty waste containers in operating rooms,

procedure rooms, toilets, latrines and sluice rooms when they become three quarters full (at least once daily). Do not collect medical waste from client care areas by empting it into open carts or wheelbarrows. This may lead to contamination of the surroundings and scavenging of waste.
This may also increase the risk of injury to staff, patients
and visitors.
Always wear heavy utility gloves and shoes when handling medical waste. Always wash your hands after handling waste and after removing your gloves

Interim Storage
If it is necessary to store medical waste on site before disposal:

- Place waste in an area that is minimally accessible to staff, patients and visitors.
- Make sure all containers have lids.
- Cover the containers so that insects, rodents and other animals cannot get into them.
- Plan for only short term storage (usually for several hours), but no more than one or two days.

Disposal
When possible, medical waste should be disposed of on the premises. This allows staff that understand the risks involved to supervise the disposal process. Burning is preferable to burying medical waste. This is because high temperatures destroy micro-organisms and reduce the volume of waste. Burning in an incinerator or oil drum is recommended. Open burning is not recommended, as it causes scattering of waste which is dangerous and unattractive. If open burning must be done, carry the waste to the site just before burning, and burn it in a small, designated area. Remain with the fire until it is extinguished.
If medical waste cannot be burned on the site, burial is the next best option. Burial is feasible only when there is sufficient ground to accommodate the amount of medical waste generated at the facility. The pit should be surrounded by a fence or a wall to limit access to it and to prevent scavenging.

General waste can be taken to the community waste disposal site
General Guidelines for Disposal of

Medical Waste
Use washable, leak proof containers for disposal of medical waste in rooms and procedure rooms.
Plastic or galvanised metal containers with covers are the best type because they are not likely to corrode. Use small receptacles that use step on levers/pedals to open the cover.

- Always keep waste containers in convenient places for users.
- Empty the container daily or when it is three quarters full.
  Never put hands into containers with medical waste.
- Always dispose of medical waste correctly; never simply throw it outside or leave it in an open pile.
- Always wear heavy utility gloves and shoes when handling and transporting medical waste.
- Wash both the gloves and your hands afterwards.
- Wash containers used for medical waste with a disinfectant cleaning solution and rinse them with water daily (or move often if they are visibly contaminated after the medical waste is dumped).

Disposal of Sharps, Liquid Medical Waste and Hazardous Chemical Waste
Sharps, liquid medical waste, and hazardous chemical waste require special disposal procedures.

Sharps
All used sharps are to be disposed of in puncture resistant containers. Puncture resistant containers can be made out of a heavy cardboard box, an empty plastic jug or a metal container. Sharps containers should be located close to the place in which procedures are performed so that staff do not have to walk across the room carrying used sharps. Keep a sharps disposal container in the laundry in case sharps are found in linen.
Close sharps containers securely when they are three quarters full. If the containers become full, people may push the sharps into the containers, which may cause injury
Sharps are not destroyed by burning, therefore, you need to render them harmless by placing needles, plastic syringes and scalpels in a metal container. Then, when the container is three quarters full, pour in fuel, ignite and burn it until the fire goes out on its own.
Plastic syringes will melt and, when they cool, become a solid block of plastic, with the sharps embedded in the block. The block can then be buried.
Decontaminate the sharps and bury them in a pit to make it difficult for others to scavenge them. If it is not possible to bury all medical

waste on-site, sharps should be given first priority for burial, since they pose the biggest risk of injury and infections.
Always wear heavy utility gloves and shoes when handling or transporting sharps disposal containers. Wash both the gloves before ungloving and your hands afterwards

To reduce the risk of needle stick pricks, never bend, break or remove needles from the syringe before disposal and do not routinely recap needles

Liquid Medical Waste

When carrying or disposing of liquid medical waste, be careful to avoid splashing the waste on yourself, other people or surfaces. Carefully pour liquid waste down a sink, drain, flushable toilet or latrine. If this is not possible bury it in a pit. Rinse the sink, drain, or toilet thoroughly with water to remove residual waste, again avoiding splashing. Clean with a disinfectant cleaning solution at the end of each day, or more frequently if heavily used or soiled.
Decontaminate the container that held the liquid waste by filling it with a 0.5% chlorine solution and soaking it for 10 minutes before washing. Always wear heavily utility gloves and shoes when handling or transporting liquid medical waste. Wash both the gloves before ungloving and your hands afterwards.

Hazardous Chemical Waste

Cleaning solutions and disinfectants, such as glutaraldehyde, should be handled as described for liquid medical waste. Rinse containers thoroughly with water, wash glass containers with detergent and water, rinse thoroughly, and reuse. Do not reuse plastic containers. Always wear heavy utility gloves and shoes when handling or transporting hazardous chemical waste. Wash both the gloves and your hands afterwards.
Disposing of cytotoxic chemicals and radioactive waste requires special consideration beyond the scope of this training course.

SECTION 2: BASIC NURSING PROCEDURES

Introduction

In section one, you covered the concepts of infection prevention and control, which you will apply in nursing practice.
In this section, you will cover some of the basic procedures which include lifting and moving patients; collection of specimens; neurological assessment; taking vital signs; drug administration; incision and drainage; monitoring intravenous fluids; care for the terminally ill and last offices

Objectives

By the end of this section you will be able to:

- Describe the lifting and moving of patients
- Discuss the collection of specimens
- Explain how to make neurological assessment on a patient
- Describe drug administration
- Manage incisions and drainages
- Discuss the monitoring of intravenous fluids
- Discuss the care of the terminally ill
- Discuss last offices

Nursing Practice (1 of 2)

Nursing practice involves the application of knowledge and skills that improve an individual's level of health. In view of this, all nurses, regardless of their level of educational preparation, learn basic skills that are fundamental to the practice of nursing.
In unit one of this module you studied the definition of nursing. The American Nurses Association (1980) states that, **"Nursing is the diagnosis and treatment of human responses to actual or potential health problems. Nursing involves skills that are beneficial to sick or well individuals."**

You are being prepared to provide services in many diverse settings such as hospitals, schools, industry and home care.
The major goals of nursing are to:

- Promote health and prevent diseases
- Restore health
- Relieve suffering

The nursing skills help patients to:

- Breathe normally
- Eat and drink adequately
- Eliminate body wastes
- Move and maintain desirable postures
- Sleep and rest
- Select suitable clothing, dress and undress
- Maintain body temperature within normal range by adjusting clothing and modifying the environment
- Keep the body clean and well groomed and protect the integument
- Communicate with others in expressing emotions, needs fears or options
- Worship according to ones faith
- Work in such a way that there is a sense of accomplishment
- Play or participate in various forms of recreation

- Learn, discover and satisfy the curiosity that leads to normal health and use of the available health facilities

In the provision of comprehensive care you will be required to apply sciences such as anatomy, physiology, sociology and psychology. You will also be required to incorporate certain skills such as assessment, caring, counselling, and comforting skills.

Lifting and Moving Patients

Basic Guidelines when Transferring a Patient

Certain techniques are used when transferring a patient to help prevent injury to the patient as well as to the nurse.

The basic recommended guidelines for you to follow are:

- Know the patient's diagnosis, capabilities, weaknesses and any movement they are not allowed to undertake.
- Put on braces and other devices a patient may use before getting them out of bed.
- Plan exactly what will be done while transferring a patient so that appropriate techniques will be utilised. This is because without planning you or the patient may acquire an injury.
- Explain to the patient what will be done. Then use the patients ability to assist as much as possible to reduce the workload on you, the nurse.
- Remove obstacles that may make transferring more difficult prior to transferral.
- Elevate the patient's bed as necessary so that work is being done at a safe and comfortable level.
- Lock the wheels of the bed, wheelchair or stretcher to prevent them from sliding as the patient is moved

Basic Guidelines when Transferring a Patient

- Observe sound principles of body mechanics so that muscles are not strained and injured.
- Be sure to keep the patients in proper alignment during transfer procedures so that the patient is also protected from strain and muscle injury.
- Support the patient's body, especially near the joints. Avoid grabbing and holding extremely by the muscles, which will injure tissues and often put unnecessary strain on joints.
- Avoid causing friction on the patient's skin. Roll or push the patient when possible rather than pull them across bed linens. Friction can be reduced by sprinkling powder or cornstarch on the patient's skin and linens.
- Use smooth rather than jerky movements when transferring the patient. Jerky motion tends to put extra strain on muscles and joints and is uncomfortable for the patient.
- Be realistic about how much you can safely do without injury

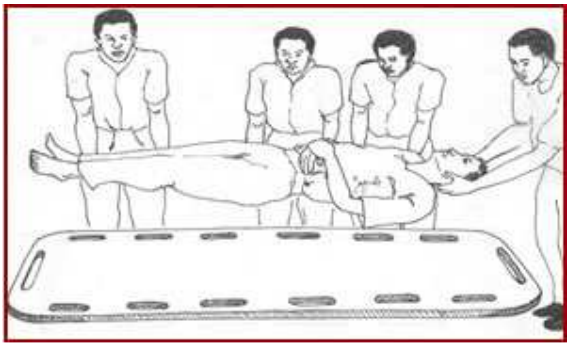
\

Transferring a Patient To and From a Stretcher

You must take great care, when transferring a helpless patient, to prevent injuring the patient and yourself.

The extremities and the head must be supported well. The most convenient way to move a patient is to place a sheet underneath them, then pull carefully on the sheet under the patient to another point, such as from a bed to a stretcher and from a stretcher back to a bed.

When a patient must be lifted and carried, a three-carrier lift is recommended.



Transferring a Patient From a Bed to a Chair and Back to Bed

The chair in which a patient sits should make it possible for them to maintain good posture. If a patient can assist and stand while they are being transferred from a bed to a chair or wheel chair, use the following techniques:

- Use equipment with firm and stable surfaces. If the mattress is soft and the patient sinks into it, place a bed board under it before transferring the patient to a chair or wheelchair
- Take the patient's condition into account
- Make distance for transferring as short as possible

- Place the chair or wheel chair parallel to and near to the head of the bed. Be sure that the wheels of a wheelchair are locked and the foot supports are in the upright position
- Place the short bed rails in the up position so that the patient can grasp a rail to sit up in bed and steady their self as they move.
- Stand on the side of the bed on which the patient will be moving. Do not reach across the bed to assist the patient. Help the patient to a sitting position.
- Allow the patient to sit a few seconds until you are sure they are not feeling faint.
- Pivot the patient appropriately as they sit at the side of the bed. If they are going to walk, help them put on shoes and stockings. Hard soled and well fitting shoes will give them more support than loose, floppy slippers.
- Place the bed in the low position or have a foot-stool handy on which the patient can stand on as they get out of bed.
- Face the patient, spread their feet to provide a wide base of support and balance, put one of your feet forward between the patient's feet, and flex the knees to provide stability. The patient puts their hands on your shoulders, while you hold in the ancillary area. Grasping the patient on their chest wall is uncomfortable and restricts breathing

Some nurses prefer to lock arms to assist the patient to a standing position. This entails the following procedure:

- As the patient's upper body is lifted, ask the patient to lift their self from the bed. If a footstool is used, assist the patient off of it while continuing to hold them.
- Maintain a wide base of support while pivoting with the patient so that their back is towards the chair.
- Bend the knees and keep the back straight as the patient is lowered into the chair or wheel chair.

After helping the patient to their feet, you should assist them into their chair. A chair with arms would provide another means for the patient to help support and guide them into the chair.

Have the patient assist by holding onto the armrests of the chair or wheelchair if they are available as they are being lowered onto it.

When a patient cannot assist with the transfer, for example, a patient cannot stand before they sit in a chair, it is best to have two persons lift the patient from the bed into a chair. One person can do so unless the patient is too heavy.

The single person technique is handy for home use and in situations when only one person is available. With the chair near the bed, and while supporting the patient from the back, gently move the helpless patient into the chair.

You should have a wide base of support. Bend your knees and rock back as the patient slides to the chair. Place the patient's feet and legs onto the bed first as you roll them off the chair and onto the bed.

Collection of Specimens

You are conversant with most of the procedures involved in the collection of specimens from patients because you have been performing these procedures. You may have assisted a doctor or clinical officer in the collection of specimens.

You have already studied infection prevention and control. During these procedures you will be dealing with body fluids and sharps. You therefore need to apply the knowledge you have acquired on infection prevention to be able to protect yourself, the patient and co-workers.

You also need to recall the body structures where the body fluids will be collected from and your knowledge of microbiology. You should not only know the techniques of collecting the specimens but also the interpretation of the findings. The specimens you will study include: blood, urine, stool, swabs and sputum.

Blood Collection

The indications for the collection of blood specimen include: anaemia, infective conditions e.g. septicaemia, severe haemorrhage and so on.

Think about what you require for the collection of blood specimens?

A nurse should have a tray containing:

- Disposable syringes and needles
- Sterile swabs and spirits swabs in separate containers
- A receiver for used swabs
- A rubber tourniquet
- Assorted specimen containers
- Strapping
- A pair of scissors
- Laboratory request forms
- Container for sharps
- Gloves
- Two blood slides
- Lancet/needle, which is sterile

The collection procedure will vary, depending on the type of investigation required. Whatever the case, you will need to prepare the patient, environment, equipment and yourself. The following preparations need to be undertaken

Patient
Explain the procedure to the patient and put them in a comfortable position.

Environment
Screen the bed. Ensure adequate working place.

Equipment
Wash the tray with soapy water, rinse and dry. Clean with antiseptic swab. Arrange the equipment neatly on the tray and take to the bedside. Label specimen bottles and slides.

Nurse
Wash your hands and put on gloves.

Method of Sample Collection
The following is standard procedure when collecting blood samples from a patient:

1. Identify the site
2. Apply the tourniquet
3. Decontaminate the skin at the site of puncture
4. Identify the vein
5. Introduce the needle and withdraw the required
   amount of blood
6. Release tourniquet
7. Withdraw needle
8. Apply pressure to the puncture site immediately
   after the needle is with drawn using a sterile dry swab
9. Put blood in correct specimen container
10. Put syringe and needle in sharps container
11. Ensure bottles are labelled correctly
12. Leave the patient comfortable
13. Send to the laboratory immediately with appropriate
    request form

Blood Slide for Malaria Parasites
The following method is suitable for use when analysing for the presence of malarial parasites:

- Clean the patient's middle finger with spirit swab.
- Pinch finger below puncture site and prick once with lancet or needle steadily.
- Wipe off the first drop of blood using a dry sterile swab.
- Squeeze and receive the next drop onto the blood slide and set aside.
- Squeeze the third drop and ask patient to smear this drop onto the second slide using the pricked finger.
- Ask the patient to apply pressure to the punctured site using a dry sterile swab.
- Allow blood to dry on slide.
- Leave patient comfortable.
- Take slides to laboratory with request forms.

Clearing
When clearing, do not forget to:

- Remove screens
- Discard disposable equipment
- Clean the tray and keep it in its place
- Decontaminate equipment, wash with soapy
  water, rinse, dry and store appropriately
- Wash hands
- Record, interpret and report findings

Urine Collection
Urine is taken to analyse for diagnostic purpose. Urine collection is used to indicate infective conditions and to confirm pregnancy. The requirements for effective urine analysis include:

- Appropriate specimen container
- Request form
- A measuring jug
- Spirit swabs in container
- Sterile syringe and needle
- Urine bag to collect specimen from babies and small children
- Gloves
- Toilet paper

Procedure
The following steps should be followed when undertaking urine analysis:

1. Explain the procedure to the patient
2. Ensure privacy
3. Assemble required equipment
4. Obtain specimen bottles and label
5. Wash your hands and put on gloves if necessary

Routine Urine Specimen
The following should be taken into consideration when collecting the urine specimen:

- If a patient is able to give specimen independently, instruct them to pass urine directly into the container.
- If patient requires assistance, give a clean bed pan/ urinal/ or in the case of infants, apply bag.
- Instruct the patient not to pass faeces into the bed pan.

- Pour the clean specimen into the specimen bottle.
- If the patient has an in dwelling catheter, allow urine to collect in bladder for approximately 30 minutes.
- Disconnect the catheter from urine bag, maintaining asepsis.
- Release clamps and allow urine to flow into the container.
- Test urine in the ward or take immediately to the laboratory with request form.

Midstream Urine Specimen for Culture and Sensitivity

If a patient is able to give specimen independently, instruct them as follows:

- Open specimen bottle carefully without touching
  the inside of bottle or lid.
- Wash genital area with soapy water, rinse and dry.
- Pass the first flow into the toilet, urinal or bedpan, the middle flow into the container and last flow into the toilet, urinal or bedpan.
- If the patient should require assistance, follow the above procedure except that you should clean the patient's genital area and/or apply a urine bag in the case of an infant.
- If the patient has an in dwelling catheter, allow urine to collect in bladder.
- Using the aseptic technique, swab the outside of the distal end of catheter, insert a sterile needle and, with the syringe still attached to the needle, aspirate the required amount of urine.
- Put urine into sterile specimen bottle.
- If catheterization is inevitable to obtain the specimen, follow catheterization procedure.
- Take specimen immediately to laboratory with request form.

24-hour Urine Specimen

Urine collection should start between 6 a.m. to 8 a.m. so that the specimen can be taken to the laboratory during early working hours. The following procedure should be adhered to:

- Give the patient a jug to void into.
- Instruct patient to collect all urine for 24-hour period.
- At the starting time, instruct patient to void and discard this urine.
- All urine subsequently passed, including the last voiding, is collected in the bottle for 24 hours.
- Take to laboratory immediately with request form.
- Decontaminate the urine jug. Wash with soapy water, rinse, dry and store appropriately.
- Wash your hands thoroughly.
- Record, interpret and report findings.

Swab Specimens

The following equipment is required when collecting swab specimens. You should have a tray containing:

- Container with culture medium if required
- Sterile swab
- Wooden spatula
- Torch
- Request form
- Normal saline in gallipots
- Slides
- Gloves
- Masks if necessary
- Sterile dressing pack if necessary
- Sterile speculum in kidney dish
- Warm water in a bowl
- Gauze swabs

Procedure

The first step is preparation.
For this you must:

- Explain the procedure to the patient
- Put the patient in appropriate position
- Screen the bed
- Ensure adequate working space
- Assemble the required equipment and take to bedside
- Label specimen container

Method

The method for collection of swabs differs according to the type of specimen being collected.

Throat Swab

When taking a throat swab, the following procedure should be adhered to:

- Ask the patient to open mouth wide and put tongue out.
- Depress the tongue lightly with spatula. Direct the light to the back of the throat and ask patient to say "A, A, A".
- Gently but firmly sweep over inflamed area, taking care not to touch the tongue with swab.
- Immediately put swab in container with medium using a septic technique.
- Take to laboratory immediately with request form.
- Leave patient comfortable.

Wound Swab
When taking a wound swab you should:

- Remove dressing if necessary. Observe the condition of the wound and determine the appropriate site for taking specimen such as infected area or pus.
- Gently but firmly sweep over the inflamed area once with sterile swab, making sure swab is well soaked with drainage.
- Immediately put swab in container with medium using a septic technique.
- Take immediately to laboratory with request form.

Wound Swab
When taking a wound swab you should:

- Remove dressing if necessary. Observe the condition of the wound and determine the appropriate site for taking specimen such as infected area or pus.
- Gently but firmly sweep over the inflamed area once with sterile swab, making sure swab is well soaked with drainage.
- Immediately put swab in container with medium using a septic technique.
- Take immediately to laboratory with request form.

High Vagina Swab
The following procedure should be followed when taking a high vagina swab:

- Request the patient to empty bladder, clean and dry the vulva with warm water using cotton swabs.
- Encourage the patient to breathe deeply for ease of insertion.
- Lubricate the speculum with sterile warm water.
- Insert the speculum gently and open it to expose the cervix.
- Direct light to cervical area.
- Gently but firmly sweep the high fornix area once, and put the swab into the container with medium.
- Remove the speculum gently and put in kidney dish for decontamination.
- Leave the patient comfortable.
- Immediately take specimen to laboratory with request form.

Clearing
After swabbing, the following clearing procedures should be adhered to:

- Remove screens
- Discard disposable items
- Decontaminate equipment, wash with soapy water, rinse, dry and store appropriately
- Record, interpret and report findings

Sputum Collection
A sputum specimen is collected to analyse for diagnostic purposes. If the specimen is for culture and sensitivity, it should be collected using septic technique. In children a gastric lavage is performed.
As a nurse, you should emphasise the importance of obtaining an early morning specimen, prior to cleaning the mouth or eating. Instruct the patient to cough deeply so that secretion comes from the lungs and is not simply saliva from the mouth.

Requirements
The following items are required when collecting a sputum specimen:

- Mouth wash
- A sputum mug
- Appropriate specimen container
- Request forms
- Gloves
- Mask, if necessary

Procedure
During the preparation phase, the following should be remembered:

- Explain the procedure to the patient.
- Screen bed if necessary.
- Assemble required equipment and take to the bedside.
- Label specimen container.
- Wash your hands and wear gloves if necessary.
- Instruct the patient on what to do and how to deposit the sputum into the specimen container.
- Take to the laboratory immediately.
- Offer patient mouthwash.
- Leave the patient comfortable.

After the specimen has been collected, the following clearing procedures are necessary:

- Decontaminate, wash with soapy water, rinse, dry and store appropriately.
- Offer patient sputum mug when necessary.
- Record, interpret and report findings.

Neurological Observations

Neurological observations are done to monitor the progress of a patient with suspected or confirmed injury to the nervous system or to

investigate the efficiency of the nervous system. These observations are indicated in unconsciousness,head injury following neurosurgery and poisoning.

Requirements
The following are required when undertaking a neurological examination. In addition to the neurological chart, you must have a tray containing:

- Torch with batteries
- Thermometers in lotion and swabs in gallipot
- Sphygmomanometer
- Stethoscope
- Receiver for dirty swabs
- Sterile pins (for pricking)

Procedure
Prepare the patient. This should be done in the following manner:

- Ensure that the patient is comfortable and appropriately positioned.
- Screen the bed if necessary.
- Darken the room if necessary.
- Clean and dry the tray and then arrange the equipment on it neatly.
- Get the neurological chart or draw up one if not available.
- Place the tray and chart next to the patient on the locker.

Method
The following method should be adhered to:

- Call the patient by name. If there is no answer, give a command e.g. 'open your eyes' or 'close your eyes'.
- If there is no response, record appropriately.
- If there is no response, press firmly the angle of the jaw below the ear using thumb or prick lightly with a sterile pin and observe facial expression.
- Record under response to stimuli as 'responding well' or 'not well'.
- If there is no response, or poor response, record under level of consciousness column as 'deeply unconscious' or 'semi-conscious'.
- To determine muscle tone and strength, ask the patient to grasp and squeeze your hands and compare the strength of each hand.
- Ask the patient to bend their knees and push feet against your palms and compare response and strength.
- Open both eyes and note size and shape of each pupil. Also check if both pupils are equal in size and whether they react to light equally.
- Open the left eye by raising the upper eyelid and shine the torch from lateral side towards the middle of the eye and note the pupil reaction to light. Wait for a few seconds, repeat the process and note reactions. Record response to light of left eye under 'L', if dilated or constricted and reacting or not reacting or sluggish reaction to light as applicable.
- Repeat the process for right eye and record under 'R'.
- Take the vital observations and record under appropriate headings.
- Note and report any change in all observations (it is important to report promptly) to include volume of pulse, depth and regularity of breathing, temporary cessation of breathing.
- Continue with these observations ¼ to ½ hourly or as indicated by the doctor.
- Keep the patient comfortable.

Clearing
Clear as necessary, following the basic procedures outlined previously and then record, interpret and report findings.

Administration of Drugs

Drug administration should be performed systematically and carefully to ensure that the right patient is given the correct prescribed drugs and dose and at the right time.

Oral route
The Take Medicine Orally procedure is indicated in the treatment of disease/conditions whereby a patient is able to swallow.

Requirements

The following should be kept in mind in relation to the administration of drugs. On the top shelf ensure there is the following items:

- Drugs in use in a tray with labels facing the front
- Medicine measures
- Spoons for capsules tablets/pills
- Special spoon for liquid drugs
- Small plates or saucers x 2
- Medicine cloth x 1
- Clean, plain paper for crushing tablets
- Hand towel
- Damp bottle cloth
- A paper for recording antibiotics and missing drugs
- Milk in a jar or packets for special patients

On the bottom shelf ensure there is:

- Drinking water in a jar
- A bowl of warm soapy water for cleaning spoons and measures
- A tray containing syringes and kidney dish, a gallipot with water or blue litmus paper (if required for drugs administered through a nasal gastric tube)
- A receiver for contaminated items

Preparation

During the preparation phase, you should:

- Explain the procedure to the patient
- Ask the patient if they have any allergies
- Ensure all patients are in their right beds and ready
- Ensure the environment is conducive to safe drug administration
- Clean the trolley and dry it
- Wipe the medicine measures, spoons, bowls and plates then place them on the trolley
- Place a clean piece of paper on the trolley under the plates
- Prepare the paper for recording antibiotics and any other relevant information
- Put cold water in the jar and place on the trolley
- Put warm water in two bowls and prepare the soapy water
- Arrange the commonly used drugs on the tray
- Check with the ward in charge for any labels that are not clear or any spoilt labels
- Close and lock the medicine cupboard and put the keys in your pocket

If you have any patient on drugs through a nasal gastric tube, make the tray for this ready before preparing your medicine trolley. You must have a pen and a watch ready at all times.

It is safer for the nasal gastric tube procedure to be conducted by two nurses. In case of students, a qualified nurse should guide them.

Method

When administering drugs, the following methods should be adhered to:

- Wash your hands and dry them
- Wheel the trolley and begin from one end of the ward
- Take the treatment sheet, read the patient's name and confirm by asking/calling patient's name to ensure that they are the right patient in the right bed
- Check on drug allergies
- Read the whole treatment sheet noting the drugs that are due to be given, according to the date and time
- Read the prescription against the containers, checking with the second nurse, and note the dosages on the prescription and on the container
- If mixtures, shake the bottle gently by turning up and down until the drug is well mixed
- Make sure the label on the bottle is uppermost to avoid soiling the label
- Remove the cork/cap and pour the drug in the medicine measure or spoon
- Measure the dose at the eye level when using the measuring container
- Replace the cork cap
- If a patient is getting more than one mixture use separate container for each mixture
- If tablets, put the needed tablets into a spoon, put spoon on a saucer
- Take medicine to the patient
- Check the dose, date and time against the prescription before giving it to the patient
- Confirm the right patient by name before giving the medicine
- Make sure the patient swallows the medicine in your presence
- Give a drink of water, milk or juice
- Record all the antibiotics and other drugs in the patient's notes as you give them

Never leave the medication trolley unattended!

Clearing
When clearing, make sure the following procedures are carried out:

- Wheel the trolley to the duty room
- Wipe all the bottles and make sure all containers have their lids well secured
- Clean the spoons, bowls, medicine measures and dry them before returning them to the cupboards
- Replace the drugs tidily in the cupboards
- Wipe the trolley and leave in the correct place
- Clean the medicine cloth if dirty
- Record all the antibiotics in the antibiotic register and any other special drugs in the care index
- Report any missing drugs and important observations of the patients' conditions to the ward in charge
- Record, interpret and report findings, for example, if drug vomited, drug refused, drug reaction, general condition of patient and so on

Injections
There are several types of injections, that is: intramuscular, hypodermic/subcutaneous and intradermal. Each of these will be covered in turn.

Intramuscular
This injection can be administered on several sites.
These include: the upper outer quadrant of the buttock (deep into the muscles); anterior lateral aspect of the thigh and the deltoid muscle in selected cases.
The method of injection involves holding the needle at an angle of 90 degrees to the skin.

Hypodermic/Subcutaneous
This injection can be administered on the upper outer arm or thigh (into the connective tissue) or in the abdominal wall.
The needle should be held at an angle of 45 degrees to the skin.

Intradermal
An intradermal injection is performed on the dorsum of the forearm. The injected fluid raises a wheal. This is used mainly for BCG, Mantoux test or drug test doses. Stretch the area of the skin between the thumb and finger.
Introduce the needle into the skin keeping it parallel to the skin at 10-15 degrees angle. Do not massage the area after removing the needle.

General Requirements for Giving Injections
When giving injections ensure that the following are to be found on the top shelf of the trolley:

- Drugs to be used in a container
- A file
- Sterile water for injection
- Spirit swabs in a bowl
- Disposable sterile syringes and needles in a container
- Receiver for carrying the drug to the bedside
- Paper and pen for relevant information

And on the bottom shelf of trolley:

- Receiver for used swabs
- Well labelled sharps container for used syringes, needles and ampoules
- Container for vials

Preparation
When preparing the patient for the procedure, please ensure that you undertake the following steps:

- Explain the procedure to the patient
- Check for allergies
- Screen the bed if necessary
- If a trolley is not in use, prepare a locker for tray storage
- Make the injection list from the patients note
- Wash hands and clean the trolley
- Clean the tray and disinfect it with spirit swabs
- Assemble equipment on the trolley
- Place the tray on the trolley and place the sterile equipment on the top shelf
- Put the un-sterile equipment, injection list and rough paper on the top shelf at the side
- Two nurses should work together

This is a sterile procedure as you studied in section one of this unit.

Method
The following general method should be followed:

- Take the ampoule or vial of the prescribed drug from the locked cupboard
- Check the name, dose of the drug and the name of the patient against the prescription
- Wash hands, dry them on a clean towel and put on gloves

- Pour a little antiseptic over one of the swabs to be used in order to clean the skin area of the injection
- If using ampoules, file the neck then, protecting the fingers with a cotton wool swab, break the ampoule off the neck
- If a using a vial, remove the metal cap, use spirit swab to clean the top
- Dilute the drug with the correct amount of water and mix well
- Draw up the drug into the syringe, then using a cotton wool swab placed at the neck of the syringe, hold up and eject any air which might have entered the syringe. This prevents any spray of drug from contaminating your hands and face
- Remove used needle and discard in sharps container and replace with new needle, place in sterile container (e.g. kidney dish, paper bag) and place on tray
- Take trolley/tray to the bedside
- Explain the procedure to the patient a second time and ask them not to move while you are giving the injection
- Check the name, the dose of the drug and the names of the patient again at the bedside, care must be taken if there are two patients in the ward bearing the same names
- Locate the injection site and clean it with the spirit swab
- Hold the skin between the fore fingers and thumb and insert the needle
- Withdraw the piston slightly to ensure that the point of the needle has not entered a blood vessel, if blood is seen discard medication and equipment and prepare again
- If all is well, push the drug in and with the swab placed over the needle withdraw quickly
- Give a little massage to aid in absorption of the drug
- Immediately discard needle and syringe into
  sharps container

Always use an injection list to guide you on
what drugs to remove from the cupboard!

Clearing
After giving the injection it is important to ensure that proper clearing takes place. For this reason, you should:

- Tidy the patient's bed and leave them comfortable
- Remove the screens to their appropriate place
- Take the trolley or tray to the duty room and clean with soap and water
- Discard swabs in the dustbin and leave the room tidy
- Record the antibiotics in the antibiotic register or any other drugs in the care index and in the patient's notes
- Remove gloves and dispose as appropriate. Wash hands with soap and water and dry them

Do not leave the medicine trolley or tray unattended.
The drug cupboard should be kept locked and keys kept in the pocket of the one administering drugs.

Finally, record, interpret and report findings.

Monitoring Intravenous Fluids

Intravenous fluids are those solutions instilled within the patient's vein. They may include solutions of water and chemicals normally found within the body, dissolved medications or blood, blood extracts and blood substitutes.
You will be expected at times to administer and regulate
intravenous fluids.
You will also be assigned to care for patients receiving parenteral fluids thereby monitoring the infusion, observing the patient and discontinuing the therapy as necessary

List five indications for administering intravenous fluids

- To restore fluid balance quickly when a patient experiences a significant fluid loss
- To prevent fluid imbalance for a patient who is currently or potentially likely to experience a loss of body fluid
- To maintain fluid balance when the patient temporarily is unable to eat and drink
- To replace specific electrolytes or other chemicals such as water soluble vitamins
- To provide some measure of nutrition
- To administer medications
- To replace blood cells or specific components of blood

You must exercise extreme caution to ensure that the correct solution is infused, because any substance that is instilled directly into the circulatory system produces a rapid effect due to its almost instant distribution throughout the body.
There are two categories of intravenous fluids: crystalloid or colloid solutions.

Crystalloid Solutions
Crystalloid solutions are a mixture of water and salt or sugar. They can be further sub-divided into isotonic, hypotonic and hypertonic solutions.

An **isotonic** solution contains an **equal** amount of dissolved crystals as normally found in plasma.

A **hypotonic** solution contains fewer dissolved crystals than are normally found in plasma. It presents as a dilute solution in comparison to the fluid within and around cells.

A **hypertonic** solution has a higher amount of dissolved crystals than present in plasma. It will draw water into the intravascular compartment from the more dilute areas of water within the cells and interstitial spaces.

Solution	Components	Specific Comments
Isotonic solutions 0.9 % saline (normal saline) 5 % dextrose and water (DW). Ringer's solution or lactated Ringer's.	0.9 of sodium chloride per 100 ml water 5 g of dextrose (glucose/sugar) in each 100 ml of water. Water and mixture of sodium chloride, calcium, potassium, Bicarbonate and in some cases lactate.	Contains an amount of sodium and chloride physiologically equal to that found in plasma. Isotonic when infused but the glucose is metabolised quickly, leaving a solution of dilute water. Replaces electrolytes in amounts similarly found in plasma. The lactate, when present, helps maintain acid base balance.
Hypotonic solutions 0.45 % sodium chloride (Half strength saline) 5 % dextrose in 0.45 saline.	0.45 g of sodium chloride in each 10 ml of water. 5 g of dextrose and 0.45 & sodium chloride per 100 ml of water.	A smaller ratio of sodium and chloride than found in plasma causing it to be less concentrated in comparison. The sugar provides a quick source ion energy, leaving a hypotonic salt solution.
Hypertonic solutions 10 % dextrose in water (Diolw) 3 % saline	10 g of dextrose per 100 ml of water. 3 g of sodium chloride per 100 ml of water.	Twice the concentration of glucose than present in plasma. The high concentration of salt in the plasma will dehydrate cells and tissue.

Check your medicine cupboard. What do you find on the bottom shelf?
Normally nursing units stock commonly used intravenous solutions in utility rooms or medication cupboards.
Blood and blood products are stored in the blood bank.
The preparation of solutions and equipment requires adherence to principles of asepsis. You should therefore practice good hand washing technique, and skills that will prevent contamination of any openings, or equipment that could introduce organisms into the patients' circulatory system.

Performing Vein Punctures
You will become skilled in performing vein punctures with continued practice and experience, especially with relation to site selection
and insertion.

Selecting a Vein
The choice of the site of a vein puncture varies with each patient.
While selecting a vein you should consider the following factors:

- Superficial veins are easily located and are more accessible for puncture.
- Veins in the arm and hands are preferred to veins in the foot or leg.
- Use veins in the arm or hand on the patient's non-dominant site.
- At times, the choices available for possible sites may be limited by the patient's condition, for example, in cases of severe burns of both arms.
- Avoid using an area of a vein that will compromise joint movement.
- Distend and inspect the veins. It is best to select a vein as low as possible on the back of the hand or on the lower forearm.

If the vein is damaged, another vein higher on the arm can be used subsequently.

- Feel and look for an area in the vein that is fairly straight.
- Avoid thin walled and scarred veins. They are difficult to enter. A normal vein is smooth, pliable and resilient.
- Do not insert a needle into a valve in the vein.
- Use larger veins for infusing hypertonic solutions, those containing irritant medications, those administered rapidly and those that are thick or sticky.
- These should be infused in the forearm.
- Spare sites that may be needed for subsequent infusions. If the duration of fluid is likely to be lengthy change sites periodically.

Calculating the Infusion Rate

It is your responsibility to calculate, regulate and maintain the rate of flow according to prescription. The prescription indicates the number of millilitres to be given within a period of time, for example, eight or two hour periods. You should then calculate the flow on the basis of drops of solution per minute.

How do you determine how many millilitres of solution are to be given each hour?

Just look at the following formula:

Total number of mls to be given
Hours in which the solution is to be infused

Here is an example scenario:

3000 ml of solution to be infused over a 24 hour period

3000ml
24 hours
= 125 ml to be infused per hour
= ml to be given per hr

You should then determine the number of drops to be infused per minute as shown below:

Number of ml per hour x drop factor = drops per minute
60 minutes

If 125 ml needs to be infused per hour, and the intravenous equipment has a drop factor of 20 drops equal 1 ml.

Try to calculate how many drops need to be infused per minute using the formula above

125 ml x 20 drops/ml = 41.67 = 42 drops per minute
60 min

You should then count the number of drops falling into the drip chamber of the tubing per minute. By adjusting the regulator clamp, the number of drops per minute will be increased or decreased until the infusion matches the rate you calculated, i.e. 42 drops per minute.

Monitoring the Rate of Infusion

It is important to maintain the proper rate of flow because too slow a flow may not meet the patient's needs for fluid and infusing fluid too rapidly may overburden the body's ability to adjust to increases in the fluid volume, the electrolytes or the medications that may have been added. Make timely observations at least every hour to determine that the volume of intravenous solution is infusing according to schedule. You could mark the container at points indicating the amounts that should be infusing hour by hour so that at a glance you are able to tell whether the solution is being infused at proper hourly rate.

Re-adjusting the Rate of Flow

You may need to make necessary adjustments in the rate of flow if the infusion is not progressing according to schedule.

To compensate for a low or excess of infused volume, the rate should be adjusted over each remaining hour of administration. The increased or decreased rate should never exceed 25% of the original infusion rate.

Example Scenario

The fluid is to infuse at a rate of 125 ml per hour or 42 drops per minute using the drop factor of 20 drops equal 1 ml. Two hours after hanging 1000 ml of fluid you note that only 125 ml have infused instead of the scheduled 250 ml. A total of 875 ml remain in the container.

You should assess the site, pulling back on the needle a bit, lowering or elevating and depressing the needle you may determine that the rate has slowed due to the level of the needle resting against the vein wall. Reposition the angle with a small piece of gauze. Recalculate the new rate of flow by using the following formula.

Millimetres of fluid remaining
Hours of administration remaining = new volume of ml per hour

Try to calculate the new volume to be infused per hour using the formula above

875 ml = 145. 8 = 146 ml per hour
6 hours

To determine this recalculated rate will not exceed the 25% limit, you should calculate as follows.

Step One
Previous volume per hour – new volume per hour = ml of difference
Example:
146 ml per hour (new volume) –125 ml per hour (previous volume) = 21 ml difference

Step Two
Millilitres difference x 100
Previous ml per hour = Percentage of rate change

21ml
125 ml= 0.168 x 100 = 16.8 = 17% change in infusion rate

Since this is within the acceptable range of safety, you may readjust the rate of flow using the previous formula for calculating the drops per minute in order to infuse the new volume.

146 x 20 = 48.67 ml = 49 ml per hour (new rate)
60

If the difference is greater than 25% inform the doctor of the current fluid assessment such as the patient's blood pressure, pulse, respiratory rate and current urine output. The doctor may prescribe a readjustment in the volume that can be infused.

Care of the Patients
When caring for the patient after performing a vein puncture the following points should be kept in mind:

- Maintain personal hygiene
- Maintain the infusion
- Inspect and dress the vein puncture site
- Maintain aseptic technique when changing on the dressing the vein puncture site
- Take care when changing solution containers or infusion tubing

How do you detect complications?

Make regular assessment of the site of the infusion, the equipment that is delivering the infusion and the patient's overall responses during the fluid infusion. You should be on the alert and be prepared to take action if any signs of complications occur when a patient is receiving intravenous fluids.

Report immediately signs and symptoms of problems with respirations such as dyspnoea, noisy breathing and coughing. Respiratory and cardiac problems are caused by circulatory overload. This may be caused by administering too much solution too quickly in relation to a patient's ability to circulate the added volume or eliminate it through urination.

If you detect complications what actions should you take?
Think of some actions you would take having detected complications.

The following actions should be taken if respiratory problems are detected:

- Decrease the flow rate
- Place patients in Fowler's position
- Assess vital signs
- Notify the doctor

This is a serious complication. The infusion may have to be stopped. Check for infiltration of the solution (that is, if the solution is running into tissues) commonly caused by a dislodged needle or a needle that has penetrated the wall of the vein.
If this happens you will observe the following:

- A slow rate
- No flow of solution
- Swelling in the area of the vein puncture site
- A burning sensation
- Local pallor of the skin
- Coldness

You should take the following action:

1. Remove the needle
2. Check for phlebitis, which may occur when a solution is irritating to the vein or the vein-puncture device remains in the same site for a prolonged period of time. This is evident by the area being red, warm, swollen and painful. The heart may slow due to localised oedema
3. Select a new site for introducing additional solution
4. Elevate the arm and place warm compresses over the area of inflammation for 20 to 30 minutes, three to four times a day for one to two days
5. Notify the doctor if the fluid contained a drug that may cause injury to tissue
6. Avoid further use of vein
7. Remove the vein-puncture device
8. Restart the infusion in the opposite arm or head
9. Apply warm compresses as described earlier

Infection of the site may occur and could spread to other parts of the body through the blood stream. Evidence of infection includes:

- The site may appear red and puffy
- Purulent discharge may be present
- The patient may have a rise in temperature and/or chills

In the event of possible infection:

- Discontinue the infusion and notify the doctor
- Apply aseptic technique when dressing the wound
- Take pus swab for culture and sensitivity

Discontinuing the Infusion

Discontinue the infusion when the amount of ordered solution has been infused and no more is scheduled to follow. To discontinue the infusion:

- Clamp the tubing and remove the tape that held the dressing and vein-puncture device in place
- Gently press a sterile dry gauze swab over the site of puncture
- Remove the needle or catheter by pulling it out without hesitation following the course of the vein
- Apply pressure to the injection site for 30 to 45 seconds while elevating the forearm. This technique helps to stop bleeding from the injection site. Apply a small sterile dry gauze swab over the dressing and secure it firmly
- Flex and extend the arm or hand several times to help the patient regain sensation and mobility in the area where the needle was located.
- Record the amount and the type of fluid infused during the current shift on the patient's fluid intake record.
- Document and sign for the time of termination, the type of fluid and condition of the vein puncture site in the patient's care index.
- Remember to also give a verbal report.

Incisions and Drainage

Incision is a clean separation of skin and tissue with smooth, even edges.

A drain is a hollow tube through which liquid secretions from a wound are removed. Some drains are sutured in place, while others may be prevented from slipping beneath the skin by placing a safety pin or clip on the end extending from the wound.

When caring for a patient with a drain you should do the following:

1. Assess the characteristics and amount of drainage.
2. Cleanse the area around a drain using principles of asepsis.
3. Remove a drain as indicated.
4. Prevent injury to the wound or displacement of any granulation tissue that may be present.

Care for the Terminally Ill

A terminal illness is one from which recovery is beyond reasonable expectations. The condition contributing to death may be a disease or the result of injury.

When a patient is dying, you are faced with dual responsibilities. The patient requires holistic care, while at the same time the patient's family and friends need support, because all persons who have a significant relationship with the patient are dealing with grief.

In your opinion, what is grief?

Grief encompasses the physical and emotional feelings related to separation and loss. You will deal with many aspects of the dying and grieving experiences. You will cover the unique emotional, spiritual and physical problems of the terminally ill, and approaches that are hopeful in dealing with anticipatory grief.

Most individuals react instinctively when they are personally involved with impending death. Some common reactions among patients, family members and health care professional include denial, avoidance and hope.

Think of your own definition of denial, avoidance and hope.

Denial is a physiological technique in which an individual does not believe certain information to be true.

Avoidance is a technique used to separate oneself from situations that are threatening or unpleasant.

Hope is the ability to cling to the possibility of a positive outcome against overwhelming odds. Most individuals prefer to deal with death only when it becomes absolutely necessary to do so

How do you prepare yourself to provide terminal care?

You may have already cared for a terminally ill patient. How did you feel? What were your coping mechanisms? Personal values and attitudes are closely associated with the quality of care you provide. You will explore various

aspects of death and dying before being faced with the actual experience.
You must understand your personal feelings about death and dying before you provide terminal care. If you neglect to do so, you will avoid involvement and remain detached. The most likely result of this attitude is that the dying person and the family will feel emotionally abandoned and are left to face a very frightening situation alone as you provide care without feelings.

What do you think about death and dying?
Go through the following questions to provoke your thinking about death and dying. Assess your personal feelings. Some good questions to ask yourself are:

- What is my concept of death?
- Who or what has contributed to my feelings about death?
- What experiences are especially important to me before I die?
- Would I want to know that my condition is terminal?
- If I could control the events that lead to my death what would I want them to be?
- Whom would I want to be present during my terminal illness?
- Where would I prefer to die?
- What fears do I have about death?

Developing a Support System

You should not feel that the burden of care depends solely on you. Other healthy team members may complement and supplement the nursing care of the terminally ill patient and their family. When you feel a sense of support you are in a better position to support others.
A support system among peers begins by developing an environment, within which nurses working together know that they can turn to each other. Peer support works best not only when you reach out for the support you need but also recognise when your peers need help and can readily say, "How can I help you?"
You will find yourself dealing with ethical and legal issues when caring for a terminally ill patient, such as euthanasia, a living will, and organ donations.

Euthanasia

Euthanasia means an easy death or mercy killing. Euthanasia is considered when death is inevitable and life-saving measures are of questionable benefit.

You will now look at types of euthanasia. These are classified as active and passive euthanasia.

Passive euthanasia uses techniques that relieve pain but do not delay natural death from occurring.

Active euthanasia is the deliberate ending of life of an individual who is suffering from an incurable condition. This latter form of euthanasia is illegal.
No matter how hopeless the situation is, the patient and their family must remain the focus of attention. They need medical care. Remember, they need time to work through their feelings. There is need for providing quality care and dignity to the dying patient's life. Effective communication must be central to all decisions. When a Do Not Resuscitate (DNR) order has been given, you should ensure that the following is done:

- The patient and their family must understand the terminal nature of the condition.
- The patient and their family should receive explanations of the possible alternatives for treatment and the options that are available.
- Some notation about the discussion with the patient or family should be documented in the progress notes.
- The patient should make the final decision if they are rational and capable of doing so.
- The family members should all be involved in the decision, substituting their judgement for what they believe would be the wishes of the patient, should the patient not be capable of making a decision.
- The order must be written on the patient's permanent record. A verbal order or a telephone order is not sufficient.
- The order should be reviewed periodically and changed at any time the patient or the family so decides.

A Living Will

A living will is a written statement describing the wishes of a person concerning their medical care when their death is near. The written document helps guide the family and health workers to understand and implement an individual's wishes if they are unable to participate in the decision making process.
A living will may specify the desire for life sustaining measures or opposition to these. It generally describes a desire to avoid being

kept alive by artificial means or use of heroic measures when the patient is terminally ill and when there is no reasonable expectation of recovery. You are advised to follow the doctors' orders and the laws of the country when using life-prolonging measures for a terminally ill.

Organ Donation

Body organs and tissues such as kidneys, heart, liver, pancreas, corneas, lungs and skin may be needed for transplants. Donations must be voluntarily given. Prior to death patients may grant such permission. After death, the next of the kin must sign a permit before tissue or organs may be removed from the body. Should you find yourself involved in asking terminally ill patients or their families about eventual donation of organs, you must be sensitive, compassionate and articulate. Keep these points in mind:

- No one should feel that another patient is being favoured at the expense of the donor.
- Those approached as potential donors may feel victimised and extremely distraught.
- Care must be taken that these individuals are not coerced into agreeing to organ donations or made to feel guilty for refusing.

You should get acquainted with the laws and policies concerning organ donations.

Informing the Dying Patient

Most patients realise even without being told that they are suffering from an incurable disease. This may be through non-verbal communication of the patients' family and health personnel. Patients feel isolated, lonely and rejected when the truth is withheld. Informed patients usually react negatively at first. Nonetheless, there are several advantages when the truth is revealed. These include:

- Maintaining all relationships with the patients on the basis of honesty rather than sustaining the false premise that recovery will occur.
- Providing the patient with the opportunity to complete unfinished business.
- Permitting the use of still unidentifiable inner resources that have been demonstrated to prolong life 'the will to live'.
- Promoting more meaningful communication between the patient, family and health care personnel.
- Resolving grief earlier and more effectively. Grief is resolved well when individuals state they want say and do things with the dying patient that they would later regret not having done.

Patterns of Emotional Reactions

Studies have shown that there is a common pattern of responding to the knowledge of an impending death. Dr. Elisabeth Kubler Ross describes stages that a dying person experiences as follows:

The Stages of Dying according to Dr. Elisabeth Kubler Ross

Stage	Typical emotional response	Typical comment
First stage	Denial	"No, not me." The patient may think there has been a mistake.
Second stage	Anger	"Why me?" the patient's hostility may be directed toward family members, friends or health workers.
Third stage	Bargaining	"Yes me, but…" The bargain may be a promise to go, if the patient is a religious person, in exchange for more time or a person may say he will do anything in exchange for such experiences as seeing a child graduate from school enjoying his next birthday.

Fourth stage	Depression	"Yes me," the patient feels sadness and often cries as though they is mourning their own death.
Fifth stage	Acceptance	"I am ready". A positive feeling and a readiness characterise the comment for death. This stage is usually peaceful and tranquil.

Note that not all persons go through these stages in the order described in the Stages of Dying table. A person may skip one of those stages, or fall back a stage. Stages may overlap. The length of any stage may range from a few hours to months. Knowing about these stages will assist you to understand and help patients and the families cope with dying.
Here are some suggestions Kubler Ross and others have offered on how to help patients through the stages of dying:

- Accept whatever manner in which the patient responds.
- Provide a non-judgemental atmosphere in which the patient can express their feelings freely.
- Be ready to listen, especially at night when patients tend to awaken and want to talk.
- Work to understand the patient's feelings.
- Provide the patient with a broad opening for communication such as "Do you want to talk about it?" This allows the patient to choose the topic that they wish to discuss.

A terminally ill patient may require continuous hospitalisation, home care or hospice care. You should be able to anticipate the services needed by the family and assist in obtaining them. You should be able to provide support and continuity of care at home

Home Care

When coordinating home care, make sure that:

- The family and the patient prefer home care to other options
- The family and the patient are aware of the patient's diagnosis and prognosis
- A support system is available for professional consultation and help with care as necessary
- Any special equipment needed for the patient is availed
- A person is ready and able to assume primary responsibility for the patient's care

Generally, terminally ill patients cared for at home, compared to those in hospital, enjoy greater emotional comfort and dignity and their families adjust better to their dying and death.

When their family members in a familiar environment surround the terminally ill patient, they feel more secure. The family members are able to communicate and demonstrate their love and affection without any intimidation. Having family members care for the patient lessens guilty feelings. Children can participate more extensively in the last days and can be helped to understand death with less fear.
The process of dying is a gradual one. Family members can start working through some grieving phases. When the care of the dying patient is too complex or very demanding for family members, hospice care is recommended when available.

Hospice Care

Hospice care as defined by Dr. Cicely Saunders of England, is a way station where terminally ill persons can live out their final days with dignity and meaningfulness in a caring environment. Hospice care emphasises helping the patient live until they die with their family with them and helping the family return to normal living after the patients' death. Hospice cares also emphasises preserving a bond between the patient and their family and helping them to be prepared so that death can be more readily accepted as a normal part of life.
If you are not familiar with the term hospice care there is a facility of this nature at the Kenyatta National Hospital, Nairobi and Moi Teaching and Referral Hospital, Eldoret and others are gradually coming up.

Responding to Emotional Needs

A dying patient requires emotional support. The patient's helpless feelings cause them to depend upon others to provide them with a sense of being safe, secure loved and worthwhile. You can help the patient and their family by sustaining realistic hope, understanding common fears, facilitating communication and helping the family accept reality.

Sustaining Unrealistic Hope

Realistic hope involves a wish for something that is more than likely possible. The patient, the family and health care personnel will manifest some degree of hope which may not be realistic nor in agreement with one another. Nonetheless, unrealistic hope should be supported. You should provide statement like 'we will continue to do everything we can and hope you are right about your expectations'. This comment neither shatters hope nor supports unrealistic hope.

Understanding Common Fears

Fears are as varied as attitudes toward death. Most people fear death because it represents a force over which there is no control. Some may choose to fight it, while others look forward to death as a relief from earthly suffering and sorrow. Yet others feel so depressed and desperate that they have suicidal tendencies. You are required to relieve the patient's fear concerning death so as to facilitate moving to stage of acceptance in which the patient can die in peace and dignity.

The Common Fears of Dying

Abandonment	Many dying patients feel isolated and alone. You should encourage the family to be present and involved. It relieves the feeling of separation from others.
Extreme pain	Discomfort that cannot be relieved is both physically and emotionally exhausting. Provide measures for controlling pain.
Loss of control	This may be related to inability to control bodily functions such as faecal or urinary elimination, diminished intellectual capacity or the inability to maintain a previously held role within the family unit.
Dependence	Most adults resent having to depend on others for functions that once were performed independently.
Body alterations	Some terminal illness is treated by the surgical removal of body structures. Drug therapy may cause hair loss or other changes in the patient's overall appearance. The patient may feel that they will repulse others.
Loss of dignity	Dying patients fear being treated as an object rather than a person.
Financial ruin	Medical expenses are bound to accumulate during a lengthy illness. The potential for leaving one's family penniless is a common fear.

Facilitating Communication

A patient may verbalise statements that mask their true feelings or may talk in symbolic language. The comments may be made to determine if others can tolerate talking about a certain subject. They may also be used as a substitute for revealing thoughts that are too frightening to discuss. Open communication between you, the patient and the family can help individuals to cope and deal with the reality of issues concerning death.

You may need to interpret what a patient may be trying to say abstractly. Non-verbal communication often conveys messages more clearly than verbal communication. What you should do is to: 'listen to what is being said'. Important clues about feelings or ideas that they are too frightened to express openly may be understood in the following ways:

- Paraphrase or restate what may be the message.
- Provide time for the patient to perceive confirm or deny the interpretations.
- Pace the conversation, but do not press the patient to communicate.
- Too slow a response may be equated with disinterest.
- Firing questions may be associated with insensitivity.

Accepting Reality

There comes a time when it becomes apparent that death will no longer be delayed. The patient and their family will find comfort in knowing this. The patient's discomfort is eased if they can express how meaningful and appreciated the dying person has been.

Meeting Spiritual Needs

Many terminally ill patients find great comfort in the support they receive from their religious faith. Help the patient in obtaining the services of a religious leader.

A minister, rabbi, sheikh, or priest is one of the team assisting the patient to face terminal illness. You should continue to provide kind words and a gentle touch.

Attending to Physical Needs

You have a responsibility of helping the patient meet their physical needs, which include providing nourishment, maintaining elimination, administering hygiene, controlling pain, protecting from harm, modifying environment and involving family members in the patients' care.

Providing Nourishment

The terminally ill patient has little interest in nourishment.
The physical effort of eating and drinking are very taxing to them. Nausea or vomiting may interfere with adequate food consumption. Consequently, poor nutrition leads to exhaustion, infection and other complications such as developing pressure sores. The patient may take fluids or tube feeding to maintain nutrition and fluid intake. When death is near, the normal activities of the gastrointestinal tract decrease. If you offer large quantities of food, the patient may get distension of the abdomen, which adds to the discomfort.
Offer frequent sips of water if the swallowing reflex is present.
As swallowing becomes difficult, aspiration may occur when fluids are given. The patient may be able to suck on gauze soaked in water or ice chips wrapped in gauze without difficulty because sucking is one of the last reflexes to disappear as death approaches.

Maintaining Elimination

Some patients may be incontinent of urine and faeces. Others may be having retention of urine and constipation.
Provide cleansing enemas, but remember that if a patient is taking little nourishment there may be little amounts of faecal material in the intestine. Cauterise at regular intervals.
An indwelling catheter may be necessary for some patients. Take care to maintain skin care if the patient is incontinent of urine and faeces to prevent odours and decubitus ulcers. Waterproof bedpans are easier to change than bed linen.

Ensuring Proper Hygiene

Keep the dying patient clean, well groomed and free of unpleasant odour to maintain the dignity of the patient. This can be done by:

- Maintaining oral hygiene
- Maintaining eye care
- Maintaining skin care by sponging them and keeping them dry to promote relaxation and quiet sleep as well as cleanliness, please note that a complete bath may be tiring and cause extreme discomfort
- Maintaining wound care if applicable
- Keeping the bed linen and bed clothing dry
- Keeping the patient's hair clean and groomed

Positioning the patient

Maintain proper positioning of the patient. Ensure there are frequent changes in position. Put the patient in semi-sitting position if dyspnoeic. Place the patient on their side if they have noisy breathing to keep the tongue from obstructing the airway.

Controlling the Pain

Keep the patient free from pain but do not dull their consciousness or ability to communicate. Control pain when it is minimal and before it becomes intense to the point where it requires larger doses of analgesics.

Protecting from Harm

In order to protect the patient from harm:

- Put aside the rails on the bed if the patient is restless
- Allow the patient's relatives to remain with them so that they do not injure themselves
- You should maintain a close watch on the patient

Modifying the Environment

Modifying the environment involves:

- Placing the patient in a room close to the nursing station for the convenience of giving nursing care and so as to observe them at frequent intervals
- Making the patient's room meaningful to them, this enables the patient to feel more comfortable and secure
- Provide pictures, books and other significant objects
- Using normal lighting, terminally ill patients often complain of loneliness and fears which may be as a result of poor vision exaggerated by darkening the room
- Ensuring that the room is well ventilated

- Speaking to the patient in a normal tone, as whispers may mean to them that there are some secrets being hidden
- Taking care of the topics of conversation, the sense of hearing is the last to leave the body and even when the patient appears to be unconscious, the patient may hear what is being said in their presence

It is comforting to the patient for others to say things that they may like to hear even when they cannot respond. It is kind and thoughtful to speak to them. You should explain to the patient what care will be given so that they do not misunderstand the actions or become fearful.

Additionally, family members should be involved, where possible, in the patient's care for the following reasons:

- Family members often appreciate helping with the patient's care
- They feel helpless and welcome the opportunity to assist the patient. Their cooperation helps to maintain a family bond
- Family members often find that helping with care improves their ability to cope with the situation
- It also helps to begin and promote the grieving process

It is important, however, to inform the family that they can call for nursing assistance at any time. You should be sensitive to the amount of care and involvement the family can undertake.

The overall responsibility and accountability of the patient's care is yours.

How would you recognise the signs of approaching death?

Most persons die gradually over a period of hours or days. Human cells cease to live when there is lack of sufficient oxygen. The process of dying has signs that indicate clearly that death is imminent. You shall now look at some of these signs.

Paranormal Experiences

The patient may relate visions of having seen, talked with or been in the presence of family members or friends that have died. They may have been visited by a religious figure such as an angel.

Motion and Sensation are Lost

This begins with the extremities of the feet and legs. The normal activities of the gastrointestinal tract begin to decrease and reflexes gradually disappear. The jaw and facial muscles relax and the patient's expression, which may have appeared anxious, becomes peaceful. The eyes may remain partly open.

Although the patient's temperature is usually elevated, they feel cold and clammy.

This begins with their extremities and the tip of the nose, reflecting the beginning of circulatory collapse.

Respiration may be noisy and the death rattle may be heard. This may be due to an accumulation of mucus in the respiratory tract when the patient is no longer able to raise and expectorate sputum. Cheyne Stokes respiration commonly occurs. Circulation fails and the blood pressure falls. The patient's skin becomes cyanotic, grey and/or pale. The pulse becomes irregular, weak and rapid.

As the level of consciousness changes, the brain may no longer perceive pain. The patient's mental condition usually deteriorates. They may become confused and disoriented. Complete unconsciousness and coma may occur, although some patients remain conscious until death. You should remember when giving care that the amount of mental alertness varies among patients.

You may have realised in your practice that some family members request to be summoned when the patient's condition deteriorates.

How would you handle such a situation if it presents itself?Here are a few suggestions:

- Summon the family, giving your name, title and indicate where the call is being made from
- Determine the identity of the person who has answered the telephone
- Explain that you are calling because the patient's condition has worsened
- Speak in a calm and controlled voice to reassure the relative that you are in command of the serious nature of the patient's condition
- Use short sentences to provide small bits of information. You may have realised that it is difficult for a relative under stress to follow lengthy technical explanations with understanding
- Pause to allow the receiver of the call time to comprehend.

  Inform the family member the care that is being provided at the moment

- Urge the relative to come at once to the hospital
- Document the time and the individual to whom you have communicated the information

If a death has occurred, the doctor should be responsible for informing the patient's nearest relative

The information should be delayed until the family member arrives in order to avoid precipitating any desperate acts such as suicide or contributing to a traffic accident.

How would you handle the relative?

Meet the relative you talked to over the telephone to allow continuity in communication. Do not leave the family alone and try to provide privacy, if possible, because they may weep and sob uncontrollably. Do not be surprised if emotions are not easily displayed, because if the family has had a period of time to anticipate the patient's death, much of the emotion already is spent.

Expect a severe emotional reaction if a dying person has been a victim of a sudden and unexpected accident. This is because the family members have not had time to prepare for the loss. You need to provide emotional support, such as, allowing them to express their grief and listening to them as they vent their feelings

Confirming Death

You may determine that a patient is dead when there is no evidence of pulse, respiration or blood pressure. Pupils will be dilated and fail to respond to light. A doctor, by law, is the one to pronounce the patient dead.

Obtaining Permission for an Autopsy

An autopsy (post-mortem examination) is an examination of the organs and tissues of a human body. It is usually performed if the death was of a suspicious nature, involved a crime, and/or occurred without any medical consultation prior to death.

An autopsy cannot be performed without the written consent of the next of kin. It is the doctor's responsibility to obtain permission for an autopsy.

The procedure involves delicate communication, tact and compassion. Many relatives will be more comfortable if they are told that the reason for performing autopsy is to establish proof of the exact cause of death.

Issuing a Death Certificate

The laws of Kenya require that a death certificate be issued for each person who has died. The laws specify the information that is needed. Notification of death is usually sent to the Registrar of Births and Deaths. This information is used to compile statistics, which are important in identifying trends, needs and problems in the fields of health and medicine.

Look for a death notification form and check the
information itemised.

Nursing Responsibilities Following the Patient's Death

You should always remember that you are still involved with both the patient and the family even after death occurs. The relatives may wish to view the body if the death occurred in their absence. You should ask them if they would wish to be left alone or if they do not mind you accompanying them. If the former, do not be too distant.

It is human for you to become involved and attached to patients and their families. Many families are touched that the nurse has also shared their loss. You should not fight to control expressing how you feel. At times you may not have words of comfort, but just listening and allow them time to reminisce or express
their emotions.

You should encourage the survivors of a sudden death to view the body, seeing and touching the body confirms the realty of death. You should clean and cover mutilated areas.

Accounting for Valuables

Every hospital has policies about the care of valuables when patients are admitted. Get a copy from the administration of your hospital. There are some valuables, which a patient chooses to keep with them, for example, a ring, a wristwatch or money. These need careful handling. Occasionally, the patient's family take the valuables home when death becomes imminent. Make sure you note it down in the patient's notes and they sign for them.

If valuables are still with the patient at the time of death, they should be identified, accounted for, and sent to the appropriate department for safe keeping until the family claims them. A wedding ring should not be removed, but should be secured with adhesive so that it does not slip off and get lost. You should note that the ring remained on the body.

Loss of valuables is serious and may result in a lawsuit. You should, therefore, take every precaution to prevent loss or misplacement of valuables.

SECTION 3: CLINICAL DIAGNOSIS

Introduction

In section two, you studied some basic nursing procedures.

In this section you will cover how to diagnose and treat minor illnesses. You will also briefly look at a new concept. In addition to the Integrated Management of Adolescents and Adult Illness (IMAI), you may have already heard of the Integrated Management of Childhood Illness (IMCI). This will be covered in unit four of module one on paediatric nursing.

Introduction

In section two, you studied some basic nursing procedures.

In this section you will cover how to diagnose and treat minor illnesses. You will also briefly look at a new concept. In addition to the Integrated Management of Adolescents and Adult Illness (IMAI), you may have already heard of the Integrated Management of Childhood Illness (IMCI). This will be covered in unit four of module one on paediatric nursing

Objectives

By the end of this section you will be able to:

- Obtain a comprehensive history from a patient
- Perform a physical examination on a patient
- Interpret the findings from history taking and physical examination
- Formulate a clinical diagnosis

The Health History

The scope of nursing practice has expanded to include some activities that were once strictly for the doctor or other members of the health care team. The nurse now employs skills in developing the patient's database by performing physical examination as a step in the nursing process. In certain situations, you will be expected to diagnose and treat minor illness. While conducting a nursing history you will look at the patient's psychological and cultural patterns, the interpersonal and physical environments, as well as the patient's life style and activities of daily living. You will be responsible for developing a database through: a detailed history of the patient's present illness; past medical history; family history and review of body systems. It will be beneficial to include: individual and family relationships; life style patterns; health practices and coping strategies.

What you should take note of during history taking is:

- Ethical considerations in data collection
- Communication skills.and interviewing techniques
- Content of the health history

Now move on to look at these components one by one.

Ethical Considerations in Data Collection

In unit one of this module you looked at legal aspects in nursing and the nursing process, and you covered the patients' rights.

Ethical considerations in data collection emphasise that the patient has the right to know why information is being collected and how it will be used. You are therefore expected to identify yourself and your role, provide a detailed explanation of what a health history is, how the information will be elicited and how it will be used.

You are also expected to inform the patient on all aspects of the data collection process and of their freedom to participate in/abstain from the process. Try and provide a private setting for the interview. This will promote an atmosphere of trust between the patient and yourself. It will also encourage open and honest communication.

Remember to only selectively record data that is pertinent to the patient's health status. Highly sensitive information should not be entered on the record but can be discussed with persons with authority at the health facility. Always remember to secure written records from the public or those health professionals not directly involved in the care of the patient.

Confidentiality and maintaining a high standard of nursing care and professional conduct is paramount.

In obtaining a personal history from the patient you will be required to utilise basic interviewing skills. The details of this will be covered in unit five of module one.

Communication Skills and Interviewing Techniques

It is important to make patients feel at ease by making them comfortable and giving them respect. Reassure the patients that all the information shared is confidential. Only health professionals directly involved in the care will

get access to it. Ensure a private setting for the interview.
Allow for the self expression of the patient so as to obtain facts that will influence spontaneous information flow. Promote the patient's full expression through non verbal communication. For example, you could encourage the patient to elaborate or continue by a nod of the head or by repeating the last few words if the patient is hesitant.
A puzzled look will encourage the patient to clarify inconsistencies in the history. Pose open ended questions such as "Tell me about it", "How did it feel?", "How can we help you?" and so on.
Be careful! At times the patient may provide you with what they thinks you want to hear. You should vary the style of questioning by including a few direct questions such as "Does the pain come before the meal, during the meal or after the meal?" You should use direct questioning when the patient has developed a sense of trust and confidence in you.
You should use a health history form to guide the interview but adjust the sequence of questions to coincide with the flow of the conservation. Listen to the patient as they answer the questions. Take brief notes during the interview and maintain eye contact with the patient.
You should demonstrate an understanding of the nature and intensity of the patient's problem.
The manner in which you respond non verbally to the patient and your ability to listen should convey a genuine willingness to understand the meaning of the patient's concern. The patient should be reassured so that the interview is no longer viewed as an enquiry but feels therapeutic.

Do not interrupt the patient's silent or tearful episodes. Resist verbal reassurances during these moments.
Encourage the patient to elaborate on their feelings by making open ended statements such as "You look sad" or "You seem to be frightened". Convey an understanding of, and respect for, the patient's beliefs and attitudes. Adopt a non judgemental attitude when dealing with issues related to sexuality, drug and alcohol use or cultural patterns.
Take into account the patient's cultural background. Remember, cultural attitudes about family relationships and the role of a woman are accepted at face value, just as attitudes toward pain, illness and hospitalisation are accepted.

"These beliefs and attitudes are derived from personal experiences which vary according to the person's cultural background." (Brunner & Suddarth, 1988).
You should also be aware of your own feelings and attitudes.
You should always try not to convey irritation, boredom or disbelief towards a patient's behaviour even though it may be offensive or morally unacceptable to you.
Interpret non verbal communication appropriately, for example, gestures that convey defensiveness, hostility, confidence or impatience. Also, learn to respond to body language.
You should make an effort to communicate in a manner that is consistent with the individual's level of understanding.
You should take into consideration the patient's educational background. Use as few technical terms as possible. Take into consideration the patient's cultural attitudes towards health
Terminate an interview in an appropriate manner that summarises the information obtained and ensures that the patient has understood the major points discussed.

Always inquire whether the patient has any questions. Search for areas of misunderstandings by briefly summarising the patient's responses. This allows the patient to correct areas of misinformation. They may also add facts they had forgotten to mention earlier.

Content of the Health History
Having looked at the basic guidelines for interviewing, move on to look at the content of the interview.
The content will include:
- Biographical data
- Informant data
- Chief complaint
- Past medical history
- History of present illness
- Review of systems
- Family history
- Patient profile
- Physical examination
- Radiological and laboratory information
- Problem formulation

Biographical Data
This information helps to put the history of the patient into context.
The information includes:
- Name
- Address

- Age
- Sex
- Marital Status
- Occupation
- Ethnicity

Informant Data

List at least three situations when the patient may not be the informant

The patient may not be the informant if they fall into one or more of these categories:

- A child
- An elderly person
- An unconscious patient
- A patient suffering from a severe psychiatric disturbance

You should assess the reliability of the informant and the usefulness of the information provided. For example, a hysterical or depressed patient may not provide reliable information whereas patients who abuse drugs and alcohol may use denial as part of their operating mechanism.

Chief Complaint

The chief complaint is the issue that brings the patient to seek medical help.

Ask questions such as "What brings you to the clinic today?"

There could be variations in getting a chief complaint. The patient may have come for just a check up or may have more than one main problem.

List the problems in order of priority. Then expose them and separate them as separate entities.

Past Medical History

A comprehensive summary of the patient's previous medical history is very important. This is because the past could have triggered the present, or the present is a continuation or a complication in the past. Ask the patient about: immunisation status; any known allergies to drugs or other substances; last physical examination; chest X-ray; eye examination; hearing examination; dental check up or papanicolaou smear (if female). For previous illnesses, record any negative or positive responses. Elicit a history of the following areas:

- Childhood illnesses: rubella, polio, whooping cough, mumps, chicken pox, rheumatic fever, sore throat
- Adult illnesses
- Psychiatric illness
- Injuries: burns, fractures, head injuries
- Hospitalisation
- Operations
- Current medications, including prescriptions, over-the-counter and/or home remedies

If the hospitalisation or major medical intervention is related to the present illness, indicate "see history of present illness" on the data sheet

History of Present Illness

You will need to reflect on your knowledge of the patho-physiology and natural history of disease when exploring the facts related to a present illness. This will enable you to arrive at a diagnosis.

The physical examination will reveal manifestations unfolded in the history laboratory and radiological information may be helpful. However their selection will be based on the history obtained.

You should compile the history of present illness as a complete story indicating:

- The date and manner of the onset of the problem, that is, whether sudden or gradual
- The setting in which the problem developed, that is, whether at home, at work or after an argument; manifestations of the problem
- Course of illness or problem

The course of illness includes self-treatment, medical interventions, progress and effects of treatment and the patient's perception of the cause or meaning of the problem.

You should delineate in detail specific symptoms such as pain, headache, fever and change in bowel habits. For example, if pain is identified, make a critical analysis about its location and radiation, quality, severity and duration. You should pursue the persistence or intermittence of the symptom, factors that aggravate or alleviate it and any associated manifestations that the patient may be aware of. The associated manifestations are symptoms that occur simultaneously with the chief complaint.

The absence or presence of associated symptoms may point to the origin or extent of the patient's problem, as well as on the diagnosis. These symptoms are referred to as significant positive or negative findings, derived from a review of systems directly related to the chief complaint.

Example

If a patient complains of a vague symptom such as fatigue or weight loss, you should review all body systems and include the

information in the history of the present illness. If the patient's chief complaint is chest pain, both gastrointestinal and cardiovascular systems may be included in the history of present illness.

In either situation, record both positive and negative findings.

Family History

Take the history of the health status or the age and cause of death of parents, siblings, spouse, children and grandparents, cousins and so on, to identify diseases that may be hereditary, communicable or environmental.

You should specifically inquire about such conditions like cancer, hypertension, kidney disease, arthritis, allergies, asthma, alcoholism and obesity.

Review of Systems

The review of systems includes a complete inventory of major body organ systems in terms of presence or absence of symptoms, past or present. It serves as a check and balance so as to prevent you from overlooking any relevant data. You should record negative and positive responses. Taking into account the history of present illness, analyse the symptom the patient has responded positively to. You should get an overview of general health as well as symptoms related to each body system.

You could use a checklist as part of the health history to review the systems. The advantage of a checklist is that it can be easily audited and is less subject to error. In the checklist circle any positive responses and underline the negative responses to indicate the presence or absence of the symptom.

A sample of a checklist for history taking
Extracted from Brunner and Siddarrth (1985) pg 56 and 57

General
Loss or gain of weight
Appetite change
Night sweats
Weakness
Fatigue
Fever
Skin
Rash
Colour change
Dryness
Nail change
Hair change
Growth or masses
Pruritis
Head
Headache
Trauma
Dizziness
Eyes
Vision (near and far)
Glasses or contact
Diplopia
Pain
Infection
Itching
Blurring
Ears
Hearing
Pain
Infection
Excessive cerumen
Hygiene practices
Tinnitus
Vertigo
Nose and sinuses
Discharge
Allergies
Obstruction
Pain
Mouth and Throat
Sore throat
Difficulty swallowing
Taste
Gums
Dentition
Hoarseness
Hygiene practices
Lesions (lips, tongue mucosa)
Dentures or partial palate
Neck
Stiffness
Swelling
Pain
Limited motion
Swollen glands
Thyroid disease
Breasts
Pain
Swelling
Self examination practices
Nipple discharges
Dimpling

Respiratory

Cough
Shortness of breath
Wheezing
Asthma
Recurrent upper respiratory tract infection
Sputum (colour, quantity)
Haemoptysis

Cardiovascular

Shortness of breath
Phlebitis
Coldness or numbness of extremities
Orthopnea
Dyspnoea on exertion
Chest pain
Palpitations
Dyspnoea
Oedema
Varicosities

Gastrointestinal

Nausea
Vomiting
Jaundice
Indigestion
Diarrhoea
Pain
Constipation
Change in bowel pattern
Haemorrhoids

Genito Urinary

Nocturia
Infection
Urgency
Dribbling
Incontinence
Dysuria and haematuria

Reproductive

Female

Menses (Menarche, cycle, duration, amount cramps, intermittent bleeding, last menstrual period LMP, number of pregnancies, live births, abortions)
∗If menopausal: age of menses cessation, symptoms of menopause, post menopausal bleeding
Vaginal discharge
Dyspareunia
Contraception
Pruritis
Social (sexually transmitted disease)

Male

Pain
Discharge
Swelling
Sores
Social (sexually transmitted disease)
Contraception practices

Musculoskeletal

Muscular pain or cramps
Pain, swelling or redness of joints
Back pain or history of injury
Ability to perform ADL

Endocrine

Heat or cold intolerance
Changes in hair pattern
Excessive thirst, hunger or urination

Neurologic

Syncope
Seizures
Paralysis
Weakness
Dizziness
Vertigo
Numbness or tingling
Problem with speech
Tremors
Memory loss
Loss of sensation

Haematologic

Blood transfusion
Anaemia
Easy bruising or bleeding

Patient Profile

The profile is useful for the analysis of the patient's problem, their capacity to deal with the problem and the health care team's capacity to provide assistance. The information to be obtained is personal and subjective. It includes the expression of feelings, values and personal experiences. A general patient profile consists of:

Past Development
Past Development includes:
- Place of birth
- Place lived
- Significant childhood/adolescent experiences

Past Development includes:
- Place of birth
- Place lived
- Significant childhood/adolescent experiences

Education and occupation
Education and occupation includes:
- Jobs held in the past
- Current position/job
- Length of time at position
- Education preparation
- Work satisfaction and career goals
- Financial resources
- Insurance coverage

Physical Environment
Physical environment can be either spiritual or interpersonal.
Other factors to be considered are:
- Ethnic background (language spoken, customs and values held, folk practices used to maintain health or to cure illness)
- Family relationships (family structure, roles, communication patterns, support systems)
- Friendships (quality of relationships)

Physical environment can be either spiritual or interpersonal.
Other factors to be considered are:
- Ethnic background (language spoken, customs and values held, folk practices used to maintain health or to cure illness)
- Family relationships (family structure, roles, communication patterns, support systems)
- Friendships (quality of relationships)

Lifestyle (patterns and habits)
Lifestyle patterns are of importance and include:
- Sleep (time individual retires, hours per night, comfort measures, awakens rested?)
- Exercise (type, frequency, time spent)
- Nutrition (24 hour diet recall, restrictions, idiosyncrasies)
- Recreation (type of activity, time spent)
- Caffeine (coffee, tea, cola, chocolate, kind and amount)
- Smoking (cigarettes, pipe, cigar, marijuana) kind, amount per day, number of years, desire to quit
- Alcohol - kind, amount, pattern over past year

Self-concept
Questions should include:
- View of self in present
- View of self in future
- Body image (level of satisfaction, concerns)
- Sexuality: perception of self as a man or woman, quality of sexual relations
- Concerns related to sexuality or sexual functioning

Stress response
Monitor stress response. This involves:
- Major concerns or problems at present
- Past experiences with similar problems
- Past coping patterns and outcomes
- Present copying strategies and anticipated outcomes
- Individual's expectations of family/friends and health care team in problem resolution

You have looked at the outline of the patient's profile.
You will now look at the significance of each subtopic of the profile

Past Development
The reason for you to question the patient's place of birth and places they lived in the past will help them to focus on the earlier years of their life.
Personal experiences during childhood and adolescence may highlight personal achievement, a failure, a developmental crisis, any incidence of physical or emotional abuse or a valued

Education and Occupation
You may have already experienced that it is very difficult to solicit information related to economical status or educational preparation from a patient.
You are advised to approach such issues indirectly by asking questions such as "Tell me

about your job" or "Do you have any financial concerns at this time?".
It is not necessary to know the exact numerical value of the person's salary. Get information as to whether their income is sufficient to meet their expenses and support the lifestyle they are used to. You could also touch on their insurance coverage and plans for health care payment.

Environment
When you are exploring the environment, you are to look at it in broad perspective. Question the patient about their physical environment. The information will include the type of housing, its location, safety and comfort within the home and the neighbourhood. What you will be trying to identify are things like environmental hazards such as isolation, inadequate protection, potential risks, pollution (noise, air, water) and inadequate sanitation facilities.
Also discuss the spiritual environment. Spirituality is expressed through identification with a particular religion. Spiritual values and beliefs direct a person's behaviour and his approach to health problems and the health care system in general. During an illness a person faces challenges toward spirituality. You should, therefore, conduct a brief assessment of the extent to which religion is a part of the patient's life, religious beliefs related to the person's perception of health and illness and religious practices.

Environment
Finally, examine the interpersonal environment, which includes cultural influences, relationships with family and friends and so on. The presence or absence of a support system is all part of the interpersonal environment.

Ethnic Background
Beliefs and practices that have been shared from generation to generation are known as cultural or ethnic patterns. They are expressed through language, dress, dietary choices and role behaviours and can influence perceptions of health and illness, and health related behaviour.
Beliefs and customs also influence the patient's experience with a health problem and their relationship with the health care team. You should, therefore, obtain relevant information to this effect with regard to their background, customs or values, special health practices including any specific practices for testing illness

Family Relationships and Support Systems
You should assess the family structure (members, age, and role), patterns of communication and the presence or absence of a support system.

Lifestyle (patterns and habits)
When looking at life you should obtain information about health related behaviours, for example, patterns of sleep, exercise, nutrition and recreation as well as personal habits such as smoking, use of alcohol or caffeine.
Obtaining information about personal habits is very difficult. You are, therefore, advised to use indirect questioning such as: "Have you ever considered cutting down your alcohol intake?"

Self-concept
Self-concept is the impression one has of one's self. It is a product of relevant experiences with others and is the result of other reactions to the self. The questions you may put across to the patient may be,"How do you feel about your life in general?" or "What do you expect your life to be like in future?"
Health concerns may threaten the way one perceives. For instance, the mental picture one has of oneself may be the result of certain medical or surgical interventions like mastectomy or colostomy, which threaten body image. You should be aware of the patient's perceptions of themself and their body. You could ask the patient the following questions:

- "What would you change about yourself if you could?"
- "Do you have any particular concerns about your body?"

Sexual history is very personal. It could be easily taken as part of the genital-urinary section within the review of body systems. You should begin with general questions that take into consideration the development stage of the person, the presence or absence of intimate relationships and so on. You should first establish whether the patient is sexually active before exploring issues related to sexual identity, contraception, or the quality of sexual relationship.

Stress Response
You may be aware that every person handles a stressful event in a manner that is intended to eliminate or minimise the stress.
You should, consequently, explore past coping patterns as well as perceptions of current stresses and anticipated outcomes. These will assist you to identify the person's overall ability to handle stress.

You should also identify expectations that the person may have of their family, friends and the health care team in helping them solve their problems.
Following a health history, a physical examination is then performe

Physical Examination

As previously mentioned, the physical examination is usually performed following the health history. You should perform assessments in a well-lit, warm area. Undress and drape the patient appropriately. You should only expose the area you are to examine. At all times consider the patient's physical and psychological comfort. Explain the procedures and their rationale to the patient.
You should always wash your hands before and after examination. You already covered this in section one when you were looking at infection prevention and control. The health history you took will provide you with a complete health profile that guides all aspects of the physical examination. It will help you to focus on body organs and systems that are of particular concern to the patient. You will perform a systematic head to toe examination as follows: skin; head and neck; thorax and lungs; breast; cardiovascular system; abdomen; rectum; genitalia; neurological system and musculoskeletal system.
In your nursing practice you must have realised that you have been assessing all relevant organs during physical examination but not necessarily in the order stated above. This may be attributed to the fact that while examining a body organ you may have combined body systems, for example, musculoskeletal and neurological examination when examining the face. This is beneficial to the patient because they are spared from sitting up, lying down and again sitting up from time to time, which can be exhausting.
As covered earlier, the four fundamental processes which you will employ during physical examination of a patient, are:

- Inspection
- Palpation
- Percussion
- Auscultation

You have already gone through the process of physical examination in order to arrive at a nursing diagnosis. Now you will look at how to make a clinical diagnosis. Before performing a general physical examination, there are certain vital observations that you should take first, including:

- Taking vital signs such as temperature, pulse, respirations and blood pressure, palpating, counting and describing the pulse
- Measuring height, weight, fluid intake and output

As you are performing the physical examination, you will also be:

- Auscultating for body sounds of the lungs, the abdomen and other organs. You will require
  a stethoscope
- Palpating soft areas of the body to check for solid masses, abdominal rigidity or tenderness

You can perform a physical examination anytime you are in a contact with the patient in any set-up, for example, while bathing a patient. Here you can obtain further information about the skin and the patient's response to activities. Move on to see how to perform a systematic examination, beginning with the skin

The Skin

The examination of the skin includes observing the nails, skin colour, bruising/bleeding, lesions, oedema, moisture, temperature and elasticity. Inspect the nails for colour, shape and clubbing. Record the findings of any of the above areas.
The colour of the skin is an important indication of something wrong, either locally or systematically, when the colour is other than normal. Have a look at the significance of colour in the following table.

The Skin

Colour	Terminology	Pathophysiology
Redness	Inflammation	Is the result of the small blood vessels in the skin becoming dilated? This is seen in cases of fever, sunburn and local infection.
Blueness	Cyanosis	Is the result of lack of oxygen in the blood? Easily seen in the nail beds, lips and mucous membrane.
Yellow	Jaundice	Is due to increased bile pigments in blood.

Pale	Pallor	Is the result of a decrease in the number of red blood cells (anaemia)?
Dark purple areas	Purpura	Large or small and are the result of ruptured blood vessels, either because of trauma or a systemic infection

Skin lesions can be single or multiples. They can be small or large as well as different in colour, size, shape and skin layer involvement.

Head
You should palpate the cranium for any lumps, abrasions and asymmetry, while noting the condition of the hair.

Neck
Palpate the neck for asymmetry, distended veins, abnormal lymph nodes and enlargement of the thyroid. Then perform a range of motion of the neck to detect any limitations.
Place a stethoscope over the carotid artery to listen for any abnormal sound resulting from circulatory turbulence.
Palpation is a vital part of the physical examination. Many body structures even though not visible are accessible by hand and may be felt.

When examining the abdomen, auscultation is performed before palpation and percussion to avoid altering the bowel sounds.
Sounds generated within the body may be felt. For example, certain murmurs generated in the heart or within blood vessels (thrills) may be detected. Thrills cause sensation to the hand much like purring of a cat. Voice sounds are transmitted along the bronchi to the periphery of the lung. These may be perceived by touch and will be altered by certain disease states within the lungs.
This phenomenon is called tactile fremitus and is useful in assessing diseases of the chest.
Now continue with your physical examination.

Eyes
You must test for visual acuity in the patient. One of the methods of screening a patient for visual activity is by asking them to read any available printed matter using one eye at a time.
Ask the patient to close one eye with a piece of paper, not with their hand.
This simple method will give you enough information to decide whether the patient has a visual acuity problem and the approximate degree of the problem.
Alternatively, visual acuity can be tested using a Schellen's chart. Visit any doctor's or clinical officer's clinic to familiarise yourself with this chart.

When undertaking the eye examination:

- Observe eyes for position and alignment to each other. Note the position of the eyelids in relationship to the eyeballs.
- You will easily see oedema, discolouration, lesions and condition of the eyelids
- Conjunctiva and sclera: You can easily check their condition by asking the patient to look up while you depress the lower lid
- Also note the colour of the eye, presence of swelling nodules, cornea and lens. They should be clear. Watch out for any opacities. Discoloration of the conjunctiva and sclera could be due to jaundice, anaemia, or cyanosis
- Pupils: observe the size, shape, and equality of the pupils using a flashlight or ophthalmoscope. Check that the pupils dilate and constrict equally when adjusting to dim or bright light
- The optic disc is assessed for size and colour

Move on now to review them together. Abnormalities may include swelling, discolouration, lesions, scaliness of the tissue around the eyes and so on

Ears
Inspect the outer ear for swelling, lesions and/or lumps with the head turned to the side. Then examine each ear with the otoscope for evidence of excess cerumen (wax) growth, redness or even discharge. You should then screen the patient by covering one ear. Standing two feet away from the patient towards the un-occluded ear softly whisper numbers, increasing the volume of your voice in stages. If the patient cannot hear, repeat the numbers you whispered. Test both ears the same way and note your findings.
Alternatively, you could test for hearing using a tuning fork, which you have to strike and hold at an equal distance from each ear to test for air conduction. Then you should place the vibrating tuning fork on each mastoid process, just below and behind the ears and then centre top of the cranium to test for bone conduction of sound.
Pull on ear to elicit tenderness. You then assess the eardrum (tympanic membrane) for signs of swelling, of colour change and for perforations. Look into the canal for discharge or wax.

Nose
With the patient's head slightly tilted back, inspect each nostril using a nasal spectrum. Inspect the cavities for colour, condition of the mucosa, bleeding and presence of foreign bodies or masses. Observe the size, shape, colour, and symmetry of the nose. Use a nasal spectrum to check the colour and continuity of mucosa.

List any abnormalities you can detect during a physical examination of the nose.

Nose
With the patient's head slightly tilted back, inspect each nostril using a nasal spectrum. Inspect the cavities for colour, condition of the mucosa, bleeding and presence of foreign bodies or masses. Observe the size, shape, colour, and symmetry of the nose. Use a nasal spectrum to check the colour and continuity of mucosa.

List any abnormalities you can detect during a physical examination of the nose.
External structural deformity, asymmetry, inflammation, swelling, deflected nasal septum, bleeding, lesions, exudates and/or foreign bodies.

Mouth
Examine the back of the throat using a flashlight and tongue blade (spatula). Look for swelling, redness, bacteria or viral patches, position and size of uvula. Check the nostrils by asking the patient to say, "Ah". Inspect the teeth for looseness and presence of caries. Observe the mucous of inner mouth for colour and presence of lesions. Ask the patient to clench the teeth and smile. This helps you to assess the bite and facial muscular tone. Note the colour and smoothness of the lips. Inspect lips for colour, lumps, ulcers or cracking, gums and teeth for inflammation, swelling, bleeding, retraction and discolouration of the gums.

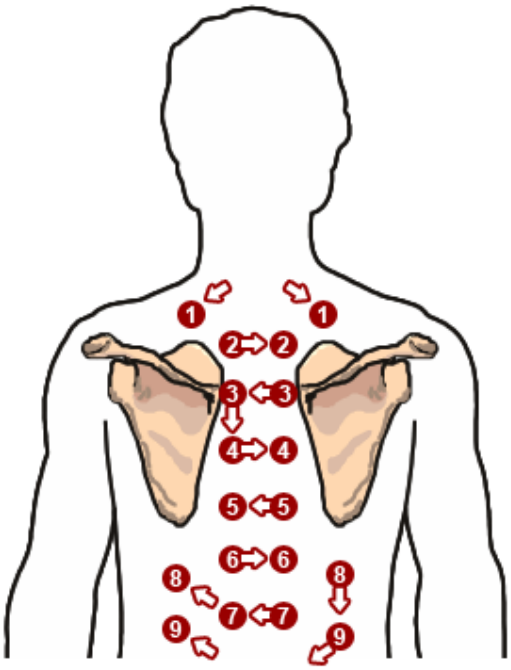
Pharynx
Use a longer blade (spatula) to depress the arch of the tongue so that you can see the pharynx. Inspect the uvula, tonsils and posterior pharynx. Note the colour symmetry, evidence of exudates, oedema or ulceration.

The Chest
You have already seen how to create rapport with the patient and how to make them comfortable. If you are examining a male patient remove the gown. For a female patient, untie the gown and part it for chest examination, so that the breast is exposed. Observe the level of shoulders for equality while the patient is sitting and facing you. Observe the pectoralis muscles on each side of the chest for symmetry as the patient presses the palms together and lifts the hands over the head.
Note any abnormal dimpling, colour or discharge of the nipples. You should ask a female patient to lie in the supine position, and examine each breast and palpate for masses or lumps from the nipple outward, then around the periphery and axilla.

Inspection
Observe the chest both from behind and from the front while the patient is sitting. Look for deformities of skeletal structures or bulges. Note any unequal movement during respiration.
Ask the patient to take a deep breath and look at the respiratory movements such as splinting. Watch for abnormalities of the skin such as rashes and lumps. Observe the rate and rhythm
of breathing.

Palpation of the Chest
Palpation of the chest is aimed at identifying the size, shape and degree of resistance of various parts of vibrations. Identify areas of tenderness or pain, for example, deep or superficial. Evaluate areas observed with abnormality. Measure the expansion of the chest and locate the position of the trachea.
With the patient in supine position, palpate the neck veins for normal filling and percuss the cardiac margins (outline of the heart). Use a stethoscope to listen to the heart sounds. Replace the patient's gown.

Percussion
Percussion is tapping the surface with a finger to produce a sound, which helps to determine the density of the underlying organs. This is done with the middle finger of your left hand as the pleximeter percusses over the distal interphalangeal of the right hand



The technique of percussion translates the application of physical force into sound. This is used to obtain information about diseases in the chest and abdomen.
The principle is to set the chest wall or abdominal wall into vibration by striking it with a firm object. The sound produced is reflective of the density of the underlying structure. Certain densities produce sounds that can be identified as percussion notes, for example:

- Tympani is a drum like sound produced by percussing the air filled stomach.
- Resonance is a sound elicited over air filled lungs.
- Hyper resonance is audible while percussing over inflated lung tissue of the patient with emphysema.
- Dullness is the percussion of the liver that produces a dull sound.
- Flatness is the percussion of the thigh that results in flatness.

How to Percuss the Chest

Place the distal phalanx of the left middle finger firmly against the chest wall. The other fingers should be held away from the chest wall. This is because any pressure they might exert against the thorax would tend to mute or dampen the sound produced.
The right hand now becomes the striking object. The middle finger of the right hand is used to strike the terminal phalanx of the middle finger of the left hand just behind the nail bed. If done sharply, a brief resonant will be produced.

The motion of the right hand should be dominantly a wrist action. The fore-arm itself should be held steadily. The clarity of the sound produced is dependant on the brevity of the action. The intensity is the function of the force used.
Percussion gives one the capacity to assess the normal anatomical detail which involves:

- The degree to which the diaphragm descends during inspiration
- Sounds over lung tissues are normally resonant
- Sound over the diaphragm is dull

You may determine the level of pleural effusion or location of pneumatic application consolidation or actelectasis of a lobe of the lung.

Auscultation

Auscultation is listening to the sounds, for example, of the lungs, heart, bowels, with a stethoscope. You can also use the same technique to listen to the foetal heart using a foetal-scope. Listening to the sounds helps in determining the airflow through the lungs and presence of fluid, mucous or obstruction in the air passages.
Abnormal sounds include:

- Rales, which are caused by moisture partially blocking air passage. The sounds produced by this blockage are not continuous and are heard mostly on inspiration. Rales are sign of pneumonia
- Rhonchi, which are low-pitched continuous sounds, which originate in larger air passages
- Wheezes, which are high-pitched hissing sounds originating in small air passageways
- Crepitations, which are as a result of the fluid in the alveoli and are heard mostly in inspiration. Presence of fine crepitations is a sign of pneumonia or congestive heart failure

Auscultation

Auscultation is listening to the sounds, for example, of the lungs, heart, bowels, with a stethoscope. You can also use the same technique to listen to the foetal heart using a foetal-scope. Listening to the sounds helps in determining the airflow through the lungs and presence of fluid, mucous or obstruction in the air passages.

Abnormal sounds include:

- Rales, which are caused by moisture partially blocking air passage. The sounds produced by this blockage are not continuous and are heard mostly on inspiration. Rales are sign of pneumonia
- Rhonchi, which are low-pitched continuous sounds, which originate in larger air passages
- Wheezes, which are high-pitched hissing sounds originating in small air passageways
- Crepitations, which are as a result of the fluid in the alveoli and are heard mostly in inspiration. Presence of fine crepitations is a sign of pneumonia or congestive heart failure

Sound is produced within the body either by the movement of the air through hollow structures or by the forces set by the movement of columns of fluid that set solid structures in motion. The different sounds produced by various movements include:

- Movement of air through the trachea and bronchi
  (breath sounds)
- Movement of air past function vocal cords (spoken voice)
- Movement of air through the intestines (bowel sounds)
- Movement of blood through vascular structures that provide critical resistance to the flow (murmurs)
- The impedance to flowing blood provided by closed valves and the heart wall (heart sounds)

SECTION 3: CLINICAL DIAGNOSIS

Sound is produced within the body either by the movement of the air through hollow structures or by the forces set by the movement of columns of fluid that set solid structures in motion. The different sounds produced by various movements include:

- Movement of air through the trachea and bronchi
  (breath sounds)
- Movement of air past function vocal cords (spoken voice)
- Movement of air through the intestines (bowel sounds)
- Movement of blood through vascular structures that provide critical resistance to the flow (murmurs)
- The impedance to flowing blood provided by closed valves and the heart wall (heart sounds)

Examination of the Cardiovascular System

Chest and Heart

The following guidelines should be kept in mind when conducting a heart or chest examination. Inspect the anterior chest for bulges and pulsation. Palpate the anterior chest for localised areas of tenderness. Identify the point of maximum impulse, known as the "apex beat". The apex beat (PMI) is a point of maximum impulse. PMI is the lowermost and the outermost point at which the heart beat can be felt maximally.

The apex beat is a vibration of the chest wall that is caused by an impulse transferred from the apex of the heart. The location of the apex beat is directly over the apex, approximately 7 to 9 cm (3 to 3 ½ inches) from the mid-sternal line at the fifth inter-costal space.

Auscultation

There are two heart sounds, which make up one combined sound, best described as "lubdub". Listen for any other sounds apart from the heart sounds. The areas of auscultation are:

- M-Mitral = 5th inter-costal space
- P-Pulmonary = 2nd inter-costal space
- A-Aortic = 2nd inter-costal space
- T-Triscupid =5th inter-costal space

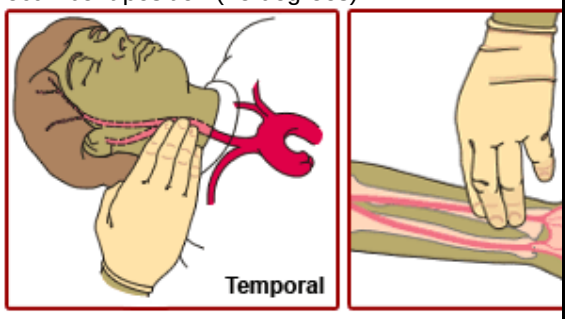
Abnormalities, which you may detect during auscultation include:

- An enlarged heart or something in the chest displacing the mediastinum can cause shifting apex beat. An enlarged heart may be secondary to hypertension or vascular
  heart disease
- Irregular heart sounds seen in ischaemic heart disease and thyrotoxicosis
- Heart murmurs found in rheumatic heart disease, congenital heart disease and occasionally in severe anaemia

Peripheral Pulses

The first step in checking for peripheral pulses is to palpate the right radial pulse. Record the rhythm, rate, volume and character. Compare the right radial with the left radial. Note the rate and rhythm. Palpate the right femoral pulse and then compare the right femoral to the right. Palpate the right popliteal and compare it to

the left. Note the temperature of the legs and observe any dilated veins in the legs. Palpate for the presence of pitting oedema in the leg and over the sacrum. To examine the neck for distended veins, place the patient in the semi recumbent position (45 degrees).



Examining the Lymphatic and Musculoskeletal System

Lymphatic system

While you are assessing the patient's musculoskeletal and peripheral vascular function, you should also palpate for the lymph nodes at their normal location, for example:

- Neck, that is, sub mental, submandibular, occipital, cervical
- Axillary, that is, central, pectoral, lateral
- Inguinal

Swollen lymph nodes may exhibit several characteristics, including, tenderness, fluctuation, firmness and hardness.

Musculoskeletal system

The musculoskeletal system can be evaluated at the same time as the peripheral/ vascular and lymphatic systems.

This system comprises bones, which support the body, muscles that move the bones by pulling on them and joints, which allow movement. Bones do not touch. Cartilage covers the joint ends of all bones and offers a cushion between the bony surfaces. There is also a space between bones covered with fluid, which serves as a lubricant.

The joint structure regulates the amount of movement possible, for example, the joint between the humerus and scapula (shoulder joint) has a greater range of motion than the joint between the radius/ulna and humerus (elbow joint).

What abnormalities might you find in the system?

There could be deviation from the normal range of motion such as limitation, stiffness or instability. You may observe joint swelling or deformity; warmth; redness or decreased strength. Next you should test for power of the arm, grip, fingers, wrist, leg, foot and thigh.

Examination of the Breast

This is a very important examination. You will find that you will perform it in general nursing as well as in reproductive health, that is, in midwifery and family planning. You will need to reflect on your knowledge of the anatomy and physiology of the female reproductive organs.

Conducting a female breast examination is a diagnostic aid in the early detection of lumps, growths or thickening in the breast. Ask the patient to undress but cover the breast until the examination begins to maintain privacy. Place a flat pillow or a folded towel under the patient's shoulders.

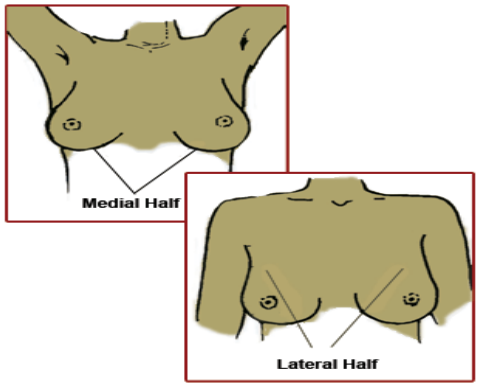
As you conduct the examination, teach the patient how to examine her breasts monthly after the menstrual period or at regular monthly intervals and after menopause.

How do you perform breast examination?

Ask the patient/client to sit, arms at her side, facing you. Inspect the breast for size and equality, shape and colour. Note whether there is any puckering or dimpling of the skin or deviation of the nipples. Repeat the inspection with the patient's arms raised over the head. Recline the patient on a flat bed or examination couch and place a folded towel under the shoulders on the same side as the breast to be examined. Position the patient's relaxed arm on that side so as to allow it to rest comfortably over her head. Now think of the breast as a wheel or clock. Begin the examination at the top of the breast, or 12.00 o'clock, with the flat of the fingers.

Inspection

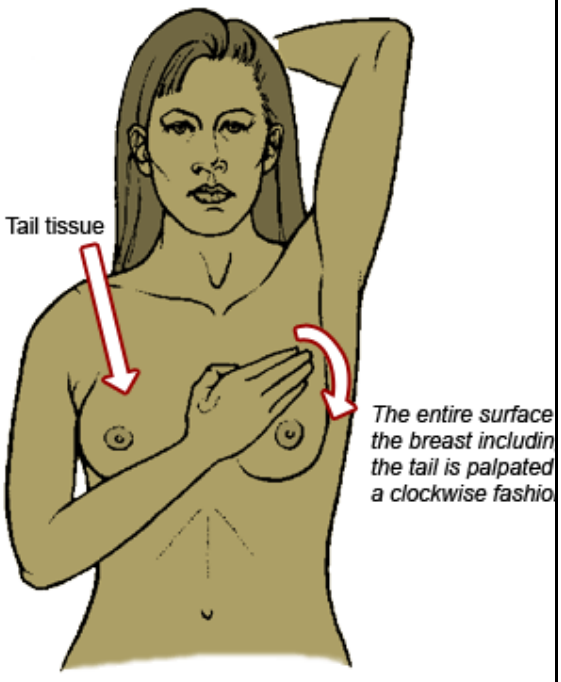
Inspect the breasts for size and symmetry, contour, appearance of the skin; observe nipple size and shape, rashes or ulcers discharge and retraction.



Palpation

Palpate the breast, moving from the outer portion of the breast towards the nipple and using light circular movements until the entire breast is covered in this manner. Then feel the area over the nipple carefully with the flat of fingers. With the arm down at the patient's side, examine the tissues of the breasts, which extend into the armpit or axillary region, feeling for lymph nodes in this area.

Palpate the breast, compressing the breast tissue between your finger and chest wall in a systematic manner and noting the position of any unexplained tissue masses. Palpate the nipples noting elasticity, discharge. Repeat the process for the other breast. Abnormalities that may be noted include lumps, nodules, masses, discharge from the nipples and colour of the skin.



Woman lies on pillow with right arm raised left hand palpates right breast with pads of fingers.

Woman lies on pillow with left arm raised above head, fingers of right hand squeeze nipple of left breast.

Remember: teach the patient to perform breast examination correctly at home, at regular monthly intervals.

Examination of the Abdomen

Before performing the examination, ask the patient to empty their bladder.

Put the patient in supine position and make them comfortable. Inspect the whole abdomen for contours, distension and asymmetry.

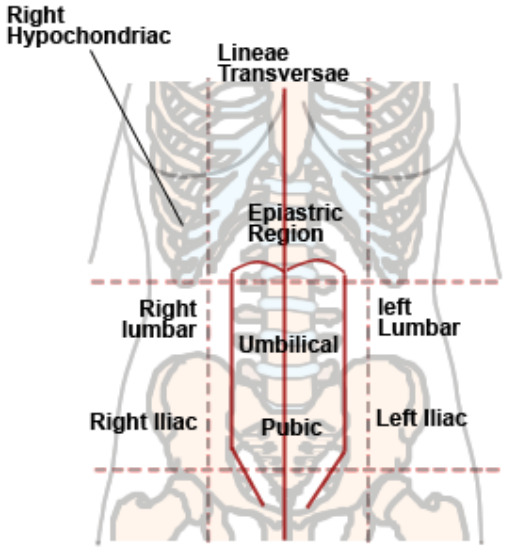
Ask the patient to point to any area of pain but examine that area last.

Inspection

You should begin with an inspection of the skin. Look for scars, stretch marks, dilated veins, rashes and lesions. Note their colour, size and shape. Study the contours of the skin, noting any distortions in shape, localised budges and masses. Finally, note the condition of the umbilicus.

Palpation of the abdomen will allow you to identify the position of abdominal organs and masses. Using the pads of your fingers, feel in all four quadrants (superficial and deep). Palpate for liver, spleen, kidneys and the bladder. With the patient breathing deeply with knees flexed, palpate the abdomen for organs and masses on expiration. Using your fingers, you can feel for the position of abdominal structures. Grasp the skin between the fingers to test for dehydration.

Perform percussion to test shifting dullness, which indicates the presence of fluid (ascites).



Auscultation
Listen to all the four quadrants noting the frequency and the type of bowel sounds. Use a stethoscope to listen to the bowel sounds. You may be able to detect the following abnormalities in the abdomen:

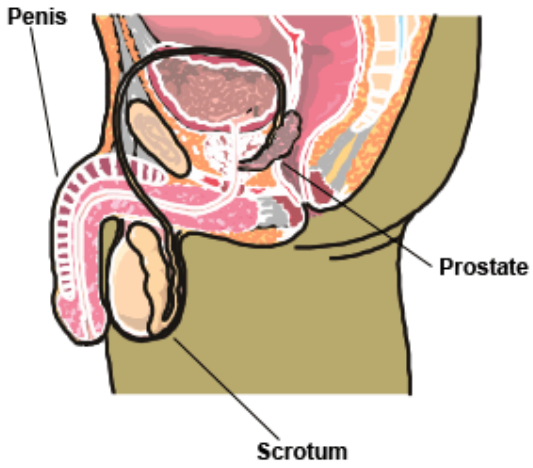
- Masses - note the location, size, shape, consistency, tenderness, pulsation and mobility.
- Enlargement - as you palpate the liver, kidney and spleen note for pain and irregularity.
- Bowel sounds - they are absent in cases of paralytic ileus in peritonitis or hyperactive in intestinal obstruction.

In a thin patient you may palpate the liver edge, portions of the large bowel, the pulsating aorta and iliac arteries and the lower pole of the right kidney

Examination of the Genitalia, Anus and Rectum

Male Genitalia
Examine male patients in the standing position so that the inguinal ring can be palpated for herniation.

Penis
Observe the skin, prepuce of foreskin, if present, the glans and the urethral meatus. Note and record any lesions, scars and drainage nodules. If the patient is uncircumcised, retract the foreskin of the penis and inspect for irritation, ulceration and presence of lesions.



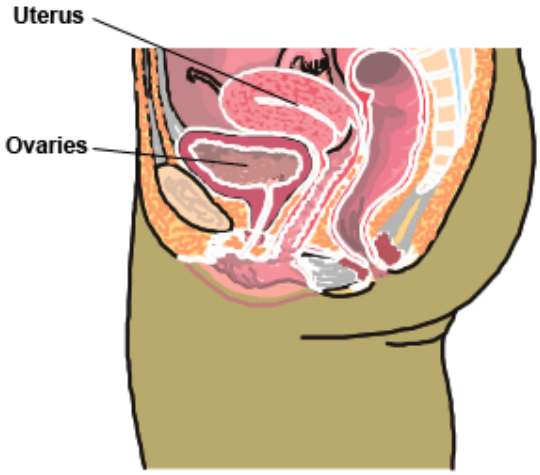
Scrotum
Observe the skin for nodules and lesions, swelling. Palpate testicles, noting the size, shape, tenderness and consistency. Palpate the epididymis and spermatic cord. Once again, note size, tenderness and consistency.

Prostate
This will be discussed with rectal examination. Observe the hernias while a patient is standing. Ask the patient to cough and try to reduce the masses if possible. The abnormalities you should keep an eye out for include:

- Syphilitic changes, that is, circular, dark red painless ulcer
- Urethral discharge thick pus drainage which indicates gonorrhoea
- Hydrocele, that is, a non-tender fluid filled mass confined to the scrotum
- Hernias, which may be arising outside the scrotum

Female Genitalia
You should examine a female patient in the lithotomy position (that is heels together, knees apart) with knees flexed. Drape the patient using a clean sheet or bath blanket as you would for catheterisation. The patient should be on an examination couch with stirrups where possible. Have a gooseneck lamp, put on sterile gloves and lubricate the outside of vaginal speculum (the inside is not lubricated because the presence of jelly interferes with the accuracy of the papanicolau (papa test).
The test is done by obtaining secretions from the cervical os on a swab. The secretions are examined for the presence of abnormal cells.

After inspecting the cervix, remove the speculum.
Then lubricate the index finger and middle finger of one hand. Insert the fingers into the vagina, pushing downward on the patient's abdomen just above the symphsisis pubis with the other hand. Palpate the uterus and ovaries. Assess the organs for location, size, outline, masses and tenderness. This examination is usually done along with pelvic examination.



Observe the external genitalia for inflammation, ulceration, discharge, swelling or nodules. Palpate any lesions and note tenderness. Pelvic examination and bimanual palpation then follow. You should comment on the size of the uterus, any tenderness, and any ovarian mass.

Try to name at least five abnormalities that you might detect

Some abnormalities you might detect include hypertrophy of the clitoris; imperforate hymen; Bartholin's cyst or abscess; vaginal discharge; fibroids; uterine prolapse or signs of cancer.

Anus and Rectum

Rectal examination is usually performed after genital examination and after pelvis examination.
The patient can be examined in two positions. The patient can either bend over the side of the bed or assume the lithotomy position, with the penis and testes held aside, or the knee chest position.
Put on gloves, lubricate the gloved fingers then insert the middle finger and palpate for size of the lower masses, internal haemorrhoids and tenderness.

Other Examinations

Examination of Arms, Hands and Fingers

With the patient seated or standing, ask them to extend both arms out in front of the body.

- Examine the musculature for asymmetry and palpate for turgor
- Range the arms, hand and fingers to assess agility
- Observe the skin for lesions, spotting and general colour
- Palpate the joints and observe for nodules and enlargement
- Observe the hands for colour and feel the temperature
- Observe the hands for any deviations of the alignment of fingers
- Observe the nails for hardness and general condition
- Test for the grip of each hand

Examination of the Back

Place the patient in the prone position or let them sit in the bed with the back facing you. Expose the back and examine the skin for spots and lesions. Note the curvature of the spine and palpate the vertebral column.
When examining school age children, check for scholiosis (lateral curvature of the spine) by looking for asymmetry of shoulder and hips while observing the child from behind. Observe for asymmetry or prominence of the rib cage while watching the child bend over so that the back is parallel to the floor. Listen to the lower lobes of the lungs with the stethoscope.

Examination of the Nervous System

The nervous system is an extremely complex network, which acts to coordinate the functions of the body. It includes the brain, spinal cord and peripheral nerves. You will review the details in unit three of module one. When examining the nervous system, you should integrate it into other aspects of the physical examination, which will now be addressed.

Mental Status

Observe the patient's general level of consciousness, ask "who" and "where" they are and observe for slurring of speech.

Motor Function

Note the gait and balance. Palpate each leg for muscle bulk and observe for discolouration, temperature and skin condition. Dorsiflex each foot to check for calf pain, a possible sign of thrombophlebitis (Herman's signs). Take pedal pulses on each foot and compare them. Palpate the ankles with fingers to assess for pitting oedema. Test strength by having the

patient press the sole of the feet against your palm. Extend and flex arms at elbow and the feet at ankle while you apply pressure. Inspect joints for enlargement. Observe muscles of arms and legs for size and uniformity

Kerning's Signs
This is another test for meningitis. Lay the patient on their back. Flex the hip to 90 degrees (straight up) allowing the knee to flex. Then extend the knee. If the meningeal inflammation is present there will be pain and irritation and sometimes a tendency to flex the neck.

Sensation
Check light touch and pin prick sensation. Have the patient indicate (with eyes closed) when they feel the touch of cotton wool and then of a pin.

Meningeal Signs
Looking for shifting of the neck with the patient lying down most easily tests meningeal inflammation. Bend the head towards the chest. If neck shifting is present there will be pain and resistance.

Testing Reflexes
There are many muscle reflexes, which you can test. The most important ones are those of the biceps and the triceps in the arms and knee (patellar) and ankle (Achilles) in the leg. The response is obtained by striking the tendon with the muscle relaxed or slightly tensed. Reflexes are graded as follows:

- 0 absent (no response)
- 1+ reduced (hypoactive)
- 2 + normal
- 3 + increased (hyperactive)
- 4 + markedly increased with clonus (continued contraction of the muscle)

Corneal Reflex
Corneal reflex (blink) is tested by touching the cornea with a soft, small wet cotton, the patient should blink.

Biceps Reflex
Biceps Reflex is tested as follows. Place your thumb on the biceps tendon, which is located just above the antecubital fosse. Striking the thumb should cause flexion of the forearm.

Triceps Reflex
To test the triceps reflex, the upper arm is supported at a right angle to the body and the forearm is allowed to hang freely. The triceps tendons is then struck with the reflex hammer just above the elbow. Extension of the forearm should occur.

Branchioradio
The branchioradio reflex is tested by striking the radius slightly above the wrist with the reflex hammer. This should cause flexion and supination of the forearm.

Knee Reflex
To test for knee reflex, the patient's lower leg must be relaxed and hanging freely from the knee. When you strike the patellar tendon, which is just below the knee with the reflex hammer, extension of the leg should occur.

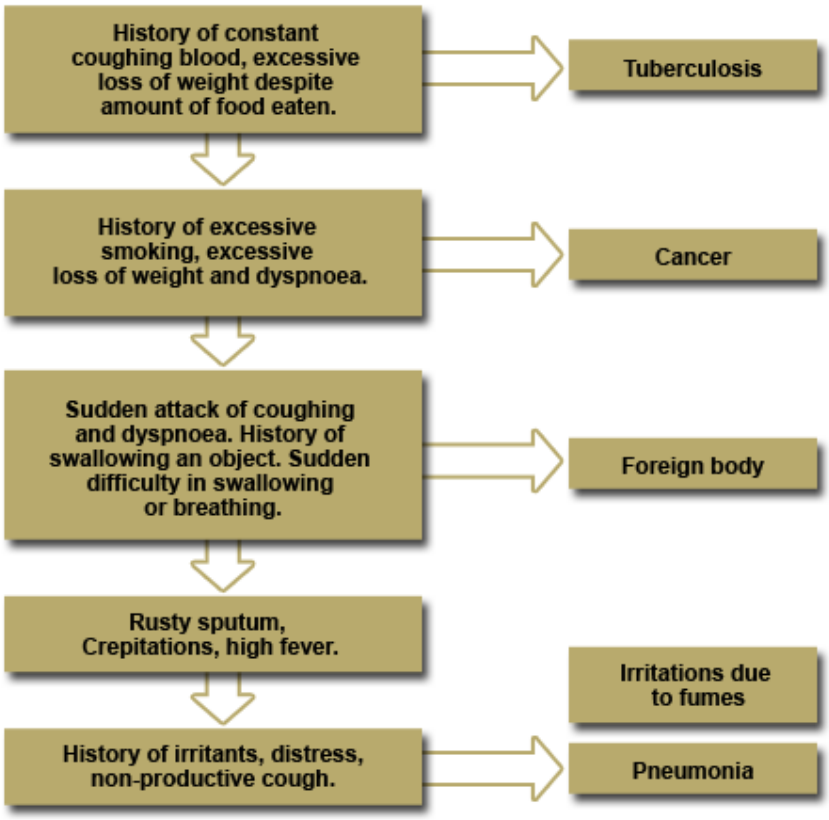
Ankle Reflex
When testing for ankle reflex, hold the foot of the patient in a position of dorsiflexion, then strike the Achille's tendon at the back of the ankle with the reflex hammer. This should cause plaster reflexion of the foot, that is, the toes should bend downwards.

What abnormalities are you likely to detect?
The following are abnormalities you may detect:

- Mental status: decreased level of consciousness,
  confusion, hyperactivity
- Motor function: weakness, atrophy and cord lesion, lack of balance, and lack of coordination, cord or brain lesion
- Sensation: decreased or loss of sense of touch, cord lesion
- Meningeal signs: presence of signs of meningeal irritation
- Reflexes: increased or decreased reflex response

You have gone through a comprehensive head to toe physical examination and have seen the abnormalities that may be detected. Now you will briefly see how you can arrive at a clinical diagnosis.
You started with history taking such as personal/social, medical, past and present. You also looked at the presenting complaints and found that there will be a chief or major presenting complaint and, possibly, accompanying complaints or signs and symptoms.

Signs and Symptoms Flowchart



The flowchart also provides other examples of specific signs and symptoms that may lead to a clinical diagnosis.
To arrive at a clinical diagnosis you have to match major complaints andexamination/investigation results.

Example:

1. Presenting complaint: A cough, which is productive.
2. Accompanying symptom: Dyspnoea, on examination rhonchi detected.
3. Diagnosis: Pneumonia.
4. Symptoms: Cough, which is productive for more than four weeks, sweating at night with weight loss.
5. Sputum for AFB: Positive.
6. Chest X-ray: Shows opacity.
7. Clinical Diagnosis: Pulmonary tuberculosis.

Integrated Management of Adolescent and Adult Illness [IMAI]

IMAI is a health care strategy that addresses the overall health care of the patient. It focuses on the main clinical conditions that account for most of the deaths among adolescents and adults. It integrates the prevention of illnesses and care into a single health care package. If you use this approach, you will find it more rewarding and it will make your work easier.
Move on to take a look at the rationale for using IMAI.

Rationale and Benefits of IMAI

Each year many adults and adolescents die prematurely of simple and preventable illnesses. When people seek treatment, they may get treated for single illnesses. However, health workers are reflecting upon a more integrated approach. This is because in many cases it may not be easy to make a single diagnosis with the limited resources. In any case, when patients present to you, they may have multiple complaints that do not point to just one diagnosis.

IMAI extends the benefits of Integrated Management of Diseases to Adolescents and Adults who are a neglected group. Furthermore, the strategy combines preventive strategies even for the management of chronic illnesses.
There are several benefits to the use of an integrated management approach for adolescent and adult illnesses. These include:

- It addresses the major adolescent and adult problems
- It responds to demand
- It also focuses on chronic diseases and their treatment, for example, HIV/AIDS
- It balances prevention and care
- It addresses special needs of the special groups
- It invests care in the community
- It promotes cost savings
- It improves equity

IMAI interventions
The IMAI has simplified guidelines, which give several possible combinations of a large number of interventions. The interventions are based on key clinical symptoms.
Every country must develop and adopt core interventions that are related to prevalent diseases in their communities.
The interventions are centred on: acute care; chronic care; HIV care; palliative care; tuberculosis and emergency treatment. When our country finally adopts and develops these guidelines, they will be very useful.
This approach to care is based on the experience with IMCI. The preventive interventions within IMAI include:

- Provision of key information on HIV
- Voluntary HIV testing and counselling
- Counselling on sexually transmitted infections, for example, syphilis
- Counselling on safer sex
- Sharing health messages on harmful alcohol use, smoking, inactivity, poor diet and so on
- Special adolescent preventive interventions, for example, insecticide treated nets, tetanus vaccinations and blood screening
- Adult's preventive intervention
- Interventions to prevent mother to child transmission of HIV, through family planning and early antenatal care

SECTION 4: PRINCIPLES OF SAFE DRUG USE

Introduction
In section three you studied how to diagnose and treat minor illnesses.
In this section, we will cover the principles of the Essential Drugs Kit, therapeutic doses and calculations of drugs in common use, drug interaction, drug assimilation, drug resistance, contraindications and side effects.

This section aims at building on the knowledge you already have on safe drug use.

Objectives
By the end of this section you will be able to:

- Explain the therapeutic doses and calculation of drugs in common use
- Describe drug interaction, drug assimilation, drug resistance, contraindications and side effects
- Describe the principles of essential drugs kit

Pharmacology

You were taught pharmacology for nurses during your KECHN training. Since then you have been administering drugs to patients.

The Definition of Pharmacology
You may have come up with various definitions. Admittedly, there are many definitions of pharmacology. The most widely accepted one states, ‘Pharmacology is the science of drugs, which includes their preparation, use and effects’.
In this definition the core word is 'drugs'. Most people, when defining drugs, think of only medicinal drugs that are prescribed by a doctor to treat illness. What about substances like caffeine, alcohol, nicotine and tobacco? What about the illegal drugs that are often abused or the environmental substances that have physiological effects when they come into contact with the body?
In view of this, the broader definition of pharmacology is 'the study of the effects of chemical substances on living tissues'. You are aware that every culture has studied plants and has developed a system of medicine founded on the use of plants. The common term used for this kind of treatment is herbal medicine. The government is in the process of regulating what is commonly known as alternative medicine.
You must be asking yourself a few questions about the significance of pharmacology in

nursing. You have a responsibility in the administration of drugs. You are expected to exercise judgment in the management of drug therapy. You require an understanding of drug action and the ability to detect both therapeutic and adverse reactions in the patient. You are also expected to counsel patients on the management of their drug regimens for optimal effect.

In your nursing practice at times you diagnose and treat minor illnesses and are involved in the prescribing of medications.

As a registered community health nurse you will be expected to promote health and prevent drug related diseases. You will, therefore, be concerned with the health impact of environment pollutants and health aspects of social, medicinal and illegal drug use. You will be teaching the community on how to avoid drug hazards and prevent chemically induced disease.

Whether practising community health nursing or occupational health nursing, you will be involved in the early detection of drug related problems through case finding and referral. In addition, you will work with patients to improve self-care practices in home-based care. When administering drugs you must detect early signs and symptoms of toxicity, adverse reactions and drug interactions as well as therapeutic responses.

You have now seen why it is important for you to learn pharmacology. Your overall role is to promote responsible use of chemicals to enhance health, at the same time minimising the detrimental effects of such use. You are, therefore, required to utilise your knowledge of the human anatomy and physiology, legal aspects of nursing, that is, ethics and law pertaining to nursing practice. Remember that you covered the laws relating to nursing practice in unit one.

When administering drug therapy, you must be skilled in practical technical procedures required to handle, control and administer drugs safely.

Laws Relating to the Control of Drugs

You may be asking yourself whether it is necessary for you to have a wide knowledge of the legislation governing the administration and supply of drugs and to some extent you do. As a nurse of the twenty first century, you must have this knowledge because of the expanding roles of the nurse, especially the community health nurse.

As discussed earlier, an understanding of pharmacology and the reasons for storing drugs, in particular is essential. This knowledge will enable you to have confidence so as to ensure your safety and the safety of the patient when dealing with substances, which could be harmful. The regulations governing the administration of drugs may be divided into two: those that are statutory, relating to various Acts of Parliament and those that are institutional policies.

The aim of this legislation is proper management of drugs so as to prevent error, illegal usage and addiction. The persons chiefly affected by the statutes are doctors, pharmacists, nurses and clinical officers.

In Kenya, just like any other country in the world, there are elaborate legislative controls governing drug use. These laws restrict the production, distribution, prescription and administration of drugs.

You must:

- Be familiar with the regulations affecting drug use in your area of practice
- Continually update yourself on the changes in drug regulations
- Know the policies of the institution you are working in.
- Abide by the drug control laws within your professional practice

As you are advising patients on the use of drugs, you must not recommend the use of illegal substances or provide drugs for patients' use without proper prescription. You must maintain the security of drugs at all times to prevent diversion to unauthorised persons. For example, medication should be stored in locked cupboards. Some drugs must be kept under double locks. During drug administration all unlocked drugs must be kept under direct observation and control. Maintain careful records of the disposition of each dose of certain drugs such as DDA (narcotic drugs and psychotropic substances).

The patient has the final control on drug use. Normally, the patient gives or withholds consent to treatment and also determines compliance. You are, therefore, to ascertain the patient's drug attitudes and practices during the assessment. Explain carefully the need to change old habits. Give clear explanations and descriptions of drug regimens. You must respect the client’s refusal for treatment and drug therapy.

The Pharmacy and Poisons Act: Chapter 244 of the Laws of Kenya, 1989

The Pharmacy and Poisons Act: Chapter 244 of the Laws of Kenya, 1989
This law requires the registration of all sellers of poisons. The act deals with the registration of pharmacists, defining statutory poisons, and drawing up the poisons list, which is divided into two parts:
Part I: Consists of those poisons which are not to be sold except by authorised sellers of poisons and by licensed wholesale dealers and dealers in mining, agricultural or horticultural accessories;
Part II: Consists of those poisons which are not to be sold except by persons entitled to sell Part I poisons and by persons licensed under section 32.
The Poisons Act, 1989 sets out various schedules which deal with the sale, labelling and colour of certain poisons. The schedules relevant to nursing are Schedule 1(5.1) and Schedule 4(5.4).

Schedule 1(5.1)

Poisons contained in the first schedule must be stored in a locked cupboard and must be adequately labelled. In hospital, they may be supplied only on a prescription signed by a registered medical practitioners or on a written order from the nurse in charge of the ward or the deputy.

Schedule 4 (5.4)

Poisons contained in the fourth schedule are divided into two parts.
1. S.4 A. This group is used in medicine and must be ordered on a prescription by a registered doctor or dentist and bears the:
- Name and address of doctor and patient
- Name of the drug
- Quantity to be supplied
- Dose to be taken and if the prescription may be repeated
- Signature of the doctor and the date

2. S.4 B. These drugs must be ordered on prescription but it requires only the date and doctor's signature. All schedule 4.A poisons are automatically included in the first schedule and are, therefore, kept in a locked cupboard. The pharmacist is required to keep schedule 4.A. prescriptions for two years.

The Narcotic Drugs and Psychotropic Substances (Control) Act, 1994

This is an Act of Parliament to make provision with respect to the control of the possession of, and trafficking in, narcotic drugs and psychotropic substances and cultivation of certain plants, to provide for forfeiture of property derived from, or used in, illicit traffic narcotic drugs and psychotropic substances and for connected purposes.
The Act sets up an Advisory Council to review any drugs likely to be misused and determine if it could constitute a social problem. The Advisory Council also advises the minister on particular measures to be taken to prevent misuse of drugs or to deal with problems created by their use by:
- Restricting the availability of such drugs
- Providing facilities for the rehabilitation of dependant persons
- Educating the public in the dangers of misusing drugs
- Promoting research into these drug problems

The Act gives power to the minister to prevent the misuse of controlled drugs including:
- Searching premises
- Obtaining information from doctors and pharmacists
- Power to arrest
- Prosecution and punishment of offenders

The Act gives schedules of controlled drugs, which are regulated by the Act as:
- First schedule which is a list of narcotic drugs.
- Second schedule which is a list of psychotropic substances
- Third schedule, which is a list of prohibited plants, including cannabis, coca bush and paupers somniferous (opium poppy)

Prescribing Controlled Drugs
The medical practitioner must write the prescription in ink and in their own handwriting giving the following details:
- Date
- Name and address of the patient
- Address of the doctor
- Dose to be taken
- Preparation
- The form (mixture, tablets, ointments and so on)
- The strength (in words and figures e.g. ten milligrams,10 mg)
- The quantity (in words and figures e.g. thirty millilitres, 30 mls or total number in

words and figures, e.g. twenty tablets, 20 tabs)

In hospital the use of the patient's prescription sheet or case notes is adequate and the address of the patient or doctor is not required.

The Supply of Controlled Drugs

The pharmacist may only supply the drugs if:

- The medical practitioner lives in the country
- The signature is known to them and believed to be genuine
- The containers are that for controlled drugs which must state the kind of preparation (tablets, capsules, and ampoules), the strength of each unit dose and the total number of unit doses
- In the case of mixtures, ointments, cream containers must state the total amount prepared and the percentage of each controlled drug they contain

Within hospitals certain rules must be observed.

Hospital Rules

Within hospitals certain rules must be observed.

- Prescriptions must be signed by a registered medical practitioner
- Stock must be ordered from the dispensary in special controlled drug books signed by the nursing officer in charge/charge nurse or the deputy
- Drugs must be delivered in a sealed container and a receipt signed by the ward in charge
- Controlled drugs must be stored in a locked container or cupboard within a locked cupboard
- These cupboards should not be used for any other purposes (for example, storing valuables)
- Details of doses given to each patient must be recorded in cardex, together with the signature of the nurse giving the dose and the person checking it
- Any drug wasted must be recorded and signed for
- Controlled drug books must be kept for two years following the last entry date
- All dangerous drugs are automatically contained in Schedule 1

A practising midwife may administer on her ownresponsibility an injection of Pethidine, Buscopan or Egormetrine.

When prescribing controlled drugs the medical practitioner must write the prescription in ink and in their own handwriting. Think of all the details that must be included on the prescription?

- The date
- Name and address of the patient
- Address of the doctor
- Dose to be taken
- Preparation
- The form (mixture, tablets, ointments and so on)
- The strength (in words and figures e.g. ten milligrams
  and 10mg)
- The quantity (in words and figures e.g. thirty millilitres and 30 mls or total number in words and figures e.g. twenty tablets and 20 tabs)

Local Regulations

Local regulations are devised by individual hospitals and are meant to protect their staff, particularly the nurse during training:

- Any dangerous drugs should be checked by a registered/enrolled nurse
- Only a small quantity should be kept in the ward
- The stock should be checked regularly
- The drug keys should be on the person who is in charge of the word or the deputy
- Ampoules containing different drugs should be stored separately
- Drugs should not be transferred from one bottle to another
- Out of date drugs and those brought in by patients should be returned immediately to the dispensary
- Drug bottles must be labelled by a pharmacist

What are you advised to do before administering any drugs when you go to work in a new hospital?

Any nurse entering a new hospital is advised to enquire about the hospital policies regarding drug administration.

Drug Standards

You looked into standards of nursing practice in unit one while discussing professional practice.

In your opinion, what are drug standards?

Standards are the yardsticks by which drug preparations are judged. As you have seen earlier, the standards for drug quality are established and enforced by the government. Medicines vary in their purity, strength, bioavailability, efficacy and safety or toxicity.

Standards of these or other properties must provide a method for measuring the attribute to be evaluated as well as an acceptable level or range for those measurements.

Take a look at these Drug Standards one by one.

Purity

A pure drug contains only a specific chemical agent with no contaminating ingredients. Drugs are not 100% pure because of the impurities from raw materials used for manufacturing them. Other ingredients are added to the chemical to manipulate the absorption process. These additives include solvents, fillers, disintegrators, buffers, waxes, dyes, inks and plastics .

Contaminants from the environment of the production plant may find their way into a batch of drugs. Standards of purity, therefore, rarely require that the substance in question be 100% drug chemical. They do, however, specify the type and concentration of extraneous substances allowed to be present in the drug product.

Potency

The potency or the strength of a drug is measured by assay techniques.
Chemical analysis is used to determine the ingredients present in a preparation and their relative amounts

Bioavailability

Bioavailability is the degree to which a drug can be absorbed and transported by the body to its site of action. This may be influenced by particle size, crystalline structure, solubility and polarity of the drug compound.

Bioavailability is commonly measured by blood or tissue concentration of the drug at a specified time following administration of a dose.

Efficacy

Efficacy is the effectiveness of a drug in treatment.

Safety or Toxicity

Safety or toxicity is measured by the incidence and severity of reported adverse reactions following the use of a drug.

How do you interpret drug data?

To be able to interpret drug data intelligently, you must:

- Be familiar with the signature of each property and the limitations of the testing procedures used to measure it
- Evaluate therapeutic responses in patients receiving medication
- Monitor adverse or toxic effects because if adverse reactions are diagnosed earlier it becomes easier to treat them

Should you be involved in clinical trials of experimental drugs on human subjects, you will need to assess the patients appropriately so as to:

- Protect patients from serious harm stemming from their exposure to unproven drugs
- Generate valid data for evaluation of the experimental drugs

You must have observed that from time to time various new drugs are introduced into the market. Move on to look at various concepts that relate to safe drug use.

Name of Drug

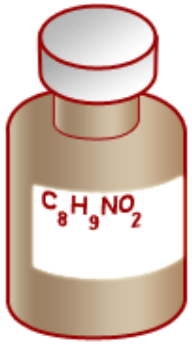
A drug may be prescribed using various names, such as the trade name, generic name, and/or chemical name. You should be aware of the various names of drugs. You should also be aware of the different drug families.

Chemical Name

The chemical name of a drug indicates its atomic and molecular structure. These names are commonly used by the chemist and/or the research pharmacist. The names are unsuitable for general use since they are long.

Examples of chemical names include:

- Acetylsalicylic acid (C6H4OHCOOC1H5)
- 7-Chloro-10 (3-dimiethlyamino-n-propy)
- phenothiazine hydrochloride
- 4-hydroxyacetanilide-p-acetami dopherol



Generic Name

A generic name (some call it approved name) is a simpler, shorter name for each drug substance. The name is often proposed by the company that first develops the drug. Examples of generic names include:

- acetylsalicylic acid commonly known as aspirin
- 7 chloro-z methyl-amino-sphenyl-3h-1, benco diazepine, 4oxide commonly known as chlordiazepoxide
- 2-chloro-10(3-dimiethlyamino-n-n-propyl) pherothiazine hydrochloride commonly known as chlorpromazine
- 4 hydroxyacetanilide P-acetamido phenol commonly known as paracetamol

Trade Name

Trademarks, trade names, brand names and proprietary names are interchangeable terms used to identify drugs manufactured by various drug companies. A specific generic drug may have various trade names.
The symbol after the trade name indicates that the trade name is registered and its use is restricted to the manufacturer who owns it. Trade names may be selected to:

- Denote the drug's chemical structure
- Identify the company responsible for manufacturing the drug
- Represent some property of the drug

Examples of trade names include:

- Chlordiazepoxide, referred to as Librium
- Chlorpromazine, referred to as Largactil
- Paracetamol, referred to as Calpol, Cetal, PMC, Panadol, Panleve, Panok, Labalgin and so on

No other firms or company can employ the same trade name. A trade name is usually selected to be short, catchy and easy to pronounce.

Examples of Names Given to Some Common Drugs

Generic Name	Chemical Name	Trade Name(s)	Commonly Used Abbreviation
Asprin	Acetylsalicylic acid	Ecotrin	ASA
Milk of Magnesium	Magnesium hydroxide	Phillips milk of Magnesia	MOM
Tetracycline	Hydrochloride of 4-(dimethylamino-1,4a,5,5a,6,11,12a-octahydro-3,6,10,12,12a-pentahydroxy-6-mythyl-1,11-dioxa-2-napthacene carboxamide.		
Prednisone	11B,17,21 -trihydroxypregna-1, 4-diene-3-20-dione	Deltasone Meticorten Cortigel Cortrophingel	ACTH

Drug Family

Drugs may be classified in many ways. One substance may belong to more than one family depending on the classification used. A drug may be designated by its chemical derivation, for example, heavy metals, xanthines, steroids, phenothiazines and so on.

Drugs may also be grouped according to the mechanism of action, for example, central nervous system depressant, anti-cholinergic, anti-inflammatory and others. In other words, drugs with similar characteristics are often grouped together in families.
The family name may denote its:

- Chemical structure, for example, barbiturate
- Mode of action, for example, antacid
- Physiologic action, for example, diuretic
- Therapeutic effect, for example, anticonvulsant, analgesic

A drug may also be listed under more than one classification, for instance, aspirin, which is an analgesic, antipyretic, and anti-inflammatory drug.

Drug Effects

Desired Therapeutic Effects

The desired therapeutic effects should indicate the mechanism of action of the drug.
For example, an analgesic is for pain relief, accomplished by central nervous system depression inhibition of inflammation, neutralisation of acid in the stomach, vasodilation in angina or muscle relaxation. You must therefore understand how medication affects body function in order to make sound judgements about which medication to use.

Side Effects

Side effects of a drug are physiological effects exerted by the chemical that are not related to the desired therapeutic effect. You must, therefore, be familiar with serious side effects and commonly occurring side effects.

Remember: All drugs have side effects. The number and range of side effects may indicate the relative toxicity of a given medication.
Adverse reactions include any undesirable effect apparent in the recipient. They may be opposite to the desired effect, allergic or extraneous. Unusual effects seen in some patients due to individual differences are known as idiosyncratic, which refers to the tendency within the individual to react unfavourably to certain substances.

When you know that a patient has an idiosyncrasy, or where a group of drugs is known to precipitate such reactions, extra care must be exercised. For example, Iodine and Iodides will precipitate coryza. Aspirin may cause urticaria and asthma. Barbiturates may cause a measles like rash.

Toxic Effects

Toxic effects are those that involve an excessive drug effect. They tend to be exaggerations of therapeutic or side effects. For example, toxicity from a central nervous system depressant used for sedation may induce a coma. If the depressant is an opiate, which acts as a miotic, the pupils are reduced to pinpoint size. The margin of safety between therapeutic and toxic doses varies greatly.

What you should know is that any substance that is physiologically potent enough to produce therapeutic effects is potentially harmful to the body at certain circumstances. Toxic symptoms could appear in clients receiving appropriate dosages. This is because drug response, metabolism and excretion vary from person to person.

Contraindications

Contraindications are conditions or symptoms that alert you to the potential dangers of the drug. You must always decline to administer any drug that you believe will cause harm to the client. In such cases, let the physician administer the drug personally. In such a situation, there are legal implications and this is the reason for the decision not to administer the drug.

Take a look at these Drug Standards one by one.

Dosage Range
The usual dosage must be included for each method of administration. Dosages require adjustment according to certain factors for example:

- Body mass
- Nutritional status
- Pathologic condition
- Patients' ability to metabolise and excrete the drug

When you notice any unusual dosages, you should verify and clarify with the doctor. You should refuse to carry out an order that, in your judgment, will result in harm to the patient. Errors in dosage are not uncommon especially in the case of verbal orders. It is your responsibility to alert the doctor to the possibility of error.

Elimination

You must be aware of the physiological mechanisms by which a drug is inactivated and eliminated from the body. The efficiency of elimination affects the efficacy and potential for toxicity of a given medication. Many drugs are deactivated by microsomal enzymes in the liver and excreted by the kidneys. You must always adhere to procedures that promote accurate identification of drugs before administering them to patients.
Drugs are derived from plants, animals or mineral resources. Others are produced synthetically in the laboratory. These drugs may be in various forms. You have been administering various preparations of drugs.
How many preparations of drugs can you recall?

The Different Preparations of Drugs

Preperation	Description
Mixture	A liquid preparation consisting of more than one drug dissolved in water or other fluids.
Draught	A mixture dispensed as a single dose usually 50ml.
Elixir	A pleasantly flavoured liquid preparation, frequently containing alcohol as an adjunct to other flavouring.
Emulsion	A suspension of two immiscible liquids, for example, oil and water, one dispersed in the other.
Syrup	A concentrated solution of sugar in water.
Linctus	A cough sedative in liquid preparation.
Tincture	A drug dissolved in spirit for either internal or external use
Solution	A drug dissolved in a liquid.
Lotion	An aqueous mixture for external use.
Liniment	A lotion with the property of counter irritation.
Capsule	Contains powder or liquid enclosed in gelatine.
Tablet	Compressed powder.
Pill	A solid spherical body containing medicinal agents in a base.
Ointment	A semi-solid medication preparation in a greasy base.
Paste	An ointment with a high proportion of an insoluble powder in it, which makes it stiff and difficult to spread.
Cream	A semi-solid emulsion.
Lamellae	Small gelatinous discs used in the eye or under the tongue.
Suppositories	Conical shaped bodies made of gelatin or cocoa butter, containing drugs for introduction into the rectum.
Pessaries	Similar to suppositories but larger, for introduction into the vagina

The Route of Administration

The route of administration is dependent on the time at which the effect is required. It is also dependent upon the method most suitable to the drug prescribed. Where possible, oral administration is preferred. Drugs can be administered orally, sublingually, rectally or by injection.

- **Orally**, where drugs are administered orally in liquid, powder or tablet form. **Sublingually**, where tablets or lamellae may be allowed to dissolve under the tongue.
- **Rectally**, which involves the use of suppositories or enemata.
- **Inhalation**, where drugs are inhaled as vapour or sprays.
- **Locally** or topically, where drugs are used locally on the skin or in the eye, ear or vagina.
- **Injection**, which can be done in several ways including intradermally, subcutaneously, intramuscularly, intravenously and intrathecally.

You must bear in mind that when prescribing a drug, the dosage may vary with certain factors.

The Factors to Bear in Mind When Prescribing a Drug

Age

The extremes of age that is, children and adults over 60 years require smaller doses than the normal adult dose. You must, therefore, calculate their drug dosage as per kilo of body weight.

The drug dosages are normally indicated at the label of the drug container or the literature accompanying the drug. In common practice, there is an assumed dosage for children over thirteen years and adults. You should note that calculation of drug dosages will also depend on the age. For children and adults over 65 years it is advisable to calculate the dosages per kilo of body weight. Follow the physician's or manufacturers instructions when you are calculating the drugs dosages.

Route

The route by which the drug may be given varies and the drug dosage may also vary according to the route of administration.

Assimilation

The assimilation of drugs given orally is fairly slow, thus the oral dose is large, whereas any

drug injected into the blood stream acts immediately and dosage is proportionately smaller.
Therefore, you must take the greatest care to check the target cells. Organise concentration so that you administer drugs by the correct route.
As you prepare to administer drugs, you have to be conversant with the knowledge of weights and measures.
Note the following examples of weights and measures carefully!

1000 micrograms(mcg) = 1 milligram (mg)
1000 milligrams (mg) = 1 gramme (g)
1000 grammes (g) = 1 kilogram (kg)
1000 millilitres (ml) = 1 litre (L)
Also remember, that while you are in the community you may be forced to convert the measurements into domestic equivalents.

A teaspoonful is nearly 5ml
A tablespoonful is nearly 10ml
A teacupful is nearly 150ml
A tumblerful is about 250ml

The Administration of Medication

Administration involves all activities related to safe drug use which include:

- Assessing the risk to a patient of a new drug order
- Delivering the drug dose to the proper body tissues
- Assessing the patient's response to drug therapy
- Treatment of adverse reactions to drugs
- Consultation with the doctor about adjusting the prescribed regimen
- Educating the patient about the proper use of drug substances

All these are your responsibilities as a nurse.

You are also expected to administer oral and topical drugs, as well as parental drugs and those injected directly into the vascular system.

The Five Rights

Accuracy in drug administration depends on five factors: the right drug; the right dose; the right patient; the right route and the right time. You shall now look at each of these factors in greater detail.

The Right Drug

To ensure that you have used the right drug, you must check and double check the package label and the cardex and medication card or sheet. You must prepare the medications you give yourself and do not administer drugs prepared by someone else.

The person who administers the medication is the one held responsible.

You should recheck the order, the label and the medication card if a client questions the medication. A mentally alert client will notice a change in medication or mention problems that have arisen from the medication.

Do not ignore statements or questions regarding medication from a client!

Please ensure that you take the following precautions when administering medicine:

- All doses are best prepared from the original container
- Medicines should not be prepared in the dark. Good illumination is necessary for positive identification
- You should caution clients about the use of non labelled pillboxes
- Do not to mix supplies of several tablets or capsule in a single container
- Make sure you check medication labels when removed from the shelf, before pouring or measuring and when returning to the shelf

The Right Dose

To obtain the right dose, you must carefully measure the medicine. Use the proper technique for pouring solid drugs such as capsules and tablets in order to minimise handling of the drugs. You should pour the medication into the container's cap, and then transfer the required number of units in the dose from the cap to the medication cup. If you require half of a tablet, a scored tablet may be cut into two pieces with a knife edge or folded in clean paper and broken with the fingers.
Scored tablets may be split by exerting digital pressure on each side of the slot. Fold tissue or a paper towel around the tablet to avoid contact between the hands and the medication. This procedure is easiest with larger tablets. Small tablets, which provide too little leverage for the fingers, should be cut with a knife. Do not attempt to split non scored tablets or to divide the dose of a single capsule. When you split tablets, give the two halves in successive doses, so that any deviation from the prescribed dose due to uneven breakage is levelled out as quickly as

possible. Do not break all the tablets available and mix the halves.
Liquids should be measured in a container with a scale that provides a mark for the required dose, for example, plastic medicine glasses or spoons.

The Right Client

You should make sure that the right client receives the right drug. You should only give drugs to the person for whom they are prescribed or recommended for.

If the patient is wearing an identification bracelet, check the client's name on their identification bracelet with the name on the medication card in your hand. Alternatively, if the patient is conscious and sane, simply call out the patient's name. This check is essential to avoid errors.

The Right Route

The right route must be used for drug delivery. Most medicines are taken orally or by topical application. Ensure that the client understands how the drug is to be taken. Sublingual or chewable tablets should not be swallowed whole. Crush oral drugs, if swallowing is difficult or if they are to be taken in liquid form. Demonstrate to the client procedures for application of topical drugs.

***Giving medication by the wrong route can cause death. The person who administers the drug is held responsible*.**

You should always check the doctor's orders and the cardex or treatment sheet to verify the medication route. Alert the doctor if the route is not in accord with that which is recommended for the drug preparation.

The Right Time

Under normal circumstances the right time for drug administration is not indicated by the doctor. The doctor only indicates the number of times a day a drug is to be given. For example, the doctor might state:

- The hourly interval between doses
- The relation of the dose to the client's activity patterns, such as, before or after meals, on rising or retiring or every 4 hours, 6 hours or 12 hours

Clients with poor time orientation, short-term memory defects or distracting activity schedules need some system for guiding them in self medication. Most hospitals have set up routines for intervals and times for medication. Nonetheless you must be familiar with times for medications and the appropriate times for administering them.

Medication Procedures

Medication procedures vary from hospital to hospital but the underlying principles remain the same. For example, to ensure that the correct drug is given, drugs should be identified with a correctly written label at all steps in the procedure.
The rules to be followed are:

- Drug containers are labelled only in the pharmacy by the pharmacist. If a label becomes soiled or illegible, the container should be returned to the pharmacy for re-labelling.
- If several drugs to be given to one patient are poured out, they may be placed in one cup provided the names of all the drugs are indicated in some way. If the patient does not take all of the drugs mixed in this way, all must be discarded and the required drug re-poured, because individual drugs cannot be identified by appearance alone for removal from the group.
- Narcotics must always be identified by a written label. Narcotics must be carefully accounted for.

Medication Errors

Medication errors continue to be a serious problem in many health institutions despite the elaborate rituals used in administering drugs. Errors are determined in relation to the five rights of correct administration.
Common errors include a drug being administered to the wrong patient; wrong medication is given; the use of an inappropriate route; errors in timing and the incompatibility of conversion factors used in calculating doses.
Mistakes in drug administration may arise at any step in the process from the physician's order to the delivery of the dose to the patient.

Recording and Tanscribing Medical Instructions

Medical Instructions should be written by the doctor.

Telephone Medical Instructions and verbal Medical Instructions are only permitted under

certain circumstances. For example, if the physician is scrubbed up for a surgical procedure, the Medical Instructions may be written by a nurse, provided it is countersigned by the doctor as soon as possible.

The nurse who takes a spoken Medical Instructions should always read it back to the doctor for his verification. If pronunciation is unclear, the drug name should be spelled out to ensure accuracy.

Recording and Transcribing Orders

Drug orders should always include:

- The name of the patient
- The name of the drug
- The dose
- The route of administration
- The frequency or timing

You should always ask the doctor to verify the route desired if no route has been specified.
The handwriting of many doctors may not legible. If there is doubt about any element of a drug order, oral verification must be sought from the doctor involved. Written orders may contain errors in dose and/or drug form. If any part of the order appears inappropriate, contact the doctor to correct any mistakes that may have
been made.

Labelling of Drugs

Pharmacy labels on drug containers may not use the same terms used by the doctor's order. For instance, the doctor may have ordered the drug by its trade name, but the pharmacy may dispense it by its generic name.

Additionally, most pharmacists label preparations with metric doses where many doctors use apothecaries' doses.

Identification of the Patient

When the patient does not have an identification band, call the patient by his name appropriately.
Patients who are unable to respond with their names due to disorientation, expressive aphasia or altered level of consciousness should wear a visible name label at all times.

Incomplete Delivery of Drugs
Drugs must reach the site of action to be effective. This may fail due to mal-absorption in the injection site, if the site is scarred, oedematous or hypoxic.

Another reason could be abnormally rapid metabolism and excretion. Other times problems may arise from lack of skill in delivery techniques.

Verification Errors

There are certain steps designed to detect errors so that they can be corrected before the drug is administered to a patient.
The following steps provide a general guideline:

- Compare the orders on the medication cards or cardex with the original orders written by the doctor.
- Compare the patient's name on written records with the name tag.
- Repeatedly read drug labels.
- Make a conscious effort to concentrate on the task at hand if routine 'checks' are to be effective.

Reporting Errors

Report an error immediately it occurs. Examples of potential errors include wrong drug, an incorrect dose, the wrong patient, the wrong route used or a drug given at the wrong time. It is absolutely necessary to report it. This helps to protect both the patient and the nurse.
Fast reporting of medication errors means that emergency measures can be taken and undesirable complications may be prevented.

For effective drug therapy and the delivery of accurate doses of active chemicals to the body tissues at the appropriate site of action of the drug involved, you must master the following skills:

- Proper storage and handling of drugs
- Command of the language used in drug therapy
- Accurate computation of drug doses
- Techniques used in delivering drugs by specific routes to specific sites

Storage and Handling of Drugs

Preservation

Drug substances require careful storage and handling to maintain their safety and potency.

All drugs must be kept in a special place and secured from access by unauthorised persons. Storage areas should be kept cool and dry. This is because chemical deterioration is

enhanced by heat, moisture and light. Water dissolves solid drugs and heat melts the waxy bases of suppositories and ointment.

Ensure that you protect sterile substances from bacterial contamination. Inspect stocks periodically, and discard any drugs whose recommended shelf life has expired or that have changed in appearance.

Finally, keep storage areas clean and orderly.

Containers

Drugs are best kept in their original containers. Note that copying labelling may result in transcription errors. You should use original containers that protect their contents. For example, light sensitive compounds are packed in amber bottles or in containers that filter out much of the harmful radiation.

Do not transfer sterile substances from container to container as it increases the probability of contamination. Protect the label from soiling to ensure it remains legible.

Remember:
Safe drug use requires that medicines have clear, accurate labels at all times.

Drug Reaction and Interaction
Any physiologically active drug has the potential to cause an undesirable reaction that may induce illness in the recipient.

Adverse reactions include toxic reactions, side effects, allergic reactions, cumulative reactions, tolerance and dependence and detrimental drug interactions

Drug Interaction
A drug interaction is when an interactant chemical modifies the therapeutic results that are anticipated with a drug. The interactant may be:

- Another drug
- Some combination of drugs
- Natural or artificial chemical components of the diet
- Pollutant chemicals from the environment
- Endogenous body chemical
- Chemicals used for diagnostic laboratory tests

Chances of a drug interaction increase with the number of drugs the patient is taking or when the patient consults more than one physician and a variety of medications are prescribed.

Drug interactions are varied. They may be beneficial or detrimental, and may vary from person to person. They may be of major clinical significance or of no clinical significance. They may affect absorption, distribution metabolism or excretion of drugs.

Drug Reactions

Here is a list of all the different categories of drug reactions.

Adverse Reactions

Adverse reactions to drugs vary in the length of time to develop. Some become apparent immediately, others appear weeks or months later. They may range from mild to catastrophic in severity. They can affect any tissue or organ.

Under normal circumstances, clients receiving relatively new drugs are particularly vulnerable to unexpected complications but adverse reactions to drugs that have been well tolerated for extended periods of time can occur, owing to changes in the ability of the client to metabolise or excrete the drug or because of recurrent illness. The slow accumulation of some drugs produces delayed

Toxic Reactions
You have learned a lot about this. Always remember, there is no useful drug that is completely devoid of toxic potential.
Think of all the toxic effects you have observed in the course of your practice.

Side Effects

These have also been mentioned earlier. As we noted there are various side effects of the commonly used drugs for your patients.

Allergic Reactions

Allergic reactions to drugs are the result of the body's immunologic response to a drug following previous exposure to that same drug. Allergic reactions do not occur during the first exposure to a drug.
Allergic reactions to drugs account for up to 10% of all drug reactions. An allergic reaction may be triggered by the drug in its unchanged form, by a drug metabolic, or by inert ingredients used in drug manufacture. Injected penicillin is a primary offender in allergic reactions
to drugs

Common allergic reactions include Urticaria

(hives) and Anaphylactic shock (involving cardiovascular and respiratory systems). This is characterised by dyspnoea and respiratory difficulty. Cough, cyanosis, angio-oedma, urticaria, pulse variations, hypotention, sometime convulsions, unconsciouness and acute cardiovascular collapse are other common reactions. The reaction is due to contraction of smooth muscles and increased vascular permeability.
The treatment of allergic reactions depends on their severity. Drugs used to counteract reactions include antihistamine diphenhydramine (Benadryl) for urticaria and epinephrine, antihistamine and bronchodilaters for anaphylactic shock.
Allergic reactions to drugs are more common in people with a history of allergies, for instance, food allergies. Allergic tendencies are also familial. A family history of allergies to drugs should be noted as significant.

Idiosyncratic Reactions

Idiosyncratic reactions are defined as genetically determined, unexpected responses to a drug. The response may take the form of extreme sensitivity to low doses or extreme insensitivity to high doses to the drug, for example, haemolytic anaemia after treatment with primaquine.

Chain Reactions

Medications are often added to a regimen to control side effects of other drugs. This can initiate a chain reaction, e.g.when cortisone is prescribed to treat a serious inflammatory condition it can cause hypertension, ulcers, diabetes and a reactivation of arrested tuberculosis. The patient may be put on diuretics, antacids or cimetidine, insulin or an antituberculous agent. Isoniacid should be prescribed with vitamin B6 to prevent a deficiency state, which can be induced by this drug.

Cumulative Reactions

Drugs accumulate in the body whenever the dosage exceeds the amount the body can eliminate through metabolism or excretion.

Tolerance and Dependence

Habitual use of drugs may create a tolerance to the drug in use, as well as other related drugs. Habitual use of drugs can also produce physical dependence.

The dependent individual will develop signs and symptoms of illness when the drug is withdrawn. Withdrawal is always uncomfortable and can be dangerous. Many substances induce both tolerance and physical dependence.

Checkpoint Question

A drug interaction is when an interactant chemical modifies the therapeutic results that are anticipated with a drug.
Possible interactants are:

- Another drug
- Some combination of drugs
- Natural or artificial chemical components of the diet
- Pollutant chemicals from the environment
- Endogenous body chemical
- Chemicals used for diagnostic laboratory tests

Mechanisms of Drug Interaction

Drugs interact in several ways.

Absorption

Absorption is the process by which a drug passes from the site of application into the central compartment of circulating fluids (the blood stream and lymphatic system). All drugs except those applied topically must be absorbed before they can produce their characteristic actions on the body. Oral administration of drugs is the most commonly employed route. 80% of all prescription and non-prescription drugs are administered orally. The mucosal membrane along the alimentary tract is a potential absorptive surface. The thin epithelial wall has high degree vascularity, which favours rapid absorption.
Absorption in the mouth and oesophagus is minimal. The stomach variable is dependent on acid environment, the presence or absence of foods, the amount and composition of gastric secretions, gastric motility and gastric emptying time.
The low pH of the stomach fluids promotes absorption of weak acids but inhibits absorption of weak bases because of the relationship between pH and ionisation. Hence, you need to know which drugs are to be taken with meals, and which on an empty stomach.
You must provide specific instructions to your pateitns as to when drugs are to be taken in relation to food ingestion. For example, insulin and other drugs that are proteins are broken down by digestive enzymes and, thus, are ineffective if given orally. Penicillin is unstable

in acid and can, therefore, be destroyed by gastric acid.
Gastric motility promotes disintegration of tablets to a variable extent. Any factor that slows gastric empting time will decrease and prolong the absorption of most drugs. Many drugs are given on an empty stomach with sufficient water to ensure rapid passage into the intestines. You should instruct your client accordingly.
.

Distribution

The process of distribution is normally underway as a drug is being absorbed into the blood supply. The presence of the drug in the blood supply makes the drug available to all parts of the body. Distribution in various fluid and tissue compartments is unlikely to be uniform because of differences in permeability of various penetration barriers, regional variation in pH and perfusion.

Differences in solubility of the drug by protein binding or carrier mediate transport into specific tissues. Distribution is important because it determines which tissues will be potential sites of action for the drug and the volume of fluid into which the drug will be diluted.

Inactivation

Drugs are inactivated by metabolism and excretion. The removal of the drug from plasma by either process is called clearance.

Renal clearance is accomplished by the kidneys. Metabolic clearance is accomplished mainly in the liver.

Metabolism

Metabolism is the breakdown of a substance through chemical reactions that are controlled by enzymes.
Metabolism of many drugs occurs largely in the liver, although some drugs are metabolised in other tissues including the nervous system, the lungs, the intestines, the placenta, the kidneys and plasma.

Excretion

The kidney is the second major avenue for drug elimination. The kidney often excretes many drugs unchanged. Kidneys remove substances from the blood by filtration and active secretion.

Read more about drug excretion. You will be able to identify which drugs are excreted through the kidneys, lungs, skin, milk and other secretions.

Remember: If a patient is in shock, intramuscular injection may be ineffective because of poor perfusion of the muscle tissue.

Checkpoint Question

What is the definition of absorption?

Absorption is the process by which a drug passes from the site of application into the central compartment of circulating fluids (the blood stream and lymphatic system).

Principles of the Essential Drug Kit

You may have heard about the Kenya Essential Drug Kit (May 1993).

These Drug Kits are being packed at the Kenya Medical Supplies Agencies (KEMSA). The kits are delivered to:

- Provincial General Hospitals (PGH)
- District Hospital (DH)
- Sub District Hospitals (SDH)
- Health Centre (HC)
- Dispensaries (DISP)
- Community Health workers (CHW)

The kits contain drugs in use to treat common conditions in specific areas.

Essential Drugs List

	Therapeutic class / Itemdescription	Details
1	Anaesthetics	General anaesthetics and theatre agents local anaesthetics
2	Analgesics antipypretics,	Non-opioids , Opioid analgesics
3	Anti-allergics & drugs in use in anaphylaxis	
4	Antidotes & substances used in poisonings	4.1 general, 4.2 specific
5	Antiepileptics	

6	Anti-infective drugs	6.1. Anthelminthics, 6.2a anti bacterials - oral liquids 6.2b anti bacterials - oral tabs/caps, 6.2c anti bacterials - injectables, 6.2d anti leprosy/ anti tuberculosis drugs
7	Antimigraine drugs	
8	Antineoplastic & immunosuppresive drugs	
9	Antiparkinsonism drugs	
10	Blood drugs affecting minerals	
11	Blood products & blood substitutes	
12	Cardiovascular drugs	12.1 antifangal drugs, 12.2 antidysrhythmic drugs 12.3 antihypertensive drugs, 12.4 drugs used in cardiac diseases
13	Dermatological Drugs	
14	Diagnostic Agents (Radiologicals)	
15	Disinfectants & Antiseptics	
16	Diuretics	
17	Gastro Intestinal Drugs	
18	Hormones, endocrinie drugs, contraceptives	18.1 adrenal, hormones & substitutes, 18.2 androgens, 18.3 contraceptives, 18.4 estrogens, 18.5 insulin & antidiabetic agents, 18.6 ovulation inducers thyroid
19	Immunologicals (vaccines)	
20	Muscle relaxants	
21	Ophthalmological, ent preparations	
22	Oxytocins & antioxytocins	
23	Peritoneal dialysis solutions	
24	Psychotherapeutic drugs	
25	Respiratory tract drugs	
26	Solutions for water electrolyte, acid base disturbance	
27	vitamins and minerals	
28	Miscellaneous	

The units of the Pack are in: ampoules, vials, bottles, tubes, cylinders, cartons, and sets. The drugs available at the dispensary or health centre are those for treating minor ailments. Drugs requiring a doctor's prescription are only available from the Sub-District hospital.

The main principle of the Drug Kit is to make drugs accessible to all health facilities. You are required to adhere to the following principles as soon as you receive the drugs.

- Drugs should not stay on the shelf until they expire
- You should always use the drugs that arrive first
- Use those drugs that are about to expire
- All drugs that are not commonly used at the health facility should be returned so that they are redistributed
- Drugs that have expired must be returned to the pharmacy

Check with the district public health nurse the operational principles in your district.

UNIT THREE PART ONE - ADULT NURSING

This first part of the third unit of the first module covers the structure and function of the human body, followed by the pathophysiology of some body dysfunctions and, finally, focuses on the nursing care of adults with the aforementioned dysfunctions.
This part of unit three is composed of four sections:

- Section One: The Organisation of the Human Body, Dysfunctions and Management
- Section Two: Support and Locomotion
- Section Three: Communication and Coordination
- Section Four: Digestive System

Introduction

Unit three part one of the general nursing module, describes the conditions and diseases of the adult that affect a number of the bodies systems.
Nursing of the adult requires an in depth knowledge of each condition. This units' role is to assist you in understanding and describing each condition of the systems, following the format of:

- Anatomy and physiology
- Definition
- Causes (where applicable)
- Pathophysiology
- Clinical features
- Diagnosis and investigations
- Management (using the nursing process)
- Complications

This unit will describe common conditions affecting the following systems:

- Musculoskeletal
- Neurological
- Ophthalmic
- Otolaryngeal
- Endocrine
- Gastrointestinal

Although there is no single book covering all materials in this unit, consider reading Anatomy and Physiology in Health by Wilson Kathleen and Anne Waugh.

Adult nursing is the care of those aged above 12 years and suffering from general medical and surgical conditions.
In order to function better as an adult nurse, you need to understand how the human body works.
You will start this unit by learning about the organisation of the internal environment of the body and disorders affecting it.
Later you will learn about the different functions of various parts of the human body. These include support and locomotion, communication and coordination, digestion, respiration, internal circulation and elimination.

You will then conclude the unit by learning about palliative care. This will make it easier for you to understand specific diseases and their management.

There is a very important concept, which is recommended for you to apply to the management of your patients.
This is the Integrated Management of Adolescent and Adult Illness (IMAI) which was introduced in unit two of this module but was not covered in detail.
IMAI is a health care strategy that addresses the overall health care of the patient. It focuses on the main clinical conditions that account for most deaths among adolescents and adults.
It integrates the prevention of illnesses and the care into a single health care package. If you use this approach, you will find it more rewarding and it will make your work easier. Now take a look at the rationale for using IMAI.

Rationale of the IMAI Approach

Each year many adults and adolescents die prematurely of simple and preventable illnesses. When people seek treatment, they may get treated for a single illness. However, health workers are beginning to realise the need for a more integrated approach. This is because, in many cases, it may not be easy to make a single diagnosis with limited resources. In any case, when patients present to you, they may have multiple complaints that do not point to just one diagnosis.

Benefits of the IMAI Approach

IMAI extends the benefits of the integrated management of diseases to adolescents and adults who are a neglected group. Furthermore, the strategy combines preventive strategies even for the management of chronic illnesses.
Benefits of the IMAI approach include:

- Addressing the major adolescent and adult problems
- Responding to demand
- Focusing on chronic diseases and their treatment, for example HIV and AIDS
- Balancing prevention and care
- Addressing special needs of the special groups
- Investing in care in the community

- Promoting savings and saving on costs
- Improving equity

Interventions of the IMAI Strategy
The IMAI has simplified guidelines in a flowing manner, which gives several possibilities and a large number of interventions. The interventions are based on key clinical symptoms. Every country must develop and adopt core interventions that are related to prevalent diseases in their communities. The interventions are centred on acute care, chronic care, HIV care, palliative care, tuberculosis and emergency treatment.
The main objective of outlining this concept in this introduction is to encourage you to think in an integrated manner in spite of the fact that we will be dealing with one disease at a time.
You will begin by learning about the organisation of the internal environment, diseases that may disrupt this organisation and their management

Unit Objectives

By the end of this unit you will be able to:
- Describe the structure and function of the human body
- Explain the pathophysiology of body dysfunctions
- Apply the nursing process in the care of adults with various disorders

SECTION 1: THE ORGANISATION OF THE HUMAN BODY, DYSFUNCTIONS AND MANAGEMENT

Introduction
When referring to the internal environment of the human body, it is referring to the cells, and how the cells are organised at various levels. It is important to know how the cells work and what processes affect them.

Objectives
By the end of this section you will be able to:
- Describe the cell and its functions
- Describe cell multiplication
- Describe the transfer of substances across cell membranes
- Describe tissues and their functions
- Describe body fluids and electrolytes

Structure and Function of Cells, Tissues, Organs and Systems

The Cell Structure and its Functions
The human body is made up of cells, which form the basic units of tissues, organs and systems. Similar cells grouped together form tissues. Different tissues grouped together to perform a related function form organs. Several different organs grouped together to perform a related function make up a system.
In the following pages you shall see how these levels are interrelated.
All living things are made up of cells. All cells in the body have a cell membrane, which forms the boundary of the cell. The cell is made of protoplasm, which can be divided into two. The cytoplasm is a gel-like substance in which many processes take place. The nucleus is responsible for cell coordination and cell division. It is made up of protein granules, and is surrounded by a membrane, which separates it from the cytoplasm.
The cell has two different nucleic acids:
- The **ribonucleic acid** (RNA) is found in the nucleus and in the cytoplasm.
- The **deoxyribonucleic acid** (DNA) is found exclusively in the chromosomes (in strands of chromatin) in the nucleus.

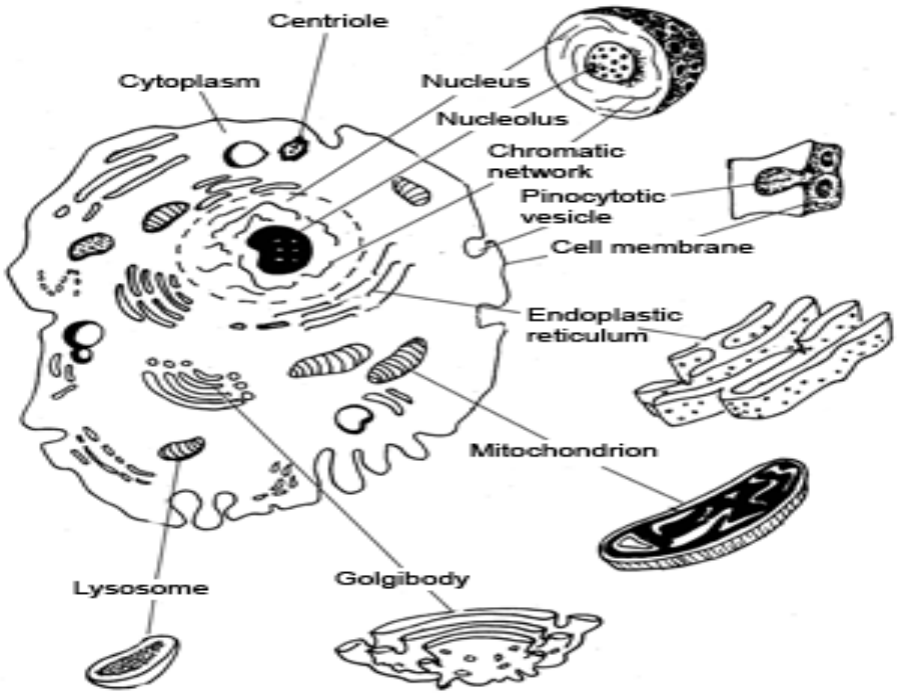
Chromosomes are the units that are involved in the transfer of the genetic material during the process of reproduction.

Mitochondria
These are rod-shaped structures that are the factories for production of energy.

Golgibody
These are folded tubes involved in protein and carbohydrate processing and transfer.

Endoplasmic Reticulum
This is a network of tubes, which is responsible for the manufacture of enzymes.

Lysosomes
These are the structures that form the digestive system of the cell.



As mentioned before, all the processes outlined on the previous pages take place within the cytoplasm. Most cells will eventually wear out and die, one by one. The only cells that do not get replaced are those of the nervous system. Dead cells are replaced by other similar cells through multiplication. The processes of mitosis and meiosis are involved in cell division. Mitosis is the division of one cell into two similar diploid daughter cells, which are identical to the mother cell. Meiosis is the division of a cell to produce four haploid daughter cells with different characteristics, and are not identical to the mother cell. This occurs during the production of spermatozoa and ova. The normal transfer of a substance from cell to cell occurs across the cell membrane.

Diffusion:
The process in which dissolved substances move across cells following a concentration gradient so that they balance on both sides of that gradient.

Osmosis:
The process which involves the movement of solute materials from a region of higher concentration to that of lower concentration via a semi-permeable membrane.

Active Transport:
Active transport is a process where energy is utilised to move substances in any direction.

It has already been mentioned that cells make up tissues. You shall now proceed to learn about the tissues in a human body.

Tissues
Tissues are made up of large numbers of cells. There are four key types of tissues in the human body, each of which has a special function.
The four types of tissue are:

- Epithelial
- Connective
- Muscle
- Nerve

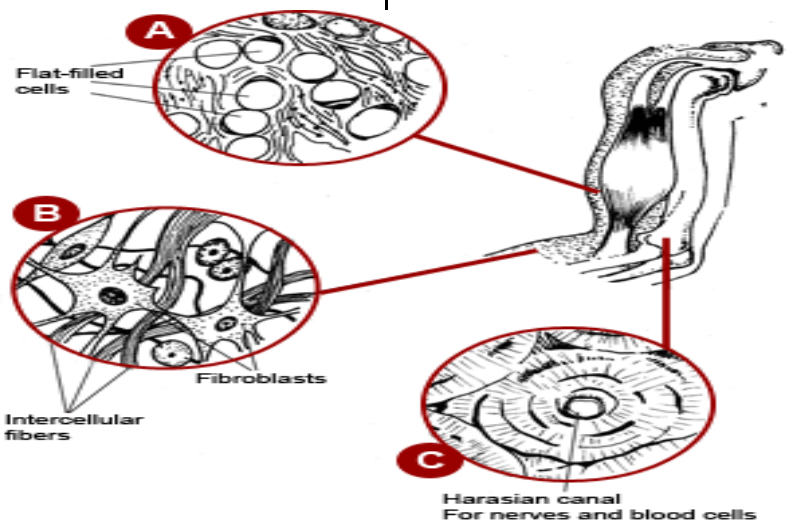
Each of these will now be covered in detail.

Epithelial Tissues
Epithelial tissues cover and protect body parts. They also produce secretions.
The epithelium covers such areas as the stomach, nose, throat and many other areas. Depending on the area where epithelial cells are found and their function, their structure maybe different.
They can, therefore, be further divided into squamous epithelium, columnar epithelium, cuboidal epithelium, ciliated epithelium and transitional epithelium.

Connective Tissue
This is the tissue that supports body structures and is found in every part of the body.
This type of tissue may be loosely structured, densely structured or fatty. The different cells that will make up this type of tissue include

fibroblasts, macrophages, fat cells and mast cells.

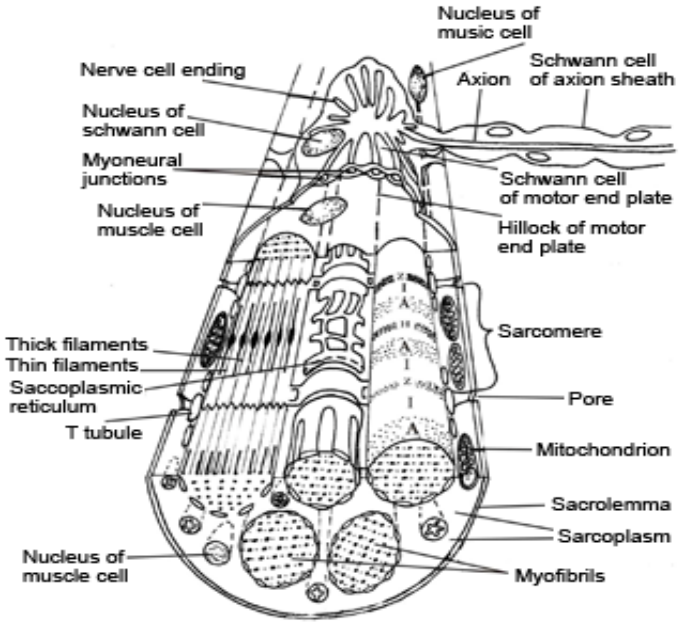
The most densely structured connective tissue is bone. Another example is cartilage.



Muscle Tissue

This is the tissue that makes up the red part of flesh. It is capable of stretching and contracting. Muscle tissue can be skeletal (therefore voluntary or involuntary) or cardiac, found exclusively in the heart or visceral muscle, which normally makes up the internal organs and walls of blood vessels.

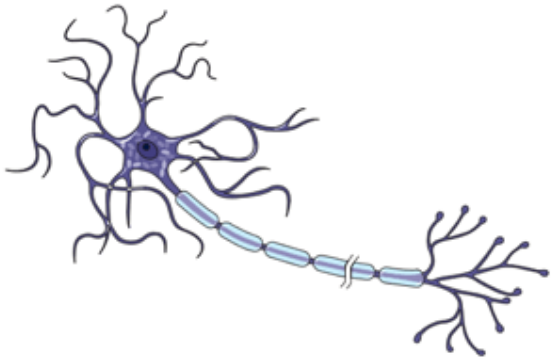
There are over 500 groups of muscles in the human body.



Nerve Tissues

This is a type of tissue that is excitable and conducts impulses. It makes up the nerves.

A Neuron



Blood Tissue
This is a special type of connective tissue, which is composed of various cells. You will come across the various types of cells again in later sections and study them further.
Many of these tissues will work together to perform a definite function. In this case, you will refer to them as an organ.

Organs and Systems
The next structural levels in the body are organs and systems.
You have learnt that tissues make up organs. Organs are always associated with each other and, therefore, perform multiple functions. These groupings of organs are called systems. Once you understand the working of various systems, which will be covered later, it will definitely help you to become a better nurse.
Some of the systems are the respiratory system, cardiovascular system and the digestive system. You will cover the systems and their functions in later sections.

Homeostasis
You have now seen that there are many systems performing various functions in the human body. The body must then constantly struggle to maintain equilibrium. This process is referred to as homeostasis. The body must sense changes in the internal environment and thereafter make appropriate adjustments. The process of sensing the changes is done by a feedback mechanism.
You will now look at some basic concepts to enable you to understand homeostasis better.

Body Fluids
You should understand some basic terms in chemistry, for example, compounds, mixtures, chemical changes and energy. Certain elements make up about 96% of the body. These are hydrogen, oxygen, carbon and nitrogen.

You are aware that water is made up of the elements hydrogen and oxygen. It makes up about 60% of the weight of an individual.

- It makes up part of all body fluids
- It protects cells from outside pressure (a bumper)
- It helps in the regulation of body temperature
- It maintains intracellular pressure
- It is involved in chemical reactions
- It washes out wastes and is, therefore, a medium of excretion

Water is an essential part of human existence; in fact all life as we know it depends on the presence of liquid water.
The fluid in the body can either be in the cell, in which case it is called intracellular fluid (ICF), or it can be found outside of the cell, in which case it is called extracellular fluid (ECF)

Electrolytes and Ions
Substances dissolve in body fluids to form ions. If these substances are able to conduct electricity in dissolved form they are then called electrolytes.
Some examples of electrolytes in the body are sodium, potassium, magnesium, bicarbonate and phosphate. These are distributed both in the intracellular and extracellular compartments. The charged particles in the

body are the ones we call ions. They are always denoted as Na+, K+, and so on.

Important Electrolytes in the Human Body
Sodium

This is the most abundant ion in the extra-cellular compartment. It is involved in the conduction of nerves and the contraction of muscles. It is also involved in the regulation of acid and base balance. The acid and base balance is maintained through the exchange of hydrogen (H+) ions with sodium (Na+) ions in the kidneys. Foods rich in sodium include processed foods, snacks, smoked foods and table salt.

Potassium

This is the most abundant ion in the intracellular compartment. It affects nerve conduction and muscle strength. Foods rich in potassium are ripe bananas, avocados, oranges, potatoes and dates.

Calcium

This makes compounds with other elements. The compounds so formed make bones and teeth hard. The ion is also involved in proper nerve and muscle functioning, and as a co-factor in the blood clotting mechanism. Foods that are rich in calcium are grains, legumes, and leafy vegetables.

Magnesium

Magnesium is a normal constituent of bones. It is also involved in energy metabolism. It is contained in such foods as cocoa, seafood, dried beans and peas.
The other electrolytes in the human body include chloride, bicarbonate, and phosphate ions. The chloride ion is involved in balancing sodium in the body and its main dietary source is salt. Bicarbonate is involved in balancing the body pH, while phosphate is involved in several processes. These include cellular metabolism, combining with calcium to form bone and forming the structure of genetic material.
The movement of electrolytes into and out of cells is through the processes of diffusion, osmosis and active transport. These have been mentioned before. The ions you learnt about may combine to form acids and bases when in the body.

Acids and Bases
An acid is a substance that produces hydrogen ions when dissolved. Acids act as electrolytes in water. They neutralise bases to produce salt and water. Common acids are hydrochloric acid and carbonic acid.
A base is a substance that reacts with acid to form salt and water. Common bases are magnesium hydroxide and aluminium hydroxide. The balance between acids and bases must be maintained for the various processes in the body to take place optimally.
You can now go ahead and do some further reading on acid and base balance. Having looked briefly at the internal environment, you will now move on to learn about the body's defence mechanisms.
You will now move on to look at acids and bases in order to broaden your understanding of the internal environment.

Body Defence Mechanisms
The human body must constantly fight against aggressors. These aggressors mostly come in the form of micro-organisms, which are fungi, protozoa, bacteria and viruses. Some micro-organisms are not harmful and we call them non-pathogens, or commensals. Those that are harmful are called pathogens.
In a later section, you will discuss infections in further detail but right now let us look at the body's immune response.

Immune Response
When the body encounters microbes, it produces antibodies against them. These antibodies will fight the micro-organisms the next time it is attacked. This is the principle employed in immunisation of individuals against diseases.
When you give a child a measles vaccine, or when you inject a pregnant woman with tetanus toxoid, you are preparing them to fight the diseases when they encounter them.

Acquired Immunity
Acquisition of immunity may be natural or artificial. If an individual has encountered an antigen (foreign material), he produces his own antibodies. If the antibodies are produced as a result of a disease or sub-clinical infection in the individual, this is called 'active natural immunity'. The disease causing organism is serving as the foreign antigen.
Alternatively, antibodies may be formed as a result of an individual being given weakened or dead microbes (vaccines). This is referred to as 'active artificial immunity'.

The individual may receive antibodies during intra-uterine life from the mother. This is called 'passive natural immunity'. Passive immunity does not last for long. This is why children must be vaccinated soon after birth. A person can receive antibodies directly by being injected with serum from an animal, or a person who has recovered from a particular disease. This is referred to as 'artificial passive immunity'.
The body also has non-specific defence mechanisms. These include the skin and mucus membranes, which act as barriers.
Other non-specific defence mechanisms include anti-microbial substances in body secretions, for example, hydrochloric acid in the stomach, lysozyme in tears and other body secretions, and saliva, which cleanse the mouth.

Homeostatic Dysfunction

Now you will look at homeostatic dysfunction. This is the alteration in the balance of body fluids and electrolytes. Following this you will spend some time learning about infections, as infections bring about an immune response in the human body.

Fluid and Electrolyte Imbalance

Fluid and electrolyte imbalances occur in most major illnesses. Some imbalances are caused by disease, while others are caused by treatment procedures and measures. They can be labelled as either deficits or excesses. Let's start with fluid volume deficit.

Fluid Volume Deficit

You learnt earlier that fluids within the body are contained in two areas; the extracellular compartment, which is outside the cell, and the intracellular compartment, which is inside the cell. Fluid deficit occurs when fluid loss from the body exceeds intake. Fluid deficit is a serious problem as water needs to move between the two compartments. Patients suffering with fluid deficit will present with dehydration.
Generally, the causes of deficits in volume are inadequate intake and increased loss. You will now learn about this in detail.

Inadequate Fluid Intake

This condition is caused by the inability to perceive thirst (thirst is a physiological process which makes the body desire fluids), or oral trauma, causing the inability to swallow. Withholding fluids for therapeutic reasons can also lead to inadequate intake.

Excessive Fluid Loss

This can occur in the gastrointestinal tract through vomiting, diarrhoea, suction and drainage of fistulae. Fluid loss through urine can occur during treatment with diuretic drugs. Certain disorders like hyperglycaemia, salt wasting renal disease and insufficiency of the adrenal glands can also produce deficits.
Due to the effects of sodium on osmosis, salt changes in the body affect fluid volumes. Excess fluid losses can occur through the skin because of fever, exposure to hot environments, burns and diseases that remove the body's ability to regulate fluids.

Fluid losses also occur if fluids that are in compartments such as oedema, ascites and blisters, due to burns, are removed suddenly.
As you are aware the signs and symptoms of volume deficits include acute weight loss, increased thirst, decreased urine output, and increased serum osmolarity. Patients can also have a decreased volume in the vascular compartment, which can lead to tachycardia, a weak and thready pulse, hypotension and shock.
A decrease of volume in the extra-cellular space will cause depressed fontanels in children, sunken eyes and soft eyeballs. Patients may also exhibit dry skin and mucous membranes, a decrease in saliva and tears, and general fatigue.

Why do patients with dehydration suffer from a high temperature?

One of the functions of water in the body is to act as a coolant. When fluid (that is made up of a high percentage of water) is lost, the cooling mechanism is affected.

Fluid Volume Excess

Fluid volume excess can be caused by high sodium and water intake. Sodium retention leads to retention of water. Increased sodium in the body may occur through excessive dietary intake. The intake can also be through drugs, remedies and solutions that contain sodium given intravenously in the hospital.
Inadequate renal losses can also lead to fluid volume excess. If a person has renal disease, increased corticosteroid levels, congestive heart failure and/or diseases of the liver, they may be unable to excrete sodium properly leading to its retention. This will affect the retention of water.
The main symptoms of fluid volume excess are acute weight gain and increased extra-cellular fluids. These would produce pitting oedema of

the extremities, puffy eyelids and pulmonary oedema.

How does a patient with pulmonary oedema present clinically?
The patient will have shortness of breath, dyspnoea and a dry cough. The patient may have distinctive breath sounds that can be identified through the use of a stethoscope. These sounds are known as rales. The other manifestations of excess volume produced by increased intracellular fluid are full and pounding pulses, and distension of veins.
The symptoms of fluid volume excess are similar to those of sodium excess (also called hypernatraemia).

Sodium Deficit
Sodium deficit (hyponatraemia) can occur in several ways.
These include:

- Dilution by excess administration of fluids (dilution hyponatraemia)
- Excessive thirst (polydypsia)
- Gastrointestinal losses (e.g. vomiting, diarrhoea)
- Skin losses (e.g. excessive perspiration, burns)
- Anaemia
- Kidney disease
- Increased levels of anti-diuretic hormone

There are several symptoms of sodium deficit. Laboratory values will show low levels of sodium and there may be increased water content in brain and nerve cells. This will result in headaches, depression, confusion, coma, convulsions and personality changes.
It may also bring about gastrointestinal disturbances, for example, nausea, abdominal cramps and diarrhoea.

Sodium Excess
Sodium excess (hypernatraemia) can be caused by excessive intake of sodium and decreased intravascular fluid. The decrease in intravascular fluid leads to a concentration of sodium in the plasma.

In what situations may there be increased fluid loss and decreased intake?
The use of drugs, diseases such as diabetes insipidus, diarrhoea, unconsciousness and inability to swallow due to oral trauma are examples of situations of when increased fluid loss and decreased fluid intake may occur.
There are several symptoms of sodium excess. Laboratory levels will show high values of sodium. This will result in thirst and dehydration, which can produce dry membranes, agitation, restlessness, elevated body temperature and decreased reflexes.
Having covered sodium and fluid imbalances, you will now discuss the management of adults with sodium and fluid imbalances.

Care of Adults with Sodium and Fluid Imbalances

Where sodium goes, water goes, too". For this reason, fluid imbalance should always be managed when thinking about sodium imbalance.

In unit one, you learnt about the nursing process. This always begins with an assessment of patients, analysing data and coming up with nursing diagnoses, planning patient care, implementing the care and finally evaluating.
In the process of patient assessment, you should note their personal history and carry out a physical assessment. Some of the manifestations mentioned earlier will form part of the database.

The goal in the management of fluid excess and fluid deficit (over-hydration and dehydration) is the treatment of the underlying cause. Before this can be done, investigations of the electrolyte levels should be undertaken.
In primary fluid deficit, the losses must be prevented and fluid replacement provided. For a patient with fluid excess, fluid restriction is all that is required.
On the other hand, the goal of management of sodium deficit is to restore sodium without causing fluid excess. Diluting the sodium concentration and promoting the excretion of the sodium through urine is the management of sodium excess.
There are specific nursing interventions necessary for these goals to be achieved.

Monitoring intake and output:
Twenty-four hour intake and output records should be maintained to include oral and intravenous fluids, vomitus and diarrhoea. You can usually estimate the amount of losses from the perspiration and from draining wounds

Monitoring weight:
Weights should be taken and recorded daily as they provide the best bedside measure of hydration status.
A rapid increase of 1 Kg is equivalent to 1000 mls
fluid retained.

Skin Assessment:
Skin assessment and care are important aspects in the care of the adult with dehydration or over-hydration. The dehydration and oedema cause the skin to become dry. Therefore, moisturising creams or oils will increase moisture retention and stimulate circulation.
For patients with oedema, elevating extremities will promote venous return and thereby provide temporary relief.
Other nursing measures include monitoring infusion rates and ensuring that patients on naso-gastric suction are closely attended to.

Potassium Deficit (Hypokalaemia)
A decreased amount of potassium in plasma is caused by inadequate mineral intake (a diet that is deficient in potassium), excessive gastrointestinal losses (vomiting and diarrhoea), excessive renal loses or intracellular losses.
The person with hypokalemia clinically presents with low laboratory values of the electrolyte, muscle weakness and cramps, hypotension, and arrhythmia. Other manifestations are anorexia, vomiting, abdominal distension, shortness of breath, thirst and high urine output. In some cases there may be confusion and depression
Excessive dietary intake, renal failure and potassium retaining drugs often cause hyperkalaemia. Patients with renal failure may have difficulty excreting potassium through their kidneys.
Clinically, potassium excess manifests with increased laboratory values of potassium, muscle cramps, nausea, vomiting and diarrhoea. Hyperkalaemia can also result in cardiac arrest if not urgently managed.

Care of Adults with Potassium Imbalances
The goals of medical and nursing management of the patient with potassium imbalances are two-fold:

- Managing hypokalemia
- Caring for those with hyperkalaemia

Before starting the specific management, the patient should be investigated. This will form part of the assessment of the patient to provide data on which nursing interventions will be based.

Hypokalaemia, is managed by administering potassium chloride supplements and increasing dietary intake of potassium. Potassium chloride supplements may be given orally or intravenously. When potassium is given intravenously, it may cause pain in the skin area over the vein where it is being infused.
For a patient who is taking diuretic medications, an increase in dietary intake of potassium or oral potassium supplements should be advised.
Patients who are on digoxin medication need close monitoring of potassium levels. This is because digoxin leads to an increase in potassium levels.
The treatment of **Hyperkalaemia** includes:

- Decreasing dietary sources of potassium.
- Administering sodium bicarbonate intravenously.
- Administering 10% calcium gluconate, 10-20mls I.V. over 10 minutes.
- Infusing 50% glucose 50mls and insulin intravenously. During cellular metabolism, potassium enters the cell together with glucose. This will lead to a decrease in the extraracellular potassium.
- Administering Calcium Resonium, 15-30 g orally (exchange resin, binds k+ in exchange for calcium).
- Performing dialysis. Heamo-dialysis or peritoneal dialysis if the above-mentioned measures fail.

You are now going to learn about imbalances of two other electrolytes. These are calcium and magnesium.

Calcium Imbalance
Calcium metabolism is dependent on three factors. They are vitamin D, and the hormones parathormone and calcitonin. These factors influence the use of calcium and are involved in the re-modelling of bone. (This explains why a child with a vitamin D deficiency suffers from rickets. You will come across further information on this in our unit on paediatric nursing.)
The primary goal in managing calcium imbalance is treating the cause. If a patient has a disorder affecting the utilisation of any of the factors that have been named, then they should be treated for that problem.
More specifically, hypocalcaemia is treated with oral or intravenous calcium supplements such as calcium lactate and calcium gluconate. Patients that have had thyroid surgery must be closely monitored for symptoms of hypocalcaemia. During surgery, the parathyroid glands may be affected leading to lack of production of the parathyroid hormone.
Hypercalcaemia is managed by promoting excretion of calcium in the urine. The best way to do this is through administration of loop diuretics.

A good loop diuretic is furosemide e.g. lasix. The patient must also increase daily fluid intake to about four litres. This will decrease the possibility of renal stone formation.

Magnesium Imbalances

Magnesium is the second most abundant intra-cellular action. The factors that influence calcium imbalance will also influence magnesium imbalance.

Hypomagnesaemia produces neuromuscular and central nervous system hyperirritability. Symptoms include insomnia, anxiety, and muscle cramps. Additionally, diets that are low in magnesium indicate a risk factor for hypotension, cardiac dysrhythmias, ischemic heart disease and sudden cardiac death. This will be mentioned again when you learn about disorders of the circulatory system and their management.

A patient with slight hypomagnesaemia can be treated with magnesium supplements. The patient also needs to increase their dietary intake of foods high in magnesium. These foods include green vegetables, nuts, bananas and oranges. If the hypomagnesaemia is severe, then IV or IM magnesium is given. This drug is mainly used in the management of hypotensive disease in pregnancy. However, it may also be used in treating hypomagnesaemia.

The management of hypermagnesaemia should focus on prevention. This, therefore, means that people with renal failure should not take medication containing magnesium. It may lead to the accumulation of the electrolyte in the plasma.

The emergency management of hypermagnesemia should focus on giving IV calcium chloride or calcium gluconate to physiologically oppose the effects of the magnesium on the cardiac muscle. Promoting urinary excretion with fluids will also decrease serum magnesium. If a patient has renal failure, they may require renal dialysis.

This information should assist you in giving better care to a patient with an electrolyte imbalance. You will now study the constituents of plasma as well as plasma proteins in an effort to better understand plasma protein imbalances.

Plasma Protein Imbalance

By now you may have learnt about the importance of plasma proteins in maintaining oncotic pressure. This is the pressure that maintains the extracellular and intracellular fluid balance. Examples of plasma proteins include albumin, antibodies and lipoproteins.

Hypoproteinaemia is a decrease in the amount of plasma proteins.

It occurs through anorexia, malnutrition, starvation and consuming poorly balanced vegetarian diets. It may also occur through malabsorption, inflammation of the gastrointestinal tract and increased breakdown of protein. Poor absorption can occur with diarrhoea. Diseases such as HIV/AIDS contribute to increased breakdown of proteins in the body.

Hyperproteinaemia is rare but occurs through dehydration resulting in haemo-concentration of the available proteins in the body.

The management of plasma protein deficits includes providing a high carbohydrate and high protein diet. A high carbohydrate diet is essential to prevent body protein breakdown as a source of energy. Deficits can be treated by use of dietary protein supplements.

Enteral nutrition or total parenteral nutrition can also be used to deal with hypoproteinaemia, if dietary needs cannot be met orally.

The former is where a patient is fixed with a naso-gastric tube for giving commercially prepared concentrated proteins, while the latter involves using an IV line to infuse proteins that have been commercially prepared.

You will now move your attention to acid and base balance before you proceed with the rest of your unit.

Acid-Base Imbalances

You will now cover some problems that you are likely to encounter in your daily practice that are related to acid-base balance. These include respiratory acidosis, metabolic acidosis, respiratory alkalosis and metabolic alkalosis.

Respiratory Acidosis

This is an excess of carbonic acid. The body pH in this case is below 7.5. Common causes of respiratory acidosis are inadequate ventilation, respiratory obstruction such as those that occur in asthma and respiratory tract tumours, impaired gaseous exchange and spinal cord injury at the cervical level. The acidosis clinically presents with cyanosis, tachycardia and disorientation.

Metabolic Acidosis

This is a deficit of the bicarbonate ion. It may also be due to an excess of other acids in the body. The pH is normally less than 7.5, and common causes are starvation leading to increased ketones due to lipolysis. The signs and symptoms include headache, weakness, and deep laboured breathing.

Respiratory Alkalosis
In this abnormality, there is carbonic acid deficit, mostly due to hyperventilation. The pH will be found to be above 7.5 and it presents with deep rapid breathing, tingling sensations, and tinnitus.

What are the common causes of hyperventilation?

- Anxiety
- Crying / Distress
- Grief
- Stress
- Hysteria
- Panic Attack

Metabolic Alkalosis
An excess of bicarbonate ion and a pH level above 7.5. characterises this abnormality, The contributory causes include H+ losses from the GIT through vomiting and gastric lavage. Over enthusiastic treatment with sodium bicarbonate may also cause it. Signs include tetany, tingling, tremors and dizziness.
The general management of acid and base imbalance involves three main actions:
1. Determine the cause of the imbalance
2. Address the cause
3. Administer fluids

Infections

Human beings are always interacting with micro-organisms. Some of them are commensals, while others attack us and bring about disease (pathogens). However, we employ defence mechanisms to minimise the danger from the latter, you learnt this earlier in the section.
The various agents of infectious diseases are viruses, bacteria, rickettsiae, chlamydia, fungi and parasites.
You will now look at each of these agents and begin with viruses.

Viruses

Viruses are small intracellular organisms. They can be classified as either DNA or RNA viruses depending on the nucleic material they contain. Each virus contains only one type of nucleic material.
Viruses do not replicate outside a living cell. They are sometimes enveloped in lipoprotein envelopes, which are from the membrane of a host cell.

Viruses must enter a host cell and use its mechanisms to multiply. This makes it difficult for the cell to recognise and fight them.

Viruses are grouped according to their characteristics and the various diseases they cause. Some examples of groups of viruses include the herpes virus group, which includes herpes zoster, chicken pox viruses, and cytomegalovirus. The other group is the retrovirus group, which include the Human Immunodeficiency Virus (HIV).
Viruses are classified according to various characteristics.
These are:

- Type of viral genome
- Mechanism of replication
- Mode of transmission
- Type of disease produced

A good example is HIV. It is called a retrovirus because it can produce DNA from RNA instead of the usual reverse. In this unit you will learn about infections affecting various functions in the body.

Bacteria
These are autonomously replicating unicellular organisms. Unlike viruses, bacteria contain both DNA and RNA. The structure and synthesis of the cell wall determine whether the microscopic shape of the bacterium is spherical (cocci), helical (spiral) or elongated (bacilli).
When the cocci divide in chains, they are referred to as streptococci. If they divide into pairs they are called diplococci and if they form clusters they are known as staphylococci.
Bacteria may be motile as a result of flagella. Other bacteria produce hair like structures called pilli or fimbriae. These enable them to adhere to other bacteria or membranes in the body.
Some bacteria require oxygen for their growth. They are referred to as aerobes. These bacteria are found in parts of the body where oxygen is abundant. Those that cannot survive in an oxygenated environment are called anaerobes. Those that can live in either of these circumstances are referred to as facultative anaerobes.
Another way of classifying bacteria is according to their appearance and staining properties.
They are called gram positive if they stain red by sufrine dye (gram stain) or gram negative if they do not.

Spirochaetes
These are a category of bacteria, which will be discussed separately because of their morphology and mobility. They are gram-negative rods. The spirochaetes move in a corkscrew fashion. They are facultative anaerobes. They are sub-classified into three groups:

- Leptospira
- Borrelia
- Treponema

You may remember the organisms that cause syphilis, treponema pallidum. Borrelia cause relapsing fever and a good example of this group is borrelia recurrentis.

Mycoplasma
These are micro-organisms capable of independent replication. They are smaller than bacteria, and do not have the same kind of cell wall as bacteria. They, therefore, have varied morphology. Some of these mycoplasma are commensals in the body.

Rickettsiae and Chlamydia
These are micro-organisms that have both characteristics of bacteria and viruses. They are intra-cellular but contain both DNA and RNA. The rickettsiae produce epidemic typhus, while chlamydia produces the infection chlamydia trachomatis in the eyes.

Fungi
Fungi are free-living saprophytes. Some of them are normal flora on the human body. Despite being normal flora, some fungi have the ability to cause serious illnesses. They are classified into two groups: yeasts and moulds. Yeasts are single celled organisms that reproduce by budding. Moulds produce long hollow
branching filaments.

Most fungi are capable of both sexual and asexual reproduction. Asexual reproduction produces spores, which are very resistant. This is the reason why you must practice good infection prevention practices. Some of the diseases caused by fungi are candidasis, superficial mycoses and systemic mycoses.
Now you will look at the last group of infectious agents,
the parasites.

Parasites
This term is used to refer to micro-organisms of the animal kingdom, which cause diseases in other animals. This group includes protozoa (such as those that cause malaria), helminths and arthropods.

The helminths are mobile parasites, while arthropods are vectors of diseases, for example, ticks. Others are ecto--parasites, for example, lice and mites that cause scabies. Ecto-parasites live on the outer body surface of their host.

Malaria
You will now look at a parasitic disease that presents a great challenge to health care services in our country. This is malaria.
Malaria is a parasite disease caused by Plasmodium. Plasmodium falciparum is the commonest species of the parasite in Kenya. The infection is usually transmitted through the bite of a female anopheles mosquito. It causes much death, especially among children and pregnant women. Its clinical features include fever, joint pains, chills, mental confusion, abdominal pain, diarrhoea, nausea and vomiting.
The clinical presentation of malaria may be uncomplicated or severe. Uncomplicated malaria has all the clinical signs mentioned above, with none of the complications that will now
be outlined.

Severe malaria presents with prostration, unconsciousness and/or respiratory distress. Additional complications include:

- Cerebral malaria resulting in coma
- Convulsions
- Severe anaemia with Hb less than 5mg/dl
- Renal failure
- Hypoglycaemia
- Fluid and electrolyte imbalance
- Pulmonary oedema and hypovolemic shock

In Kenya, due to the lack of effective and adequate health care systems, you may have to deal with treatment failure and recrudescence (recurrence) of clinical symptoms. There are areas in Kenya with endemic malaria. These areas include Kitui, TaitaTaveta and Tana River districts.
Other areas exhibit unstable malaria, which occurs sometimes during epidemics in areas of low malaria risk. The epidemic areas are the western highland regions of Kisii and Kericho, extending in a belt to parts of Western Kenya.
The treatment of uncomplicated malaria should involve a combination of artemisinin based drugs, such as Coartem, which is a combination of artemether and lumefantrine. If this is unavailable, other artemisinin based drugs may be used. For any patient with malaria, supportive management for the

anaemia, fever, nausea, diarrhoea and other symptoms that inevitably arise, should be undertaken.

Care of Adults with Infections

From experience, you are aware that developing countries suffer high morbidity and mortality related to infectious diseases. It is, therefore, necessary to learn about the management of adults with infections.

From unit one, you would have learnt that assessment is done as part of the nursing process to obtain information necessary to plan the care. Based on the nursing diagnoses made, several actions are necessary

The care for an adult with infection will be done in various phases. There is the acute intervention phase during which you should observe vital signs, for example, fever, pulse rate, respiration and blood pressure.

Antipyretic medication is used to control fever. Fever must be controlled to allow the body to fight infections more easily.

Antipyretic drugs include:

- Acetylsalicylic acid
- Acetaminophen

The use of anti-microbial drugs, for example, antibiotics, anti-protozoa drugs, anti-viral drugs and anti-fungal drugs is important to control viruses, protozoa bacteria and fungi. These medications may be given orally, parenterally, topically or by any other route that is suitable.

At the same time, it is important to consider the patient's comfort, rest, nutrition, fluid and electrolyte balance and any other accompanying symptoms. Always remember to evaluate care administered to ensure you meet your objectives.

Infection Prevention and Control

It is necessary to follow aseptic procedures in keeping the ward as free from microbes as possible. Infection prevention precautions are required for this purpose. The precautions are category specific, disease specific, universal precautions and body substance isolation.

These are the precautions you follow when washing hands, decontaminating instruments, undertaking high level disinfection and sterilization. Barrier nursing, isolation and reverse barrier nursing of patients are all intended to minimise infections and their spread.

You have covered these precautions in unit one and you will come across the concepts again in the units on Reproductive Health and Communicable Diseases.

Care of an Adult with an Immune Deficiency

You have learnt that when the immune system does not adequately protect the body, an immune deficiency state exists. There are many immunodeficiency states and several measures specific to each disease are available that will be used in the management of these states.

You will, however, concern yourself with one syndrome that is a major problem in sub-Saharan Africa generally, and Kenya in particular. This is the Acquired Immunodeficiency Syndrome (AIDS).

HIV and AIDS

The management of a HIV-infected patient focuses on:

- Monitoring HIV disease progression and immune function
- Initiating and monitoring antiretroviral therapy
- Detecting and treating opportunistic infections
- Managing symptoms and preventing complications

Ongoing patient assessment and patient education will help you to accomplish these functions.

However, the best way of managing HIV/AIDS is prevention. This starts with being aware of one's HIV status, remaining faithful to one's sexual partner and/or the use of condoms during sexual intercourse. Perhaps you have heard of the ABCD of HIV/AIDS prevention. It generally includes all the information that you will give your patients concerning HIV/AIDS. In addition, good nutrition for adults and children already infected will enable them to lead better quality lives.

Pharmacologic Management of HIV/AIDS

Antiretroviral drugs are given to patients so that they may slow down the multiplication of the virus. However, they do not eliminate it. Nevirapine, Azidothymidine (AZT) and other drugs are distributed at various centres in the country. These drugs are expensive and may be beyond the reach of many patients. It is your responsibility to give patients all the information required and let them make informed decisions.

Opportunistic infections and other manifestations of HIV respond well to treatment.

Pneumonia requires the use of appropriate antibiotics. The antibiotics that may be used include the cephalosporins, aminoglycosides such as kanamycin.

Diarrhoea requires correction of dehydration and use of drugs, for example, cotrimoxazole (Septrin) and metronidazole (Flagyl).

Oropharyngeal candidiasis requires the use of anti-fungal agents such as nystatin oral drops, miconazole oral gel or Ketoconazole tablets to control candida.

Tuberculosis needs close follow-up and use of anti-tuberculous drugs. This is because of high rates of relapse among HIV-infected patients.

HIV and AIDS

HIV testing and patient education is an important aspect of the management and prevention of AIDS. Voluntary Counselling and Testing (VCT) services are now available in Kenya and should be promoted as part of the effort to control the spread of the infection.

Patient education should cover the topics of HIV transmission, how to avoid getting infected and how to live healthier lives even with HIV infection.

This information on HIV/AIDS may not be enough but will be a basis for further reading. You should spend some time finding out more about this.

SECTION 2: SUPPORT AND LOCOMOTION

Introduction

You are now ready to continue with section two. In this section you will learn the structures involved in enabling support and locomotion of the body. These include the muscles, bones, ligaments, and joints. Before you start, here are the objectives to achieve by the end of this section.

Objectives

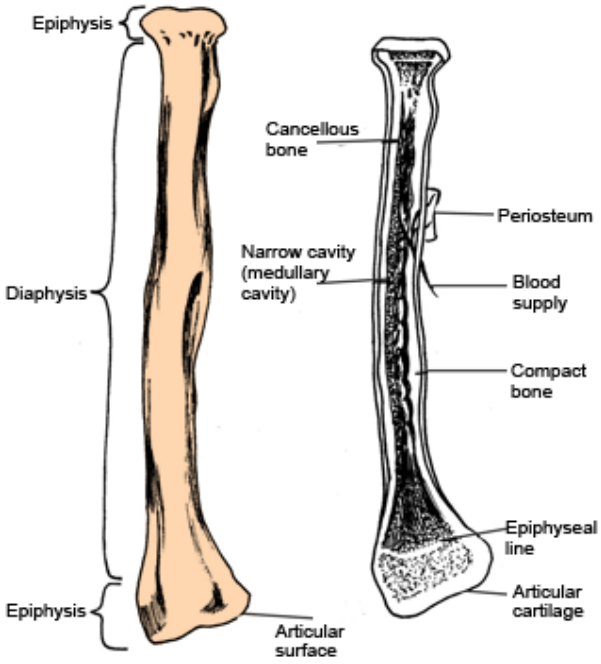
By the end of this section you will be able to:

- Describe the bony framework of the body and its functions
- Describe the process of bone healing
- Describe common orthopaedic conditions
- Describe the structure of the major muscles and their functions
- Describe the structure, type and functions of the major joints
- Utilise the nursing process in the management of adults with bone, muscle and joint problems

Bones and their Functions

You have already learnt that bone is a type of connective tissue. It is made up of water, living cells, calcium and phosphorus as its main components. The cells making up the bone are osteoblasts and osteoclasts. The latter are involved in the shaping of the bone through bone re-absorption.

The image (right) shows the macroscopic structure of a bone. In the human body, there are several types of bones mainly based on their shapes.



Bones

The bone is the hardest tissue in the body and when fully developed comprises of:

- Water 20 %
- Organic material 30% to 40%
- Inorganic materials 40% to 50%

Inorganic material mainly constitutes of mineral salts especially calcium and phosphates. Organic materials comprise of bone cells.

There are two types of bone tissue - compact and cancellous. Bones are almost completely covered by periosteum which is a vascular fibrous membrane. Periosteum gives attachment to muscles.

Types of Bones

Bones are classified as long, short, irregular, flat or sesamoid, long bones eg. femur, humerus.

Development of Bone

This is the process of bone formation that begins before birth and is not completed until age 25 years. Long, short and irregular bones develop from cartilage models.

A primary centre of ossification results from deposits of both organic and inorganic bone elements. This further develops allowing for a clear demarcation of the diaphysis. A two degree centre of ossification develops from the epiphysis. An epiphyseal cartilage demarcates the diaphysis from the epiphysis.

Osteoblasts and osteoclasts are involved in bone development. Osteoblasts are present at the centres of ossification of immature bone, at ends of diaphysis and epiphyseal cartilage. They are involved in bone building.

Osteoclasts are responsible for bone resorption. They maintain and shape the bone.

It is advised that you do some further reading later, on the development of bone and various bone cells. You will now learn about the bony skeleton.

The Skeleton

The human skeleton is divided into two main parts: the axial skeleton and the appendicular skeleton. The axial skeleton refers to the central, while appendicular refers to the attachments.

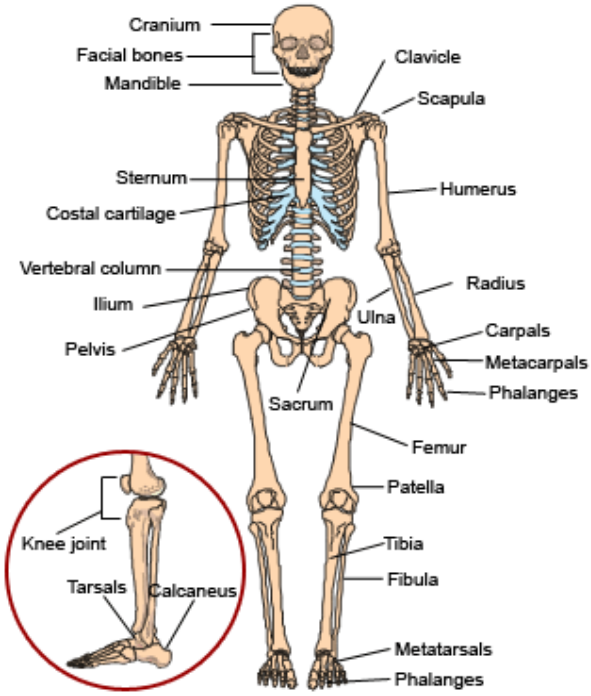
The axial skeleton is made up of the skull, the vertebral column, the ribs and the sternum. The appendicular skeleton consists of the shoulder girdle, upper limbs, pelvic girdle and lower limbs. The total number of bones in the human body is at least 206. Study the diagram of the human skeleton.

Functions of Bones

The bones perform several functions. They:

- Provide the basic framework of the body
- Provide points of attachments to muscles and tendons
- Form a reservoir for calcium
- Permit movement of the body as a whole by forming joints
- Form boundaries of many cavities, which provides protection to organs within
- Contain red bone marrow, which is involved in the production of blood cells

You will need to find time to study in detail the various bones.



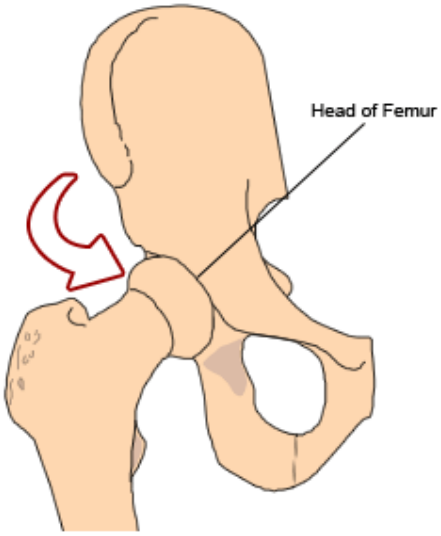
Joints

There are points in the body at which bones attach to each other. These are called joints. They form the points at which many movements can be made and positions changed.

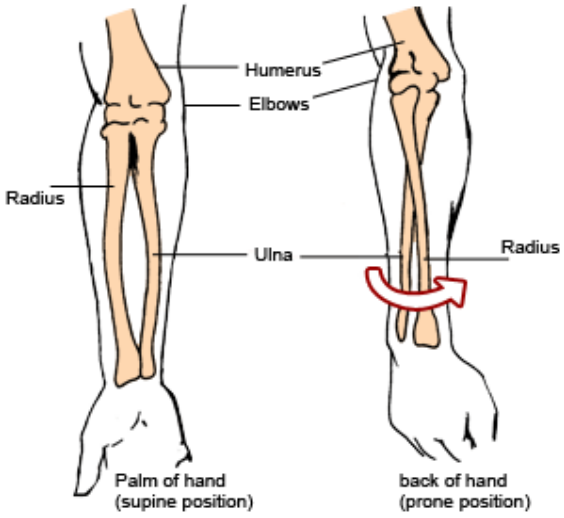
Generally, there are three main types of joints:

- **Fibrous** joints, which are fixed and immovable joints. Examples include the joints between various skull bones (or sutures).
- **Cartilaginous** joints, which are slightly movable and enable you to bend. They have cartilage between two bones. Good examples are joints between the vertebral bones.
- **Synovial** (diarthrosisl) joints, which are freely movable. They are further subdivided into ball and socket joints, hinge joints, gliding joints, pivot and saddle joints

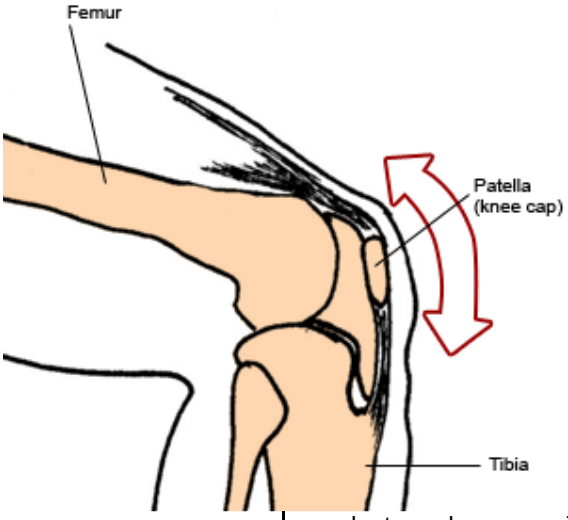
Ball and Socket Joint



Pivot Joint



Hinge Joint



Movements of Joints

The various movements made at the joints include:

- Flexion: bending forward and backward. The knee joint is a good example of this.
- Extension: straightening or bending backwards.
- Abduction: movement away from the midline. The best example of this is moving your arm or leg away from your body laterally.
- Eversion: turning the sole of the foot outwards.
- Inversion: turning the sole of foot inwards.
- Supination: turning the palm up.
- Pronation: turning the palm downwards.
- Rotation: movement around the long axis. You may use either the lower limb or the upper limb.
- Circumduction: a combination of adduction, flexion and extension.
- Adduction: movement towards the middle of body.

Muscles and Ligaments

You previously learnt that muscle tissues belong to either of three groups. These are visceral, cardiac and skeletal.

Cardiac muscle is exclusively found in the heart.

Skeletal muscle is what makes up most of the structures in your body. It is called striated or voluntary because its contraction can be controlled at will.

Visceral muscle makes up the intestines and the hollow organs. It is not striated and is involuntary.

Muscles can contract and are extensible and elastic. They are also irritable, which explains why nerve impulses can excite them. These properties enable them to stretch and return to normal, become thicker and respond to a stimulus. Individual muscles have various names.

Functions of Muscles

Muscles are influenced by nerve impulse, hormones and, for cardiac muscle, impulses generated in the heart muscle. Muscle contraction causes movement of various parts in the body. Energy for contraction is obtained from metabolism. This energy is in the form of Adenosine Triphosphate (ATP).

The nerves and special messengers, that is, the hormones, do an important job. The functions of the muscles can, therefore, be listed as:

- Contracting, hence, performing work
- Protecting internal structures
- Producing movement in conjunction with muscles, bones and joints

You will now start learning about the disorders of the various structures in more detail.

Disorders of Bones and their Management

Disorders of the bones range from those that occur as a result of altered growth and development, to those due to disordered metabolism, neoplasm, injuries and their complications.
The disorders occurring during growth and development include femoral ante-version where there is internal torsion or rotation of the femur and toeing-out of the foot with the foot flat and toes spread out. Many of the conditions resolve by themselves while a few may need surgery. However, these are generally rare conditions.

Scoliosis
Scoliosis, which is lateral deviation of the spinal column. This condition can occur without any cause or may be caused by certain diseases. For instance, disturbances in vertebral development and neuromuscular disorders such as poliomyelitis can lead to scoliosis.
The manifestations of scoliosis include uneven shoulders and a prominent scapula, asymmetry of the flanks and asymmetry of the thoracic cage. The patient may also have rip humps.

Kyphosis
Kyphosis is an exaggeration in the curvature of the thoracic spine. This may lead to a change in the volume of the thoracic space. It will, therefore, affect the functional lung capacities.

Poliomyelitis
Poliomyelitis is another debilitating disease which, though a disease of the nervous system, may affect the muscular-skeletal system.

Lumbar Lordosis
Lumbar lordosis is an exaggeration in the curvature of the lumbar spine. This normally occurs during growth and development.

You will now learn about some of the disorders of bone metabolism, which include osteoporosis, osteomalacia and rickets.

Osteoporosis
This is a disorder in which the rate of bone reshaping (resorption) is greater than the rate of formation. This results in a loss of organic matrix and mineral content. The bone then becomes brittle, fragile and fractures easily. This is a condition that is common among the elderly. It can also be seen in post-menopausal women, people with Cushing's syndrome and those who are on steroid treatment.
The manifestations of osteoporosis are pain and spontaneous fractures. In some cases, wedging and collapse of vertebrae causes loss of height. It may also lead to kyphosis.

Osteomalacia and Rickets
These terms refer to the same process occurring at different ages. In both cases, there is a deficiency of vitamin D. If the deficiency occurs before fusion of the epiphyseal plates then the bones get deformed, but if fusion has already occurred, then the bones will bend easily. Rickets therefore occurs in children and osteomalacia in adults.
Both conditions are caused by mal-absorption syndromes, lack of exposure to sunlight and excess secretion of vitamin D. You can now reflect upon the effects of poor nutrition to bones.

Care of the Adult with Osteoporosis, Osteomalacia and Rickets

The prevention of osteoporosis focuses on adequate calcium intake and calcium supplementation. Some foods high in calcium content are whole and skim milk, spinach, cheese, dark green vegetables, and sardines. You may remember that we mentioned some of these earlier.
Oestrogen replacement therapy after menopause is used to prevent osteoporosis among post-menopausal women. Another useful management technique is calcitonin treatment, which acts by blocking the effects of the parathyroid hormone on bone resorption. The drug etidionate disodium also inhibits bone resorption. It is important to tell patients that weight bearing exercises are also useful in prevention of osteoporosis. Although loss of bone cannot be reversed totally, the use of oestrogen, exercise and calcium can prevent further loss.
You should strive to keep patients with osteoporosis ambulated to prevent further loss of bone substance as a result of immobility.

You should also ensure that we institute measures to avoid pathological fractures in patients with osteoporosis. Always include health education on the prevention of home accidents in your management. Those at risk should avoid walking on slippery floors, and should wear shoes with a firm sole.
The management of osteomalacia is directed towards correcting the underlying cause. Remember you learnt that this disorder is associated with vitamin D deficiency. Vitamin D

should be supplemented and the patient will generally improve. Calcium and phosphorous intake may also be supplemented after proper investigation.

Bone Tumours

Bone tumours constitute about 1% of all malignancies in the adult population. Sometimes tumours in the bones metastasise and cause complications in other organs. Bone tumours include osteomas, chondromas, fibromas, chondrosarcoma, osteosarcoma and multiple myeloma. The conditions associated with bone tumours are infections, pathological fractures and anaemia among others.

Generally the manifestations of bone cancer include bone pain that lasts over a week and unexplained swelling over a particular bone. Other manifestations include warm skin over the affected bones and prominent veins. Perhaps you have seen clients with bone cancer.

Bone tumours are rare in adults but if present, they rapidly metastasize and cause bone destruction. In addition, they lead to organ involvement. An example is multiple myeloma. This will involve the bone marrow and lead to anaemia. Chemotherapy is, therefore, used to suppress plasma cell growth in the bone marrow. Steroids are also given to these patients. However, both these management methods increase the patient's susceptibility to infection. Therefore, you need to practise good infection prevention and control. In osteoclastoma and sarcoma, chemotherapy, surgery and radiation may improve survival rates.

After assessment of a cancer patient, focus on achieving the following goals.

- Ensuring satisfactory pain relief
- Enabling the patient to maintain preferred activities
- Encouraging the patient to accept body image changes resulting from chemotherapy radiation and surgery
- Decreasing the possibility of injury
- Educating the patient on disease progression and prognosis

You should also pay attention to pathological fractures, spinal cord compression and limb amputation. Pain relief is achieved by the use of strong analgesics. Counselling and patient education will enable the patient to choose the kind of activities to engage in. It will also assist patients to avoid injury.

Bone Infections

Infections also affect the bones. Some infections are brought about by surgery to the bone, while others are spread through fractures, abscesses and blood borne micro-organisms. One of these bone infections is called osteomyelitis.

In osteomyelitis, certain micro-organisms, mainly staphylococci, affect bone tissue. The infection can be either by direct or indirect invasion. The infection leads to pain on the affected area, abscess formation, fever and necrosis of the bone tissue. In your practice you may have seen that orthopaedic patients can complicate with osteomyelitis.

Vigorous antibiotic therapy is the treatment of choice for acute osteomyelitis. Some immobilisation of the affected part is necessary. The development of sepsis is common if metastasis of bacteria moves to other sites. Pathologic fractures may also occur due to weakened bone. Deformities of the affected extremities should not be overlooked. In such cases, preventive measures such as proper alignment and immobilisation are necessary.

Osteomyelitis can be chronic or acute. Treatment of chronic osteomyelitis includes surgical removal of the poorly vascularised tissue and dead bone. It also involves irrigating the area with antibiotics.

Generally the goals that we must strive to achieve in the management are:

- Pain and fever control
- Preventing the transmission of the infection to other areas of the body
- Decreased complications of bone fractures and deformities
- Maintenance of a positive outlook and cooperation with the treatment plan

Specific nursing activities include close monitoring of the patient, promotion of drainage, use of fluids, immobilisation, good nutrition to the patient, use of antibiotics, use of assistive devices such as crutches, minimising infection and patient education.

You will now learn about fractures.

Fractures

A fracture is any break in the continuity of bone.

Classification of Fractures

They are classified according to:

- Location
- Type
- Direction or pattern of fracture line

Location

Long bones can be described as having 3 parts; proximal, midshaft and distal. A fracture of the long bone is described in relation to its position in the bone. .

Types of Fracture
This is in relation to its communication to the environment, degree of break in continuity of the bone, character of fracture. For example an open fracture communicates with the environment because it penetrates the skin, while a closed fracture does not penetrate the skin. We also talk of the degree of break, e.g. green stick, partial or complete and character of fracture which is described as comminuted, impacted, segmental, etc The pattern of fracture line can be described as transverse, spiral, oblique, etc.

Bone Healing Process
After a fracture, bone healing follows a number of stages:

- A haematoma forms between surrounding soft tissues.
- Inflammatory process sets in with accumulation of macrophages. This takes about five days. The macrophages, phagocytose the haematoma. Growth of granulation tissue begins.
- The osteoblasts secrete non-lamellar osteoid. Calcium is also absorbed which aids in hardening of bone to form callus.
- Osteoclasts become active removing excess callus and opening up a medullary canal in callus. This may take up to one month.

Factors enhancing bone healing:

- Adequate nutrition
- Adequate blood supply
- Absence of infection

Bone Healing Process
Factors hindering bone healing:

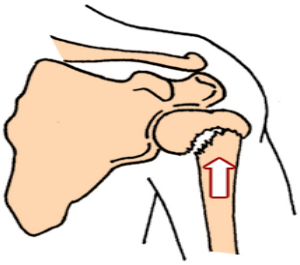
- Presence of infective organisms e.g. streptococci
- Fat embolism in medullary canal
- Excessive bone tissue fragments
- Deficient blood supply
- Continued mobility (lack of proper reduction and immobilisation)
- Age - old age due to slowing
- Nature of injury
- Type of bone lost
- Degree of immobilisation

Clinical features

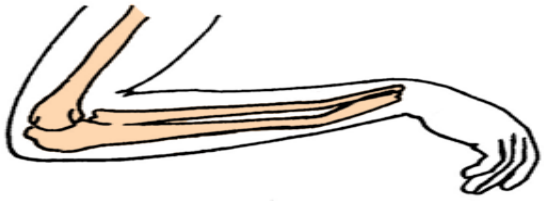
- Pain at site of injury
- Swelling due to haematoma formation
- Loss of function due to pain and deformity
- Deformity depending on force and muscle tissue surrounding muscles e.g. angulation, shortening of extremity

Diagnosis
This is made from the history e.g. fall or trauma in road traffic accidents. An x-ray examination confirms diagnosis.

A **fracture dislocation** break complicated by the joint.



An **impacted fracture** where the bone is broken and wedged into another break.

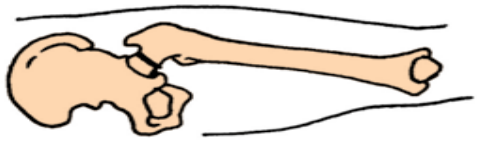


A **green stick fracture** where the bone is broken and bent out but securely hinged at one side.

A **closed fracture** where there is no open wound.

An **open fracture** where a wound in the skin communicates with the fracture.

An **extracapsular fracture** – the bone is broken outside of the joint.



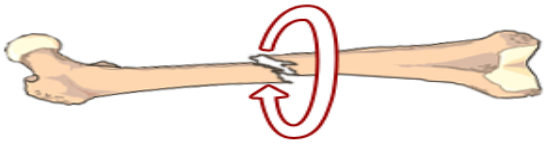
An **intracapsular fracture** - the bone is broken inside
the joint.

Comminuted fracture where the bone has splintered
into fragments

A **longitudinal fracture** where the break runs parallel with the bone.

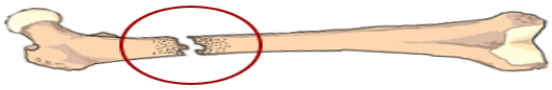
A **transverse fracture** - the break runs across the bone.

An **oblique fracture** occurs when the break runs in a slanting direction accross the bone.

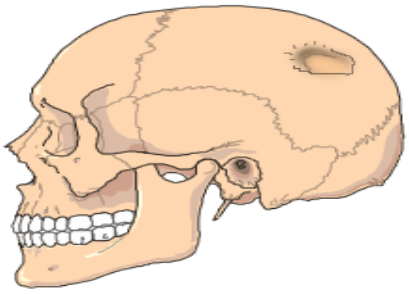


A **spiral fracture** is where the break coils around
the bone.

.



A **pathologic fracture** occurs when the break is at the site of bone disease



A **depressed fracture** occurs when a piece of the skull is broken off and driven inwards.

Principle Management of Fractures
The emergency management of a fracture involves:

- Assessing the airway, breathing and circulation
- Assessing any bleeding sites and controlling bleeding
- Treatment of any life threatening injury
- Immobilisation by use of splints
- Applying cold compresses
- Elevating the extremity
- Minimising mobility
- Monitoring the patient closely

The principle management of fractures falls along 3 lines:

a) Fracture reduction
b) Immobilisation
c) Rehabilitation (restoration of function)

a)Reduction

The aim is to replace the bone fragments to as near as normal anatomical position as possible.
Methods used are:

- Open reduction. This is a surgical method of bringing the fractured parts together.
- Closed reduction. Here manipulation is used without viewing the fractures. An x-ray must be taken immediately after.

b)Immobilisation

The aim is to prevent movement of injured parts already reduced by the above methods. It is accomplished through the use of:

- External devices e.g. splints, plaster casts, external fixation devices or traction.
- Internal devices inserted during open reduction e.g. screws, nails, plates.

Traction
Traction involves a steady pull on a body part. This is a method of reduction and immobilisation used to maintain fractures apart but allowing sufficient contact for healing.
Traction may be either skin or skeletal. In skin traction the pull is transmitted to the skin on the fractured bone. In skeletal traction, the force is directly applied to the bone by use of pulls. In both, weights are used to maintain traction and the traction force must be maintained throughout the initial healing stage.

Indications:

- To reduce a fracture
- Maintain alignment
- Overcome muscle spasm
- Correct deformities

Specific Care for Patient on Traction
The care is similar to that of a patient on a cast and internal fixation. In addition, you should maintain continuous traction and avoid adding weight to the traction.

Skin Care

Nurse the patient on sheepskin to avoid pressure sore formation and gluteus. Keep the skin clean around pin sites in skeletal traction to avoid infections.

Plaster Casts
This is a common external fixation device which is applied over skin.

The skin should be intact, clean and well

padded before a cast is applied to avoid risks of infection. Casts are molded over the affected body part after closed reduction has been done

Specific Care for a Person in a Cast
This should fall into a number of categories.
1) Patient Education
- Before the application explain the procedure to the patient and the extent of the immobilisation.
- After cast application explain the care of cast to the patient and when it will be removed.
- Instruct patient not to insert sharp objects in to the cast to avoid injury in the skin.

2) Skin Care
- Inspect skin around the cast edges for redness or irritation.
- After cast removal, skin should be washed thoroughly and oiled.

3) Mobilisation
- Weight bearing is at the discretion of the physician. The patient can ambulate
  on crutches.

4) Positioning
- After cast application, position limb elevated on a pillow to decrease oedema.
- Observe limb for colour changes and sensation. If the patient experiences tingling sensations, the cast is too tight and should be removed.

Internal fixation
It has the advantage of allowing direct visualisation of fracture of the surrounding tissues. Its main disadvantage is that anaesthesia is required and there is the risk of infection if strict surgical asepsis is not maintained. Devices used for internal fixation include:
- Plates and nails
- Intramedullary rods
- Screws
- Pins

.
Specific Care for a Person with an Internal Fixation Device
1) Patient Education
- Explain the surgical procedure and general care expected post-operatively to the patient.

2) Promoting Mobility
- Instruct and assist the patient on turning and transfer.
- Assist the patient to use an appropriate ambulatory aid if the fracture is of a lower extremity.
- Maintenance of immobilisation depends on whether traction or cast has been used.

External Fixators
External fixators are also used but applied under anaesthesia. They are indicated where there is extensive soft tissue and bone injury where an internal device may not be used.

Complications of Fractures
These include:
- Fat embolism
- Deep vein thrombosis
- Impaired fracture healing e.g. malunion, non union infection

Disorders of Joints and their Management

Arthritis
Arthritis is a descriptive term applied to more than 100 rheumatic diseases.

Rheumatoid Arthritis

Rheumatoid Arthritis is a systemic inflammatory diseases affecting synovial joints.

Pathophysiology

The disease begins in the synovial membrane within the joint. This leads to an inflammatory process. The inflammatory process is triggered by an unknown event that damages or irritates the joint tissues. Continued inflammation leads to thickening of the synovium especially where it joins the articular cartilage.
At this point, fibrin develops into a granulation tissue known as pannus. This leads to adhesions between joint surfaces and fibrous or bony ankylosis. Pain occurs as a result of cartilage degeneration due to erosion.
Clinical Features

Early Signs	Late Signs	Other Signs
Fatigue	Pallor	Increasing pain
Weight loss	Anaemia	Paraesthesia
Pain at rest and with movement	Joint deformities	Dislocation
Morning stiffness	Contractures	

Rheumatoid arthritis may also affect other body systems e.g. the heart.

Diagnosis

This is made from the history and presence of :

- Anaemia
- Narrowing of the joint spaces seen on x-ray
- Mild leukocytosis
- Rheumatoid factor

Clinical Features

Early Signs	Late Signs	Other Signs
Fatigue	Pallor	Increasing pain
Weight loss	Anaemia	Paraesthesia
Pain at rest and with movement	Joint deformities	Dislocation
Morning stiffness	Contractures	

Rheumatoid arthritis may also affect other body systems e.g. the heart.

Diagnosis

This is made from the history and presence of :

- Anaemia
- Narrowing of the joint spaces seen on x-ray
- Mild leukocytosis
- Rheumatoid factor

Assessment

- Inspection and palpation of the same joints on both sides of the body for asymmetry, skin color, size, shape, tenderness, swelling
- Limitation of active joint movement

Nursing Diagnosis

- Pain related to swelling of joint
- Self-care deficit related to loss of muscle strength

Expected Outcomes

- Patient verbalises decreased pain
- States factors that lead to fatigue and how to avoid them
- Reports adequate sleep and rest
- Demonstrates improved ability to perform self-care activities and participates to the fullest extent

Rheumatoid Arthritis - Interventions

Think about how you might evaluate the following care?
These should include those that promote:

1) Comfort

- Proper positioning of limb
- Administering of medications e.g. indocid 50-75mg tds naprosyn 100mg bd
- Providing heat or cold treatments on the affected joints according to what the patient says works best
- Encouraging the use of resting splints

2) Independence

- Assist in activities of daily living as needed
- Encourage use of supportive devices e.g. trapeze to move up the bed

3) Reducing fatigue by for example, providing frequent rest periods. Instruct patient on how to conserve energy.

4) Mobility and prevention of injury by:

- Assessing all joints for signs of inflammation and deformity
- Avoiding positions that can lead to formation of contractures
- Encouraging patient to wear shoes and not slippers for ambulation

5) Patient education should include care in all the areas described above.

Degenerative Joint Disease (Osteoarthritis)
A condition affecting one or more joints characterised by degeneration of joint tissue or a non-inflammatory condition of the joint characterised by degeneration of joint tissue.

Pathophysiology
The onset is slow with erosion of articular cartilage, thickening of subchondral bone and formation of osteophytes or bone spurs. Normal articular cartilage is white, transluscent and smooth in osteoarthmitis. The area of the cartilage becomes soft and the surface becomes rough and cracks. Eventually the cartilage is destroyed and the underlying bone goes through a remodeling process. Osteophytes or bone spurs appear at the joint margin at the sites of attachment. These may break off and appear in the joints as joint mice.

Clinical Features

- Pain in affected joint (deep aching) which increases with weather changes or increased activity
- Muscle spasms
- Shortening ligaments
- Joint deformity

Diagnosis

- Based on evaluation and history
- X-ray films show narrowing of joint space

Post-operative Management

This includes:

1. Proper positioning of the patient in bed to avoid hip dislocation. A wedge pillow maybe used between the limbs.
2. Vital signs observation which should be done four hourly to assess the patient's progress. Oxygen may be administered for the first six hours to improve perfusion. Other observations are of the incision site for bleeding and drainage if drain is in situ. If the drainage is minimal the drains should be removed 48 to 72 hours post operatively.
3. Pain management control should be maintained throughout the recovery period e.g. pethidine 75mgIV eight hourly and as needed followed by oral diclofenac100mg bd for 14-21 days.
4. Ambulation. The patient starts on passive exercises as soon as the pain is controlled. They should ambulate as soon as is possible to avoid complications e.g deep various thrombosis.
5. Nutrition. Depending on the type of anaesthesia used and patients condition they may be allowed to take oral sips six hours after surgery. If they had intravenous infusions running, these should be allowed to go through and the input and output chart should be maintained to monitor fluids. The patient should be allowed to feed on a well balanced diet soon after they can tolerate fluids.

Post-operative Management

This includes:

1. Proper positioning of the patient in bed to avoid hip dislocation. A wedge pillow maybe used between the limbs.
2. Vital signs observation which should be done four hourly to assess the patient's progress. Oxygen may be administered for the first six hours to improve perfusion. Other observations are of the incision site for bleeding and drainage if drain is in situ. If the drainage is minimal the drains should be removed 48 to 72 hours post operatively.
3. Pain management control should be maintained throughout the recovery period e.g. pethidine 75mgIV eight hourly and as needed followed by oral diclofenac100mg bd for 14-21 days.
4. Ambulation. The patient starts on passive exercises as soon as the pain is controlled. They should ambulate as soon as is possible to avoid complications e.g deep various thrombosis.
5. Nutrition. Depending on the type of anaesthesia used and patients condition they may be allowed to take oral sips six hours after surgery. If they had intravenous infusions running, these should be allowed to go through and the input and output chart should be maintained to monitor fluids. The patient should be allowed to feed on a well balanced diet soon after they can tolerate fluids.

You should have considered the following other cares:

- Elimination needs
- Hygiene needs
- Health message

The health messages given should include among others that the patient should avoid squatting on a low toilet seat or to picking something from the floor to avoid dislocation of prosthesis.

Situations that might lead to dislocation include:

- Disorders affecting bones
- Metabolic bone diseases
- These affect the normal haemostatic functioning of bone e.g Paget's disease and osteoporosis

Osteoporosis

Osteoporosis is a metabolic condition of the bone resulting in low bone mass.

Causes include

- Diabetes
- Rheumatoid arthritis
- Leukemia

Pathophysiology

In the normal bone forming process, bone remodelling occurs at the same pace as bone resorption. In osteoporosis, there is rapid bone loss. This leads to thinning of the lamellar with deformity and later collapse. The bone may easily fracture.

Diagnosis

- History and clinical features
- X-ray

Clinical Features

- Acute onset back pain in low thoracic region cause vertebral fracture
- Kyphosis (postural changes)

Management
Prevention of the condition is through early administration of calcium supplements to encourage bone strengthening. Others include vitamin D, Fluoride. Give health messages about dangers of smoking and need to avoid it. Women approaching menopause may require assessment for suitability of hormone replacement therapy.

Care of the Adult with Joint Disorders
Patients with osteoarthritis have degeneration of articular cartilage in the joints. Management involves relief of discomfort and protection of the joints from undue strain. The relief of pain can be achieved by resting the involved joints, advising the patient to avoid activities that precipitate pain, use of heat, analgesics and anti-inflammatory drugs, for example, steroids.
The use of correct body mechanics, assistive devises and the avoidance of heavy weight bearing is also helpful. The joints should be restored to their maximal extent through the use of progressive range of motion exercises, avoiding flexion deformities and the utilisation of corrective and graded exercises.

Amputation
Amputation is often necessary as a result of:

- Progressive peripheral vascular disease
- Severe crash injuries
- Severe burns
- Severe congenital deformities or malignant tumours

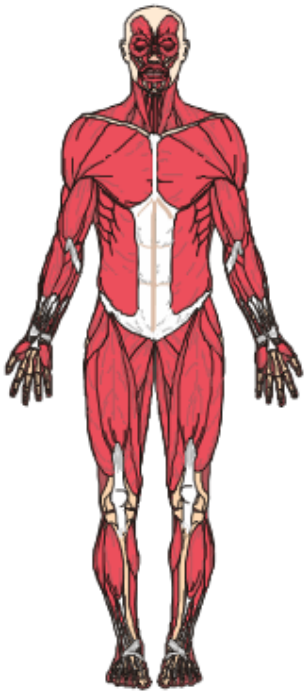
The amputation is performed at the point furthest from the torso that will heal well. The ankles, slightly below knee, and slightly above knee are some of the common points of amputation. Pre-operatively, you assist the patient to undergo investigations and support them psychologically. Always give good nutrition, correct Hb, teach the patient how to use assistive devices such as crutches and involve them in exercise programmes.
Post-operatively, the patient requires good wound drainage as well as proper wound dressing and antibiotics to decrease sepsis. Immediately after surgery, the patient should also be closely monitored for haemorrhages, vital signs fluctuations and wound drainage. Physiotherapy is utilised to prevent the development of contractures. Pain management is an important aspect. Phantom pain often occurs as a result of the missing limb and psychotherapy is recommended.
We talk of phantom pain when a patient reports pain in an area distal to a point of amputation. For example, a patient may report pain on missing toes.
Care of the skin at the stump area, muscle strengthening and balancing exercise, in addition to education on use of prostheses are all important aspects in the care of the patient with amputation. Always remember that rehabilitation of the patient with amputation is an important consideration of nursing. The graphic below illustrates the common points of amputation.

Gout
When there is accumulation of products of purine metabolism, especially uric acid in the body, they may crystallise in the joints causing joint inflammation and destruction. The first symptoms of gout are typically joint pain that starts with distal joints and swelling. The disease is aggravated by infections, cold weather and consumption of meals rich in purines.
The management of gout is mainly preventive. Once an individual starts presenting with symptoms, they need to be advised on how to avoid acute gout attacks. Anti-gout medication comes in two forms. The first is pain-controlling medication such as indocid, diclofenac and aspirin at a high dose. The second is medication that acts to decrease the production of uric acid e.g. allopurinol. The patient must be advised to avoid over indulgence on roast meat, organ meat (such as liver), baked chicken and sardines, as these are high in purines. They should also drink lots of fluids to facilitate the secretion of uric acid through the kidneys.
The next topic you will learn concerns disorders of muscle and ligaments and their management.

Disorders of the Skeletal Muscles and their Management

Skeletal muscles make up about half of the mean body weight of individuals. They have various characteristics as you have studied earlier. They undertake the function of causing movement of various body parts. If muscles are not put to use for reasons such as pain, lack of exercise or disease, they may atrophy. Atrophy is a decrease in the number and size of muscle fibres. This is one of the reasons that physical therapists continually work with bedridden patients, in an effort to prevent disuse atrophy.
Muscles can get inflamed. This is called myositis. When bone forms within the muscle due to infiltration of bone cells, the condition is referred to as ossifying myositis. This is normally due to repeated injury accompanied by a haemorrhage into a muscle compartment.

Inflammation of muscles can be brought about by parasites and infections, for example, the larvae of the Trichinella spiralis, commonly found in muscles that are rich in a substance called cytochrome. These are muscles that work hard to produce energy. Autoimmune responses can also result in muscle inflammation.
The manifestations of inflammation of muscle include pain, swelling, easy fatigability and sometimes paralysis.



Neoplasms of Muscles
There are over 500 muscles in the human body. Conditions affecting the muscles are rare. Primary tumours of muscles can either be malignant or benign. These are mainly rhabdomyomas and rhabdomyosarcomas. Secondary tumours are a result of metastases from other organs of the body. These are very rare. The manifestations of secondary muscle tumours are pressure symptoms, decreased blood supply to the affected area, pain and infection. Keep in mind that there are general symptoms of neoplasms for almost all tumours and they include anaemia, nausea and anorexia.
Before concluding on the disorders of bones and skeletal muscles we should not forget to mention that muscles can be over-stimulated and go into spasms, which are often extremely painful and may render the use of the involved limb difficult. This could be a result of neurological disease and can lead to lower back pain, and muscle pull.

Care of Adults with Muscle and Ligament Disorders
You have learnt about several soft tissue injuries, including sprains, strains, dislocations and subluxation. These are abnormalities affecting the articular points. The main goals of management of sprains and strains are to return the limb to normal function and to ensure satisfactory pain relief and comfort.
You must, therefore, undertake the following actions while managing patients with these problems:

- Assess for neurological and circulatory status
- Elevate the involved limb
- Apply a compression bandage, except in cases of dislocation
- Immobilise the affected limb
- Eliminate weight bearing on the affected extremity
- Administer analgesics to control the pain

Specialised techniques may also be employed by physiotherapists to assist the patient in achieving the two goals that have just been listed.
Focusing on pain relief, realignment of articular surfaces and promoting joint function will treat dislocation and sub-luxation. Anti-inflammatory drugs, immobilization, and regulated rehabilitation are also utilised in the management of sub-luxation and dislocation. Muscle spasms are managed by a combination of drugs, physical therapy or both.
One example is Valium, which has some muscle relaxant activity and is commonly employed in our setup.
Tumours involving muscles can be treated with radiation, chemotherapy, surgery or a combination of these. These are treatment methods that are generally employed in the management of all cancers.
Now you will learn about back pain.

Low Back Pain
Low back pain is a major musculoskeletal disorder that is commonly encountered. It is caused by several factors.

Causes of Lower Back Pain
Here are some causes of lower back pain:

- Lumbo-sacral strain
- Unstable ligaments
- Weak muscles
- Osteoarthritis of the spine
- Inter-vertebral disc problems

- Osteoporosis in the elderly patients

You should take down a good personal history and perform a thorough physical examination.

Treatment of Lower Back Pain
Here are some treatments used for lower back pain:

- Rest the patient on a firm mattress, in the modified supine position with slight flexion so as to relieve the pain
- Heat and appropriate medication for pain relief are important for the patient with back pain
- To promote additional lumbar flexion, pelvic traction may be prescribed
- Drug therapy
- Exercise programmes
- Encourage proper body mechanics and posture especially during strenuous exercise
- Initiate physical therapy sessions

Drugs are used for muscle relaxation, whereas electrical nerve stimulation and use of wide leather belts promote comfort.

SECTION 3: COMMUNICATION AND COORDINATION

Introduction

Body systems do not work in isolation - their functions are interrelated and integrated. The coordination of all these functions is left to the nervous and the endocrine systems.
The endocrine system works through the use of special messengers, known as hormones.

Objectives

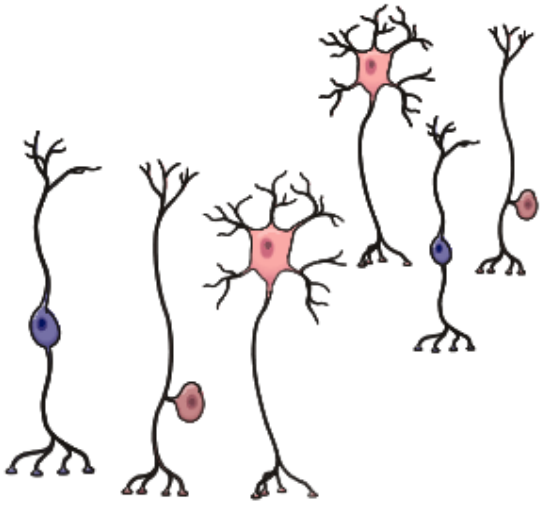
By the end of this section you will be able to:

- Describe the structure and function of the nervous system
- Describe the disorders of the nervous system and their management
- Describe the structures and functions of the eyes and ears
- Describe the disorders of the ears and eyes and their management
- Describe the structure and functions of endocrine organs
- Utilise the nursing process in the management of disorders of the endocrine system

Neurons

The Nervous System - The Structure
The nervous system is divided into two parts: the central nervous system and the peripheral nervous system.
The central nervous system consists of the brain and spinal cord while the peripheral nervous system consists of the cranial nerves, spinal nerves and autonomic nervous system.

The neurons are the functional cells of the nervous system.
A neuron consists of a nerve cell/body, an axon and a dendrite. When they are grouped together outside the central nervous system, they are called a ganglion. Neurons are specialised cells, which enable the transmission of information in the form of nerve impulses.



Neurons can be divided into two groups. The first group takes messages from receptor end organs into the Central Nervous System (CNS). These are sensory or afferent nerves. The second group takes messages away from the CNS to the effector organs. These are known as motor or efferent nerves.
More than one neuron may be involved in the process of relaying information. In such cases, the multiple neurons connect with each other, at a point of connection called a synapse. At the synapse there are chemical transmitters, or neurotransmitters, which are involved in the transmission of messages. Two examples of

neuro-transmitters which you may have heard of, are Acetylcholine and Noradrenaline.

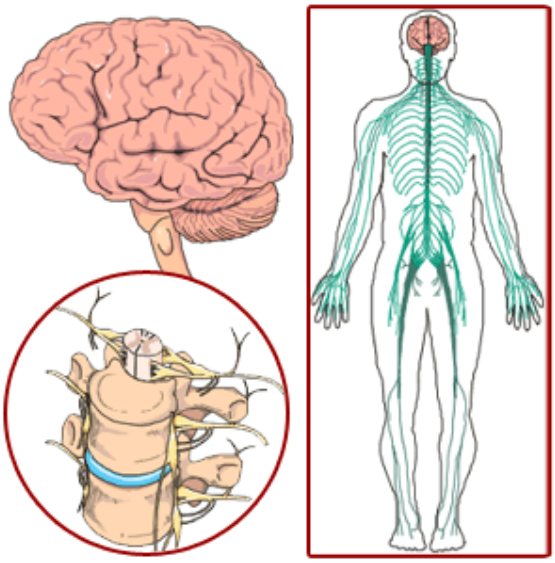
The Brain, Spinal Cord and Nerves

You will have heard of the central nervous system. This term refers to the brain and the spinal cord. Membranes called meninges cover the brain and spinal cord. Within the cranium, the meninges are found between the skull and brain. In the vertebral column they are found between the vetebrae and the spinal cord. The dura mater and the arachnoid mater are separated by a potential space - the subdural space.

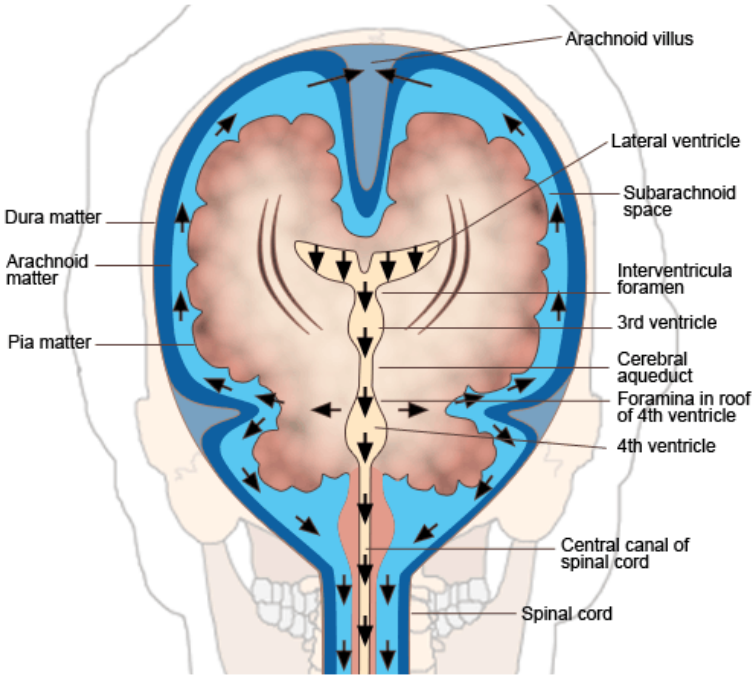
The three membranes, starting from the outermost are:

- Dura Mater
- Arachnoid Mater
- Pia Mater

There are two spaces between the three membranes. The space between the arachnoid and pia mater is the sub-arachnoid space and it contains cerebrospinal fluid. In your practice, you have seen patients having cerebrospinal fluid (CSF) removed for laboratory study.



The Flow of the Cerebrospinal Fluid



The Brain

The brain consists of the following parts:

The **cerebellum** undertakes coordination of voluntary muscle movement. Posture and balance are also controlled by the same part of the brain. Finally, the reticular formation found in the core of the brainstem performs the functions of coordination of skeletal muscle and maintaining balance. It also coordinates activity of the autonomic nervous system and performs the function of selective awareness. When you want to continue reading, while the radio is playing, the process that enables this dual activity is referred to as selective awareness.

The **medulla oblongata** comprises certain vital centres. These are the respiratory, cardiac, vasomotor and reflex centres of vomiting, coughing, sneezing and swallowing. As these vital centres suggest by their names, they control the functions mentioned. Temperature regulation is done by the hypothalamus.

The **pons** forms a bridge between the two cerebral hemispheres and other parts of the brain

The other part of the brain is the **midbrain**. It is involved in relaying ascending and descending nerve fibres

The **cerebrum** is the largest area and its cortex has many furrows. One of the big furrows divides the cerebrum into right and left hemispheres. These are further divided into lobes, which are named according to the bones of the cranium under which they lie.

Can you remember the bones of the cranium?

The lobes of the brain named after the cranial bones are the frontal, parietal, temporal and occipital lobes. The cerebrum is associated with mental activity, for example, memory and intelligence, sensory, initiation and control of voluntary movement. This part of the brain (cerebrum) can further be subdivided into sections according to their specific function.

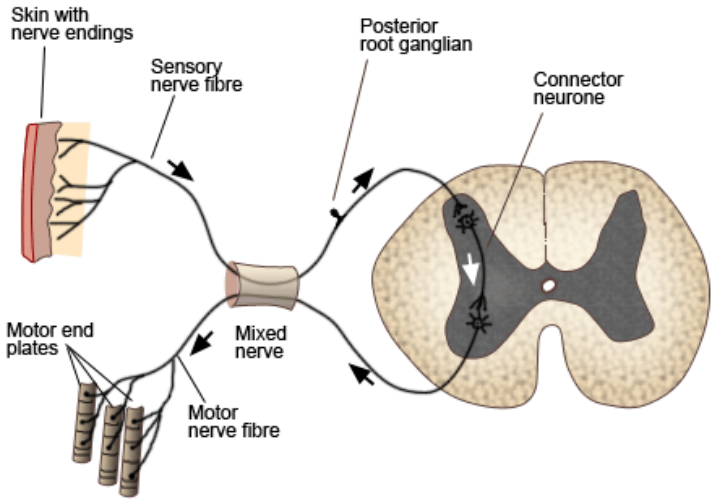
The Spinal Cord

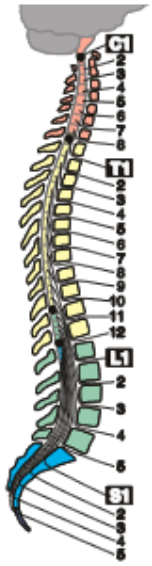
The spinal cord is part of the central nervous system, which we have already discussed. It is the link between the brain and the rest of the body. The spinal cord is divided into two parts: the anterior median fissure and the posterior median septum.

The spinal cord is composed of grey matter at the centre and white matter on the outside. The grey matter has cells of the sensory nerves, the connector nerves and of the lower motor neurons.

White matter is arranged in tracts that may be sensory or motor. In the spinal cord, neurons transmit impulses to and from the peripheral. In the grey matter of the spinal cord, between the cells of the anterior and posterior horns, are small connector neurons which transmit an impulse straight from the skin to muscles. For example, when you touch a hot bowl of soup, a message is relayed to the spinal cord for you to withdraw your hand quickly. This is referred to as the reflex action.

Simple Reflex Arc





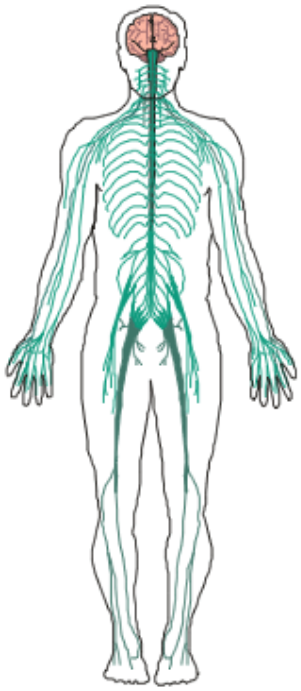
The CNS comprises several nerves that are involved in the relaying of messages, which you will now examine.

Peripheral Nerves

There are 31 pairs of spinal nerves and 12 pairs of cranial nerves. The 31 pairs are distributed as eight cervical, twelve thoracic, five lumbar, five sacral and one coccygeal. Each of these nerves supplies a particular area of the body. The illustration opposite outlines the distribution and origins of nerves.

The 12 cranial nerves are numbered from one to twelve.

1. Olfactory
2. Optic
3. Occulomotor
4. Trochlea
5. Trigeminal
6. Abducent
7. Facial
8. Vestibulocochlea
9. Glossopharyngeal
10. Vagus
11. Accessory
12. Hypoglossal



Autonomic Nervous System

The autonomic nervous system supplies the involuntary muscle tissue of the body. It controls the movements of the internal organs and the secretion of glands. The autonomic nerve cells are situated in the brain stem and spinal cord.

The parasympathetic and sympathetic nervous system have opposing effects on the body. They both send weak impulses to the organs and glands maintaining normal activity. In stressful situations the sympathetic impulses become stronger and the organs and glands react to the situation. The parasympathetic nervous system will take over when the stressful situation has passed and the functions of the organs return to normal. Some of the activities controlled by this system include:

- The rate and force of the heart beat
- Vasodilatation
- Vasoconstriction
- Secretions of the glands, for example, in the alimentary tract and sweat glands

Some of the organs and the systems controlled by the autonomic nervous system are:

- Cardiovascular system
- Eye
- Skin
- Digestive system
- Respiratory system
- Urinary system
- Genitalia

Read more about the nervous system. As a primary reference book, Ross and Wilson, 9th edition, pp. 141-175 is recommended.

What are the functions of the cerebrospinal fluid?

You should have included some of the following functions:

- It is involved in the exchange of substances, for example, nutrients between the CSF and the nerve cells.
- It keeps the brain and spinal cord moist.
- It is a shock absorber for the brain, spinal cord and nerves.
- It supports the brain and spinal cord and protects them.
- It maintains pressure around the delicate structures in a uniform manner.

Disorders of the Brain and Spinal Cord

Increased Intracranial Pressure

One of the most common consequences of traumatic and non-traumatic lesions in the brain is increased intracranial pressure.

The brain is protected within a rigid bony structure, the cranium. The cranium encloses:

- The brain
- Cerebral blood vessels and blood
- Cerebral spinal fluid (CSF)

An increase in any of these three lead to an increase to the intracranial pressure. Increased ICP is a life threatening situation. When pressure increases, arterial supply is affected and the resultant hypoxia causes cerebral oedema which aggravates the problem.

Causes of increased intracranial pressure include:

- Cerebral oedema
- Hydrocephalus or obstruction of the flow of the CSF
- Space occupying lesions e.g. haematoma, tumours, abscesses

Increased intracranial pressure manifests with severe headaches, projectile vomiting and pupil oedema. The brainstem may be compressed, leading to loss of consciousness, respiratory arrest and even death. Raised intracranial pressure, by reflex, slows the heart rate because it also affects the cardiac centre. The heart rate and blood pressure should, therefore, be closely monitored.

Care of the Patient with Increased Intracranial Pressure

The goal of management of a patient with increased intracranial pressure is to identify and treat the underlying cause and support brain function. Caring for the patient with increased intracranial pressure involves patient assessment through the use of the Glasgow Coma Scale as well as general treatment.

Glasgow Coma Scale For Adult / Child & Infant		
Child/Adult	**Infant**	**Score**
Eyes		
Opens eyes spontaneously	Opens eyes spontaneously	4
Opens eyes to speech	Opens eyes to speech	3
Opens eyes to pain	Opens eyes to pain	2
No response	No response	1
Verbal		
Oriented	Coos and babbles	5
Confused	Irritable cry	4
Inappropriate	Cries to pain	3
Non specific sounds	Moans to pain	2
No response	No response	1

Motor		
Obeys commands	Spontaneous movements	5
Localizes pain	Withdraws to touch/pain	4
Flexion	Flexion (decorticate)	3
Extension	Extension (decerebrate)	2
No response	No response	1
Total Score:		**3-14**

Assess for verbal response, pupilary response, reflexes, motor and sensory input. General management involves maintaining a neurological observation chart and administering osmotic diuretics such as IV mannitol.
You may use an indwelling catheter and maintain a strict input and output chart. Control of temperature and observation of vital signs are very important as well as preparation for surgery if the patient's condition deteriorates.
Changes in vital signs are caused by increasing pressure on the thalamus, hypothalamus, pons and medulla. Other clinical manifestations include decrease in motor function and changes in the dilatation and reaction of the pupil of the eye.

Traumatic Lesions of the Central Nervous System
Injuries can affect the functioning of the central nervous system. Minor injuries can cause a little haemorrhage and inflammatory oedema. Major injuries can cause tears in the meninges and even death. Occasionally, bleeding can occur and form a subdural haematoma. This may manifest with the same signs and symptoms as raised intracranial pressure.
An extradural haemorrhage may occur if one of the main arteries in the brain is ruptured. This process may be accompanied by a fracture of the skull bones. The patient loses consciousness and as time passes, there is increased intracranial pressure, which may eventually result in a coma.

Head Injuries

Definition: *A head injury is any trauma to the scalp, skull or brain.*

Types of Head Injuries
These include scalp lacerations, skull fractures and brain injuries. Brain injuries are categorised as being minor or major. Concussion is considered a minor brain injury. The patient may not lose total consciousness with this injury. Major brain injuries include contusions and lacerations.

Clinical features will depend on the type of injury present. Diagnostic procedures include x-rays, CT scan, MRI.

The patient who has a head injury requires immediate management at the casualty department and ongoing review and care afterwards. Immediately after receiving the patient, you must maintain an open airway, and ensure they have adequate breathing and circulation. This is because, as you have already learnt, cerebral hypoxia can lead to brain oedema and further damage the brain.
You must determine the baseline condition of the patient by assessing responsiveness, presence of headache, vomiting or double vision. You should also evaluate pupil size, blood pressure, pulse and respiration.
It is important to assess motion and strength of extremities and consider injuries to other organs. An accurate personal history and physical assessment are always paramount. You may start to administer anti-seizure medication and fluids depending on the assessment.
Later on, support of the airway, close observation, fluid and electrolyte balance correction and control of temperature are instituted. Medication to decrease cerebral oedema such as osmotic diuretics, for example, IV mannitol, anti-seizure medication, for instance, epanuitin should be administered. Patient support and restraint will also contribute to improvement of the patient.
Always remember that preventing complications is part of the care of your patients.

Complications of Head Injury
- Unconsciousness
- Loss of corneal reflex
- Hypothermia
- Problems related to motor and sensory deficits
- Seizures
- Behavioural disorders

The Unconscious Patient

Definition*: Uconsciousness is an abnormal state in which the patient is unaware of self or environment. Unconsciousness is a manifestation of a large number of pathophysiologic processes including trauma, metabolic disturbances, mass lesions and infections.*

The unconscious patient should be nursed in the semi-prone position. The airway should be opened by the use of an oral airway device or the insertion of an endo-tracheal tube. Oxygen should be administered and secretions minimised through suction. Assess the patient's level of consciousness and make a record of the same. Evaluate vital signs half hourly and maintain fluid and electrolyte balances strictly. You should manage restlessness and keep the patient clean, dry and free of pressure sores.
The extremities should be put through a range of motion exercises. This promotes blood supply to various parts. Catheterisation and regular turning are also part of care for the unconscious patient. You should catheterise the patient to avoid wetting, which predisposes them to pressure ulcers. It will also enable you to closely monitor the intake and output. Protection from seizures, complications (for example infection), aspiration, obstruction of the airway, and corneal irritation should all be part of the care plan.

Non-Traumatic Cerebro-Vascular Disorders
Stroke (Cerebrovascular Accident)
Definition: *This is a condition in which neurologic deficits occur as a result of decreased blood flow to a focal (localised) area of brain tissue.*

Causes
Cerebrovascular accidents result when there is inadequate supply of blood to the brain (cerebral ischeamia) or cerebral hemorrhage within the brain.

Types of stroke (CVA)
There are three types:

- Thrombotic
- Embolic
- Haemorrhagic

Non-Traumatic Cerebro-Vascular Disorders
The most common types of ischemic stroke are thrombotic and embolic. Haemorrhagic strokes are generally the result of spontaneous bleeding into the brain tissue itself or the subarachnoid space or ventricles.
The most common cause of haemorrhagic stroke is a ruptured cerebral aneurysm. This is a saccular outpouching of a cerebral artery that occurs at the site of weakness in the vessel wall. The weakness may be the result of atherosclerosis, a congenital defect, trauma to the head, aging or hypertension.
When cerebral haemorrhage occurs, patients loose consciousness, progressing to coma and even death. This condition is common in people aged over 50 years of age.

Clinical Manifestations
The warning signs of stroke include temporary blindness in one eye, hemiplegia and defects in speech and confusion.
In haemorrhage, thrombosis and embolism within the brain, the manifestations depend on the area of the brain affected.
Normally, in the case of a severe stroke, consciousness is lost but is eventually regained. Speech may also be affected but later recovers. Loss of voluntary movement on the side of the body opposite to the side of the brain affected results in a condition referred to as hemiplegia.
Patients affected by this condition need intensive care, which shall be covered in the third section. The care of the patient with a non-traumatic lesion may take several forms.

Management of Non-Traumatic Lesion and Cerebro-Vascular Accident
Disorders affecting blood supply to the brain may lead to quick loss of brain function. You will now look at the care of patients who have cerebro-vascular accidents, including strokes, transient ischemic attacks and emboli.
In the acute phase of stroke, you must carry out an assessment, ensure adequate cerebral perfusion pressure and reorient the patient when they regain consciousness. The principles of nursing care for an unconscious patient will apply.
You have already learnt about these. In the rehabilitative phase, the goals are to prevent deformities, retrain the affected limbs and help the patient gain independence in personal hygiene, and other activities of daily living. To do this, good positioning and physical therapy are necessary. Patient and family education are required to achieve the results quickly. The patient with cerebral haemorrhage requires bed rest, treatment of headache, antihypertensive drugs and reduction of cerebral oedema. They should also be prepared for surgery and rehabilitation afterwards just like the patient with head injuries.

Management of a Patient Undergoing Intracranial Surgery

Indications of intracranial surgery include:

- Brain tumour
- Vascular abnormalities such as aneurysms
- Cranio cerebral trauma

Depending on the location of the pathologic condition a craniotomy may be done at the frontal, temporal, parietal, occipital or a combination of any of these.

Pre-operatively you should assist the patient while they are undergoing diagnostic tests. You can do this by answering questions from the patient and relatives.

Evaluate the patient's condition and prepare them for surgery by shaving the head, giving enema, administering pre-medication as ordered and informing the patient on what to expect after surgery. The patient may need to know about the various operations, drainage, what they can and cannot do and so on. Pre-operative teaching is important in allaying the fears of the patient and the family and also in preparing them for post operative period.

What are some of the intracranial surgical operations that can be performed in Kenya?

One of the most common intracranial operations performed in Kenya is craniotomy to remove tumours, relieve pressure and evacuate blood clots.

Post-operatively, you must establish proper respiratory exchange, assess the patient's level of consciousness, evaluate for signs and symptoms of increasing intracranial pressure and control cerebral oedema. Steroids and osmotic diuretics will decrease cerebral oedema. Analgesics, changing the patient's position, an in-dwelling catheter and close observation are some of the measures that are put in place.

Always make sure you observe for drainage, which could be leaking cerebrospinal fluid, and for complications of intracranial haemorrhage such as post-operative meningitis, wound infections, pulmonary complications and post-traumatic epilepsy.

Brain Tumours

Tumours of the brain may be primary, arising from tissues within the brain or secondary, resulting from a metastasis from a malignant tumour elsewhere in the body.

The clinical features result from the local destructive effects of the tumour, the resulting accumulation of metabolites, displacement of the structures, the obstruction of CSF flow, effects of oedema and increased ICP on cerebral functions.

The management of the patient with a brain tumour involves total or partial removal of the tumour and decompression, radiation and chemotherapy. For surgery, the principles of care of a patient undergoing intracranial surgery will apply.

A patient on radiation requires steroids, close observation and education. Generally, principles applied in the care of patients with cancer will also apply. If a patient is on steroid therapy, they may be predisposed to infections. Always be observant for potential infection.

Infections Affecting the Neurological System

Two infections that affect the neurological system are meningitis and encephalitis.

Meningitis is an acute inflammation of the membranes covering the brain and spinal cord. The infection may spread and cause suppuration in the brain. Infections can localise in the menengis resulting in Meningitis. They may also spread and cause suppuration in the brain. This could lead to a cerebral abscess. The mode of spread of infections is normally two-fold. The infecting micro-organisms may be blood borne, or they may get to the brain via local spread, that is, if there is communication with brain substance after trauma, therapeutic devices, for example, shunts or surgery. The local spread is a result of infection in the ear or fractures of the skull bones.

The micro-organisms commonly involved

Encephalitis is the inflammation of the brain substance. It can be caused by trauma and infection. The infection is usually due to bacterial, viral and fungal micro-organisms.

Patients with these infections will present with fever, severe headache, unconsciousness and convulsions. Stiffness of the neck, paralysis of cranial nerves and hemiplegia may also occur.

Patients can go into coma and the risk of death is substantial. Have you nursed any patients with these infections? What clinical picture do they present with?

The management of infections of the neurological system involves:

- Investigations including lumbar puncture to examine the cerebrospinal fluid.
- Use of intravenous anti bacterial drugs for meningococcal meningitis (or the

most effective drug or those specific to the infective organisms).

- Anti viral medications for aseptic meningitis, for instance, Zovirax.
- Anti fungal medication for cryptococcal meningitis.
- Anti pyretic and analgesic medications are necessary.
- Anti convulsant drugs may be prescribed to prevent or control seizure activity.

Nursing management includes:

- Assessment of the vital signs and neurological evaluations two to four hourly.
- The patient should be assisted to a position of comfort.
- Fluid and electrolyte status is maintained through intravenous fluid placement until the patient is able to resume oral intake.
- Supportive care is necessary to prevent complications related to prolonged bed rest. Activity should be gradually increased as tolerated, but adequate bed rest and sleep should be encouraged.
- In most cases, meningitis does not require isolation with the EXCEPTION of meningococcal meningitis.

Complications include:

- Dementia
- Seizures
- Deafness
- Hemiplegia
- Hydrocephalus

Demyelinating Disorder, Metabolic Disorders and Vitamin Deficiencies

From our study of the normal structure of the nervous system, can you remember the myelin sheath? This is the covering of the nerve axon. When it is damaged, the conduction of nerve impulses is impaired. Certain disorders can result in impaired formation of the myelin sheath or damage to it (demyelination). One such disorder is multiple sclerosis. Its cause is not well understood. Another cause of demyelination is encephalitis.

Multiple sclerosis is a chronic neurological disease characterised by multiple patchy demyelination of white matter in the central nervous system. Multiple sclerosis is chronic and manifests with impaired vision, paralysis, bladder dysfunction and emotional instability. These manifestations can occur as acute episodes interspersed with recovery periods. This type of disorder requires patients to receive support and understanding from you, the nurse, and their families as part of the management. Considering the impaired vision and mobility, the environment should be structured in such a way that accidents are avoided.

Medical management will include drugs to control spasticity such as diazepam in combination with physiotherapy. For fatigue, patients may be treated with drugs such as Amantadine. Steroids may be administered for optic neuritis. Anti depressants and counselling is important where patient presents with psychological disturbances.

Vitamin deficiencies sometimes result in serious consequences to the nervous system. The most common deficiencies affecting the nervous system are vitamin B1 and B12 deficiencies. Vitamin B1 deficiency causes unsteadiness, double vision, and mental impairment. Vitamin B12 deficiency causes degeneration of the spinal cord. The deficiencies can occur because of alcoholism, deficiencies in the diet or malabsorption.

Metabolic disorders in the brain could result from hepatic encephalopathy, alcoholism and hypoglycemia. Poisoning of the brain substance can occur as result of direct toxins in substances consumed, drugs or as a result of toxins liberated through the metabolic process in the body, e.g. bilirubin.

Care of the Adult with Multiple Sclerosis, Vitamin Deficiencies and Metabolic Disorders

All patients initially require a thorough assessment. This provides the data for planning and eventually for evaluation. The main goal of care is to ensure the patient with multiple sclerosis should be treated for muscle spasticity through exercises, avoidance of muscle fatigue, prevention of muscle contractures, walking and the use of braces and crutches.

You should also avoid skin pressure and immobility. This decreases the possibility of pressure ulcers. Position change, avoidance of trauma, and giving careful attention to pressure areas are very important.

Assist the patient to overcome inability to coordinate by regularly practising walking techniques and support. If they have bladder dysfunction, catheterise and maintain adequate fluid intake. Bowel training for bowel incontinence is a good practice. For optic and

speech problems, adequate attention should be given to training and use of assistive devices. Most importantly, attention to activities of daily living and patient education can help patients lead better quality lives.
Vitamin deficiencies and degenerative disorders of the nerves that result in nerve damage will also require the same care as is given to the patient with multiple sclerosis.

Degenerative Disorders
All patients with degenerative diseases require a structured and predictable environment. This means that you should give education to their caretakers to organise their environment in such a way that home accidents are prevented. They should always have somebody present to help them and should be oriented to their surroundings regularly.
Two degenerative disorders are Alzheimer's disease and Huntington's Chorea

Degeneration of the neurons occurs in certain individuals due to certain disorders. In **Alzheimer's disease** there is dementia, that is, degeneration of intellectual ability, loss of short-term memory and loss of physical ability. The cause of Alzheimer's disease is not known.

Senile dementia affects elderly individuals and also results in the degeneration of intellectual ability. In **Huntington's chorea**, patients manifest with unusual grimacing and uncontrolled jerking movements, which we call chorea. This particular condition is inherited as a dominant trait.

Herniation of the Intervertebral Disc and Laminectomy
Herniation refers to squeezing of the disc between two vertebral bodies. It is normally a very painful process and patients should be managed appropriately. The treatment of the herniated disc involves immobilisation to allow for healing of soft tissues and reduction of inflammation. Immobilisation involves the use of traction, bed rest, collars and braces.
Muscle relaxants, anti-inflammatory drugs and analgesics are also generally used. Additionally, a moist heat compress will help the patient. The patient with lumbar disc herniation requires bed rest, anti-inflammatory or analgesic drugs, heat treatment and sometimes surgery. Patient education should be included to ensure the patient co-operates with treatment procedures.

Laminectomy
Laminectomy is the removal of the lamina to expose the spinal cord. It is recommended for the prevention of irreversible neurological damage, for progressive disease with muscular weakness and for recurring episodes of pain. Pre operative management includes teaching the patient to practice log rolling to ensure the spinal column remains in alignment when turning until healing has occurred. Explain the importance of taking analgesics regularly, deep breathing and leg exercises.
Post-operatively, the patient requires bed rest, use of a pillow under the head and knee flexion to relax back muscles. Assess movement and sensation of extremities for signs of nerve compression. Change of position through logrolling, use of pillows between legs when turning and avoidance of extreme flexion must be part of the care. Assess for haematoma and leakage of cerebrospinal fluid, and for urinary retention. The patient should void within eight hours after surgery.
You should give drugs to reduce inflammation, relieve pain and anxiety and decrease the possibility of infection. The patient should also be given education on self care and should be closely observed for complications.
A more common neurological disease that you may have encountered is epilepsy.

Epilepsy
The term refers to two or more unprovoked seizures in one year. The seizures are sudden and uncoordinated. Epilepsy is normally a manifestation of underlying disorders. If they are linked to a particular part of the brain, then they are called focal or partial epilepsy. However, if they cause unconsciousness and general brain dysfunction, they are called generalised epilepsy.
The manifestations of focal epilepsy are hallucinations of taste, smell or hearing. Jacksonian epilepsy affects motor functions, leading to twitching of particular areas. Generalised epilepsy can either be petit mal seizures or grand mal seizures.

Grand Mal Seizures
In **grand mal epilepsy**, the patient may be aware that the seizure is imminent. This is followed by an aura phase after which there is a generalised tonic contraction. The third phase is the clonic phase where muscles have jerky movements. The tonic and clonic phases are collectively referred to as the ictal phase. Finally the patient enters the phase of relaxation and moves from coma to sleep. This is the post-ictal phase

Petit Mal Seizures

Petit mal seizures are characterised by a phase of transient loss of consciousness. Perhaps you have seen patients who stare expressionlessly for some time before they continue with their function without being aware. This is a characteristic of petit mal seizures

Primary epilepsy has no known cause. Some of the causes of secondary epilepsy are cerebral scarring due to head injury, cerebral vascular accidents, infections, degenerative CNS diseases and childhood febrile illnesses. It is important to bear this in mind so that you control febrile illness well and avoid head injury in neonates during obstetric care.

Seizures that occur spontaneously in succession are called status epilepticus. These normally occur without recovery. This condition is considered a major medical emergency. Vigorous muscular contractions impose a heavy metabolic demand and can interfere with respirations. At the height of each seizure, some respiratory arrest occurs which produces venous congestion and hypoxia of the brain. Repeated episodes may lead to irreversible and fatal brain damage.

Factors that precipitate status epilepticus include:

- Withdrawal of anti epileptic drugs
- Fever and infection
- Cerebral oedema

Management of status epilepticus includes positioning the patient to lie on the lateral position to prevent inhalation of secretions from the mouth. Give IV (not IM) diazepam 10-30mg STAT slowly over three minutes, repeat if there is no response. If no response put 80mg in 500mls of normal saline, adjust rate to control seizures.

Other useful drugs include phenobarbitone sodium - IM 125mg to 250mg, phenytoin sodium (Epanutin) 100mg tds. Treat hyperpyrexia by temperature reducing measures.

Give care as for the unconscious patient. Oral anti convulsants are given as soon as the patient gains consciousness.

The general management of status epilepticus will follow the general care pattern we will now outline. You will learn more about this disorder in children in the unit on paediatric nursing.

Care of the Adult Patient with Epilepsy

You have studied epilepsy and its various forms. After a careful assessment of the patient with epilepsy, you should concentrate on meeting the following objectives as part of the management of the disorder:

- Determine and treat (if possible) the primary underlying cause
- Prevent recurrence
- Manage the seizure and prevent injury

During a seizure period, closely observe the patient and support the patient by giving privacy and ensuring an adequate airway. Do not attempt to place anything in the mouth and always protect the head from injury, for example by placing a folded blanket under the head. After the convulsions have passed, re-orient the patient to the environment.

Generally, medications such as phenytoin, carbamazepine and phenobarbitone are useful anti-seizure drugs. Other drugs may be given for tranquilisation. Patient education on a safe environment and coping with stress is also required. If there are underlying causes, these should be treated, for example, in the case of a tumour, surgical excision is recommended.

Other common conditions include:

Parkinson's Disease

Definition: *This is a progressive neuro-muscular disease involving degenerative changes and dysfunction of the basal ganglia. It is a disorder of movement and posture*.

Patients have deficient amounts of naturally occurring dopamine which is required for normal functioning of the basal ganglia in the brain.

The cause is unknown but it is associated with viral infections such as viral encephalitis or meningitis, cerebral vascular disease, toxicity or poisoning.

The clinical features are initially non specific aches and pains but the key features are tremors, rigidity and slowness of movement (Bradykinesia). Other features include slow eye movements, depression, postural hypotension.

Patients with parkinsonism are susceptible to respiratory complications because of muscle rigidity which prevents excursion and ability to cough. There is disturbance of autonomic nervous system. Patient's appearance deteriorates as they cannot attend to activities of

daily living.

Patients with Parkinson's disease require medication such as Levadopa 0.25-0.5mg daily. This relieves symptoms of tremor and rigidity.

The aim of nursing care is to maintain muscular and joint function so that the patient can be as independent as possible. Blood pressure monitoring to detect postural hypotension and teach the patient to avoid rapid postural changes. Moderate exercises to

improve muscle tone which reduces stooping and shuffling movements. Patient should be instructed to walk slowly and carefully. Provide adequate rest to prevent fatigue.
General nursing care includes assisting the patient to feed slowly, prevent constipation and provide psychological support to counteract depression, discouragement and hopelessness. Speech therapy should be done to correct dysarthia. Involve patient in own care.
Patients have deficient amounts of naturally occurring dopamine which is required for normal functioning of the basal ganglia in the brain.

What complications may ensue after severe head injury?
Your examples should include:

- ***Coma***
- ***Paralysis***
- ***Respiratory failure***
- ***Hypothermia***

What are the functions of the cerebrospinal fluid?
Did you think of the following

- ***It is involved in the exchange of substances, for example, nutrients between the CSF and the nerve cells.***
- ***It keeps the brain and spinal cord moist.***
- ***It is a shock absorber for the brain, spinal cord and nerves.***
- ***It supports the brain and spinal cord and protects them.***
- ***It maintains pressure around the delicate structures in a uniform manner.***

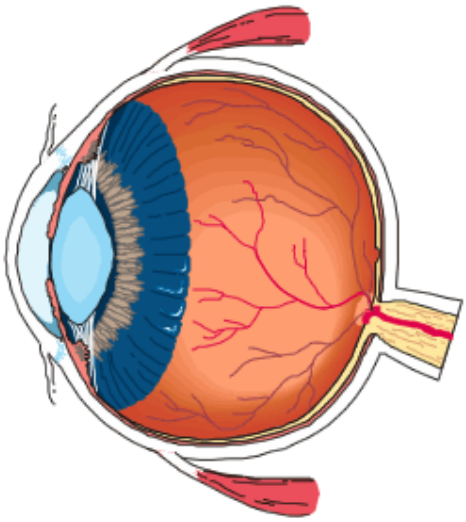
You should study further the various nerve cells of the central nervous system and the movement of cerebrospinal fluid. This information can be found in any anatomy book.

The Eyes and Ears

Under the special senses, you should consider the vision, hearing, smelling and taste. However, you shall only learn about the diseases of the eye and ear and how to manage them.

The Eye

This is the organ of sight, which lies protected in the orbit of the skull. The other protective structures of the eye are eyelids, brows and eyelashes. The eye blinks by a reflex that serves as further protection. Eyes function as a pair. Anteriorly, a transparent mucus membrane called the conjunctiva covers the eye. The eye surface is kept moist by tears produced by lacrimal glands.
The eye has three layers. These are the sclera and cornea on the outside, the choroids, cilliary body and iris in the middle, and the retina is the inner most part of the eye. Anteriorly the cornea allows light rays to pass through. Since the lens is convex, it refracts or bends light rays to focus on the innermost part of the eye, the retina. Light rays are absorbed by the choroid to stimulate nerve endings.



The cranial nerve that supplies the eye is the optic.
The cilliary body is the point of attachment for muscles and ligaments whose contraction changes the thickness of the lens.
The iris lies behind the cornea and is circular and forms an opening at its centre called the pupil. This varies in size depending on light intensity. You may have seen patients who have organophosphate poisoning and whose pupil were pinpoint in size.
The lens lies behind the pupil.
The innermost part, the retina, has cells involved in changing light rays into nerve impulses. Behind and in front of the cornea and lens is a clear fluid called aqueous fluid (humor) and vitrous humor respectively. The vitrous humor is colloidal. The aqueous and vitrous humor maintain intra-ocular pressure.
The nerve that supplies the eyes is the optic nerve. Light is focused onto the retina in both eyes and is bent by the lens.
The pupils change size to allow the appropriate amount of light to enter the eye. The eyeballs

also move to change the visual field. Once light is changed into nerve impulses, the brain can interpret and form a visual image.

Basic Assessment of the Eye and Vision

This consists of a careful patient interview and physical assessment of the eye structures. The patient will normally have complaints e.g blurred vision, itchy eyes, discharge that must be examined.
A basic assessment of the eye includes observing:

- Eyelids and conjunctiva e.g for oedema
- Corner e.g for clarity
- Sclera e.g for colour
- Iris and pupil e.g colour shape size
- Lens - transparent or opaque

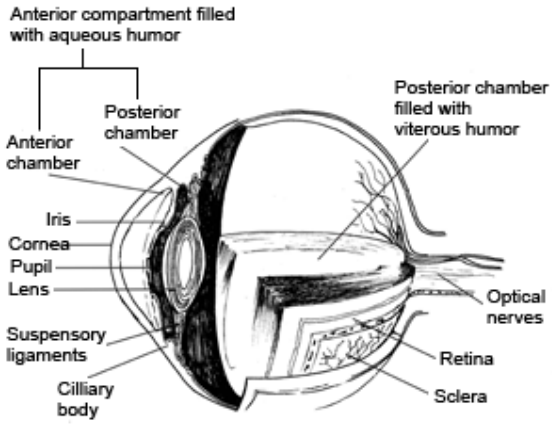
Visual acquity means acuteness or sharpness of vision and includes measurement of distance and near vision.

A Snellen's chart is used to measure acuteness of vision. It consists of printed letters or words in various sizes.

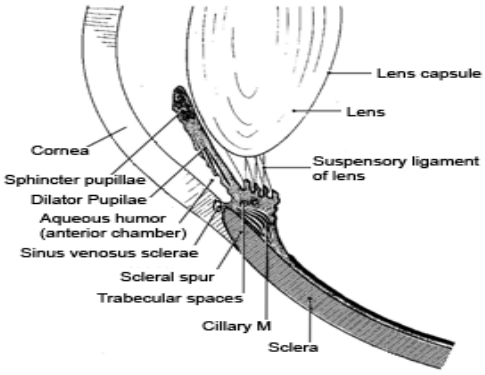
The inspection of the internal structures is done by use of an ophthalmoscope.

This allows the examiner to view the back of the eye through the pupil to see the optic nerve, retina, blood vessels and macula.

The Human Eye



The Structure of the Eye



Disorders of the Eye

Blepharitis

Blepharitis is one of the most common disorders of the eye. It is an inflammation of the eyelids, characterised by irritation, burning, redness and itching of the eyelid margins. The assessment of a patient with blepharitis must gather all the information related to any recent trauma, possible exposure to allergic substances and infection.
In our country, blepharitis is commonly associated with trachoma. During management you should consider the various causes. The drugs commonly used include tetracycline eye ointment, gentamycin and kanamycin eye drops. Any allergens should be eliminated from the patient's environment

Eye Infections and Inflammations

(a) Hordeolum/Stye: An infection of small glands of lid margins.

- Causative organism: Staplylococcus aureours.
- Clinical features: Tender swollen pustive on eyelid, it eventually ruptures.
- Management: Apply warm compresses three to four times a day to facilitate ripening and drainage. This can be done by hot spoon bathing. Tetracycline eye ointment can be applied three times a day in severe cases after cleaning the lid margin. Incision and drainage should be done if it does not resolve.

b) Chalazion: A Sterile cyst located in the connective tissue in the eyelid.

- Clinical Features: Small lump, hard and non-tender but may put pressure on the eye and affect vision.
- Management: May resolve on its own otherwise incision and drainage is done if it does not resolve. Cleaning of eyes facilitates healing without further complications.

Uveitis

Uveitis: Acute inflammation of the uvea (i.e choroid)

- Causes: Infection, allergy, toxic agents or systemic disorders e.g. diabetes
- Clinical Features: General eye pain around the eyeball. Swelling photophobia, visual impairment.

Management

Treat the underlying cause. DO NOT ADMINISTER ANTIBIOTIC WITH STEROIDS this may mask the inflammation and cause further damage to the eye structures. Refer to an ophthalmologist for assessment and further care.

Corneal Ulceration and Corneal Detachment

Ulceration of the cornea may be caused by trauma or cataract surgery. If a patient receives blunt trauma to the eye, the retina may separate from the choroid and vitreous humor seeps behind the eye. This will cause retinal detachment.

Clinically, the patient presents with flashes of light, they may see floating images (floaters) and there is a sensation of veiled sight. On examination, the patient may have loss of vision. Keratitis is the inflammation of the cornea that may be caused by infection, hypersensitivity, and trauma. The management will follow the same pattern as ulceration. Most importantly, the cause of the problem must be removed.

Corneal Ulcer

A patient who has a corneal ulcer requires examination, systemic antibiotics, warm compresses for comfort and padding of the eye. For the patient with retinal detachment, bed rest is always recommended to promote healing and tranquilisers may be administered to reduce anxiety. Surgery may be undertaken in specialised centres.

Ptosis

Weakness of the muscle that elevates the eyelid causes ptosis. This is characterised by the drooping of the upper lid. This drooping makes it difficult to see. The commonest causes of ptosis is drugs, trauma and muscle weakness. The etiologic factor should be removed to promote vision.

Conjunctivitis

This is the inflammation of the conjunctiva. Infections, allergens, chemical agents or physical irritants commonly cause it. The signs and symptoms of conjunctivitis include redness, a burning sensation in the eye and tearing.

Patients have a gritty sensation in the eye, and there may be itching and discharge. Bacteria, viruses and other agents may also cause conjunctivitis. The treatment includes antibiotics, anti-inflammatory drugs and analgesic drugs. One of the common drugs that you are likely to use is tetracycline eye ointment.

Trachoma

Trachoma is one of the most widespread eye problems in the drier regions of our country. It is caused by the agent chlamydia trachomatis. Flies normally transfer the micro-organisms from person to person. It is a common cause of blindness in Kenya. The micro-organisms will affect the conjunctiva leading to conjunctivitis. As the inflammation proceeds, the eyelids get turned inwards causing scratching and scarring.

Finally, this may end up in blindness. This is a preventable cause of blindness. The main factors to concentrate on in prevention are good personal hygiene, avoiding the sharing of handkerchiefs, and getting rid of flies. The treatment of trachoma involves use of antibiotics and the commonest one is tetracycline.

Cataract

Cataract: is the opacity of the lens.

- Causes: Cataracts may be associated with aging, trauma, congenital or secondary to other medical conditions.

Pathophysiology

Cataracts associated with aging may result from a decrease in protein, accumulation of water and an increase in sodium content that disrupts the normal fibres of the lens. This leads to opacification of the lens.

Clinical Features
The primary symptom of cataracts is a progressive loss of vision. The degree of loss depends on the location and extent of opacity, it can manifest with:

- Gradual painless blurring and loss of vision
- Glare at night and in bright light
- Haloes around lights
- Cloudy white opacity on the pupil

Diagnosis
This is done by direct inspection of lens with an ophthalmoscope after pupil dilation.

Management
Surgery is the treatment of choice under local anaesthesia, the lens is extracted. An intraocular lens implant may be inserted.

Pre-operative Management

- Informed consent is signed by the patient
- Health messages on the expected post-operative restrictions are given e.g. avoid bending over or rubbing eyes to avoid dislodging of implant
- Treat patient for any coughing or sneezing to avoid complications

Post-operative Care

- Immediately after surgery
- Position patient to lie on back or on the side of the unoperated eye to prevent strawling by patient
- Keep eye padded for rest
- Clean aseptically before instilling eye ointment

Complications

These include infection, bleeding and elevated IOP. The patient is instructed to promptly report when they notice signs of complications.

Glaucoma
Glaucoma: is an eye disease characterised by progressive nerve atrophy and loss of vision.

Pathophysiology

The normal range of aqueous humor pressures in the eye ranges from 10 to 21 mmhg. In a normal eye there is a balance between the production and drainage of acqueous humor that allows the intraocular pressure to remain relatively constant. An increased intraocular pressure results from a blockage in the outflow. When this blockage persists, the optic nerve is damaged with loss of vision. In primary open-angle glaucoma, the changes occur slowly. The process can also occur more rapidly in response to injury infection or as a complication of surgery.

Clinical Features
1) Open Angle Glaucoma

- Intraocular pressure of > 24mmHg
- Slow loss of vision, peripheral vision lost before central vision
- Persistent dull pain in eyes
- Difficulty adjusting to darkness
- Failure to detect color changes

2) Angle Closure Glaucoma

- In its acute form, it presents with severe ocular pain, decreased vision, pupil enlarged and fixed eye red, steamy cornea
- It may cause nausea and vomiting
- Intraocular pressure may exceed 50mmHg
- Permanent blindness can occur if there is marked increase in pressure for 24-48 hours

3) Congenital Glaucoma

- Enlargement of eye, lacrimation, photophobia, blepharospasm

Diagnosis

Tests include: Tonometry: measurement of intraocular pressure, Ophthalmoscopy to evaluation of colour and shape of optic cup.

Management
This is first medical (conservative). Surgical intervention is indicated where conservative management fails.

Conservative Management
Drugs are used to lower the intraocular pressure and prevent loss of vision. Drug therapy does this by:

- Increasing outflow of aqueous humor
- Decreasing product of aqueous humor

Drugs of choice include:

- Miotics constrict pupil e.g pilocarpine
- Cholinesterase inhibitors to constrict ciliary muscle e.g eserine
- Carbonic anhydrase inhibitors to decrease aqueous humor production e.g. diamox

Surgical Management
Trabeculectomy is the common procedure performed. This creates an opening in the trabecular meshwork to allow for draining. The specific management includes:

- Observations post anaesthesia
- Protection of operative eye with patal or shield
- Maintaining comfort in the eye by drug instillation
- Regular assessment of intraocular pressure
- Administration of medications in combination to protect the eye from infections and inflammation i.e. antibiotics and steroid
- Patients to avoid lifting heavy objects and any straining e.g. at defecation to avoid prolapse of eye contents

Colour Blindness
At this point it is important also to make a note about the condition known as colour blindness. In this disorder individuals confuse, mismatch or have reduced acuity for colour discrimination. Mostly, this is a genetic problem.

General Care of Eye Injury
Eye injuries are a common occurrence in our environment. The types of injuries include lacerations to eyelids, corneal injuries, foreign bodies on cornea or in penetrating injuries, splashes to the eye. Preventive measures are more important in this case, but for the patient who already has an injury to the eye, you must undertake the following:

- If there is any penetrating object, leave it in situ, cover the eye lightly with a sterile dressing and refer immediately.
- In the case of splashes to the eye, irrigate the eye with saline solution for 15 minutes.
- Prepare for examination of the eye and assist in determination of the extent of the injury.
- Advise the patient on care and follow-up. Patients with severe injuries may have their eyes padded and should be advised to take good care of the eye to minimise infection and to seek medical care as soon as possible.

You need to learn skills used in treatment of eye conditions e.g. Hot spoon bathing, eye irrigation, version of eyelid to manage eye injuries.

For the patient having eye surgery you must assist in the immediate pre-operative management by:

- Preparing for general anaesthesia, for example, evacuation of bowel.
- Removal of dentures.
- Trimming eyelashes.
- Instructing the patient regarding post-operative restrictions such as no showers or shampoos, no lifting and no sleeping on operated side until healing has taken place. They should also avoid sneezing and breathing through their noses as this increases intra-occular pressure.

In the post-operative period, the patients require good positioning, preferably, the dorsal recumbent position, with the use of lateral pillows. The patient also requires education on what to report, for example, severe pain, bleeding and how to communicate if they cannot see. Analgesics and other drugs may also be prescribed.

The Ear
The ear is the organ of hearing, and comprises the external ear, a middle ear and an inner ear. The external part of the ear has the auricle, which is externally visible. The auricle concentrates sound into the ear canal. The external auditory meatus ends at the eardrum, also called the tympanic membrane.
After this membrane is the middle ear, which has structures made up of three tiny bones: the tapes, the incus and malleus. By vibration, the three bones transmit sound waves to the inner ear. The three bones are called ossicles.
A coclear, which is the real organ of hearing, and semicircular canals that are involved in balance, is found in the inner ear.
Once the auricle has concentrated sound waves, they vibrate the tympanic membrane, which causes movement of the three tiny bones. The moving sound waves cause movement of fluid in the cochlear and specialised cells pick these waves to produce nerve impulses. These specialised cells are in the organ of Corti.
The brain interprets the impulses from the semi-circular canals. The three semi-circular canals are at right angles to each other. They, therefore, represent the three planes of position.
The nerve that supplies the ears is the vestibulo-cochlear nerve, which has a vestibular branch for balance and cochlear branch for hearing. The external auditory meatus produces wax or cerumen that protects the ear.

Disorders of the Ears
The diseases that affect the ears can be classified into those affecting the external ear, the middle ear and the inner ear.

External Ear
Tumours, foreign bodies or simple inflammation are the conditions that commonly afflict the external ear. Inflammation of the external auditory meatus is called external otitis. It is caused by irritation by various substances, for example objects placed in the ear. Ear wax produced from the ear canal may cause obstruction.
The external ear may also suffer from tumours, which can be benign or malignant. General ear care can help prevent obstruction and inflammation. Tumours are normally excised if they cause hearing loss.

External Otitis can be bacterial or fungal or due to an allergic reaction e.g. from soaps, hairsprays.
The patient experiences pain on touching or moving the auricle. Some people are prone to infection from swimming in contaminated water and this is referred to as 'Swimmers ear'. Furuncles also occur and these are mainly caused by Staphylococcus aureus. Incision and drainage of the furuncle is rarely done and this is best managed by administration of antibiotics and application of hot packs. This usually results in resolution of the furuncle.

Cerumen in the ear canal may occasionally be impacted causing ear ache and hearing difficulties. These wax deposits may be softened using warm glycerine drops. When cerumen becomes difficult to dislodge, it can be removed with a cerumen spoon under magnification.

In some instances, **foreign bodies** are inserted accidentally into the ear canal. Insects can easily be removed by instillation of oil drops as the oil allows the insects to float and be flushed out. For foreign bodies of vegetable origin, irrigation with any fluid is contraindicated as they have a tendency to swell making removal difficult. Removal of foreign bodies should be by a skilled person as the object may be pushed even deeper, lacerating the skin of the canal and perforating the ear drum.

External Ear
Tumours, foreign bodies or simple inflammation are the conditions that commonly afflict the external ear. Inflammation of the external auditory meatus is called external otitis. It is caused by irritation by various substances, for example objects placed in the ear. Ear wax produced from the ear canal may cause obstruction.
The external ear may also suffer from tumours, which can be benign or malignant. General ear care can help prevent obstruction and inflammation. Tumours are normally excised if they cause hearing loss.

External Otitis can be bacterial or fungal or due to an allergic reaction e.g. from soaps, hairsprays.
The patient experiences pain on touching or moving the auricle. Some people are prone to infection from swimming in contaminated water and this is referred to as 'Swimmers ear'. Furuncles also occur and these are mainly caused by Staphylococcus aureus. Incision and drainage of the furuncle is rarely done and this is best managed by administration of antibiotics and application of hot packs. This usually results in resolution of the furuncle.

Cerumen in the ear canal may occasionally be impacted causing ear ache and hearing difficulties. These wax deposits may be softened using warm glycerine drops. When cerumen becomes difficult to dislodge, it can be removed with a cerumen spoon under magnification.

In some instances, **foreign bodies** are inserted accidentally into the ear canal. Insects can easily be removed by instillation of oil drops as the oil allows the insects to float and be flushed out. For foreign bodies of vegetable origin, irrigation with any fluid is contraindicated as they have a tendency to swell making removal difficult. Removal of foreign bodies should be by a skilled person as the object may be pushed even deeper, lacerating the skin of the canal and perforating the ear drum.

The Middle Ear
The middle ear is a cavity, which has the eardrum and the auditory ossicles. In the middle ear, we can have otitis media, caused by micro-organisms such as staphylococcus aureus, and inflammation caused by the insertion of foreign objects. This condition may

be complicated or caused by a simple common cold.

Problems of the Middle Ear
Perforation of the tympanic membrane can result from accidents involving the skull. Traumatic damage may be from blast effects of explosives. Infection such as acute and chronic suppurative otitis media can also cause perforation. Other causes include foreign bodies, burns of the face that extend to the ear and accidental or deliberate blows to the face.

Otitis Media
Acute Otitis media is an inflammation of the middle ear as a result of entrance of pathogenic bacteria into the normally sterile middle ear. The mode of entry of the micro organisms is via the auditory canal from the respiratory tract. Bacteria that commonly cause this condition include streptococcus pneumoniae, staphylococcus and Haemophilus Influenzae. Occasionally, infection also spreads from the external ear if the tympanic membrane is perforated. Infection usually leads to accumulation of pus in the middle ear and outward bulging of the tympanic membrane. When the membrane ruptures, there is purulent discharge from the ear (otorrhoea).

The Middle Ear
The middle ear is a cavity, which has the eardrum and the auditory ossicles. In the middle ear, we can have otitis media, caused by micro-organisms such as staphylococcus aureus, and inflammation caused by the insertion of foreign objects. This condition may be complicated or caused by a simple common cold.

Problems of the Middle Ear
Perforation of the tympanic membrane can result from accidents involving the skull. Traumatic damage may be from blast effects of explosives. Infection such as acute and chronic suppurative otitis media can also cause perforation. Other causes include foreign bodies, burns of the face that extend to the ear and accidental or deliberate blows to the face.

Otitis Media
Acute Otitis media is an inflammation of the middle ear as a result of entrance of pathogenic bacteria into the normally sterile middle ear. The mode of entry of the micro organisms is via the auditory canal from the respiratory tract. Bacteria that commonly cause this condition include streptococcus pneumoniae, staphylococcus and Haemophilus Influenzae. Occasionally, infection also spreads from the external ear if the tympanic membrane is perforated. Infection usually leads to accumulation of pus in the middle ear and outward bulging of the tympanic membrane. When the membrane ruptures, there is purulent discharge from the ear (otorrhoea).
Chronic otitis media results from repeated attacks of otitis media causing persistent perforation of the ear drum. Bacterial resistance to antibiotic therapy and virulence of the infecting organisms are causative factors. Chronic otitis media presents with persistent or intermittent foul smelling discharge. Pain may be present with varying degrees of deafness.

Complications associated with otitis media include mastoiditis, brain abscess and seventh cranial nerve paralysis.

The treatment of otitis varies according to the organisms and severity. Broad-spectrum antibiotics and anti-inflammatory drugs are given for the pathogens, as well as for pain and inflammation. Myringotomy, which is an incision into the posterior aspect of the tympanic membrane, is made surgically for drainage purposes. Your role here is to observe the drainage and assess hearing. In chronic otitis media and inflammation of the mastoid process (mastoiditis), antibiotics and surgery are the choice interventions. The surgical operations performed are simple mastoidectomy or radical mastoidectomy, which involve complete or partial removal of the mastoid bone.

Inner Ear
The inner ear also suffers otitis interna, labyrinthitis and sensorineural hearing loss. Patients who have disorders of the inner ear are likely to have vertigo (giddiness), tinnitus (buzzing in the ears) and unilateral deafness. The infections of the external ear may spread to the inner ear so they should be immediately treated.

Motion Sickness
This is disturbance of equilibrium caused by constant motion. There is excessive stimulation of the semicircular canal and vestibular apparatus resulting in dizziness, nausea and vomiting.

Meniere's Disease
This is an inner ear problem where there is labyrinthine dysfunction. It is characterised by the presence of a triad of symptoms which

include paroxysmal whirling vertigo, tinnitus and sensorineural hearing loss.

Hearing Loss

This is classified as either conductive or sensorineural. Conductive hearing loss results from impairment of the outer ear, middle ear or both. There is impaired transmission of sound waves from outside to the oval window. Causes of conductive hearing loss include presence of wax or foreign bodies in the ear canal, otitis media, barotraumas, otosclerosis and injury to the tympanic membrane.

Sensorineural hearing occurs where sensitivity to and discrimination of sound is impaired. Sounds may be conducted properly through the external and middle ear but are not analyzed correctly in the inner ear. This can result from disease of the cochlea, the cochlear branch of the vestibular nerve or the hearing area of the brain.

Otitis is one of the most common ear problems.

The treatment of otitis varies according to the organisms and severity. Broad spectrum antibiotics and anti-inflammatory drugs are given for the pathogens, as well as for pain and inflammation. Myringotomy, which is an incision into the posterior aspect of the tympanic membrane, is made surgically for drainage purposes. Your role here is to observe the drainage and assess hearing.

In chronic otitis media and inflammation of the mastoid process (mastoiditis), antibiotics and surgery are the choice interventions. The surgical operations performed are simple mastoidectomy or radical mastoidectomy, which involve complete or partial removal of the mastoid bone.

The nursing care of a patient following ear surgery involves:

- Inspecting for drainage and observing vital functions
- Changing of dressings
- Providing post-operative pain relief
- Educating the patient to sneeze and cough with an open mouth
- Advising patients to avoid flying, swimming and any activities that may jeopardise the healing process
- Providing antibiotics
- Observing patients for complications such as vertigo and hearing loss

The patient with hearing loss should also be taught methods of communication that do not involve the use of sound, for example, lip reading.

The nursing care of a patient following ear surgery involves:

- Inspecting for drainage and observing vital functions
- Changing of dressings
- Providing post-operative pain relief
- Educating the patient to sneeze and cough with an open mouth
- Advising patients to avoid flying, swimming and any activities that may jeopardise the healing process
- Providing antibiotics
- Observing patients for complications such as vertigo and hearing loss

The patient with hearing loss should also be taught methods of communication that do not involve the use of sound, for example, lip reading.

Other Senses

The other senses, which you will briefly cover, are smell experienced by the nose, taste experienced by the tongue, and touch experienced by the skin.

To be able to smell, chemical particles from substances get into the nose and epithelia cells on the upper part of the nose, where olfaction or smelling is carried out. The olfactory nerve is a cranial nerve involved in enabling the sense of smell.

Taste is facilitated by the taste buds found on the tongue. The tongue can distinguish sweet, sour, bitter, salty and other tastes. A part of the glosso-pharyngeal nerve supplies the tongue with its sensory ability.

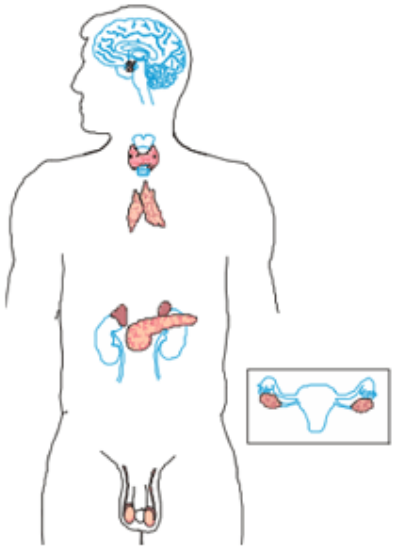
Look up the structure of the nose and throat to reinforce what you have been learning.

The Endocrine System

The endocrine system consists of glands widely separated with no anatomical links. The endocrine glands are termed as ductless and they secrete chemicals known as hormones.

Hormones are chemical messengers produced by ductless/endocrine glands, which flow directly into the blood where they are carried to another organ to influence activity, growth or nutrition. The hormones, together with the autonomic nervous system that you studied earlier, regulate the internal environment. The endocrine glands are:

- 1 Pituitary gland
- 1 Thyroid gland
- 4 Parathyroid glands
- 2 Adrenal (suprarenal) glands
- The pancreatic islets (islets of langerhans)
- 1 Pineal gland or body
- 1 Thymus gland
- 2 Ovaries in the female
- 2 Testes in the male



The Pituitary Gland and the Hypothalamus
The pituitary gland lies within the sella turcica, a depression within the sphenoid bone, inferior to the hypothalamus. You have learnt that it is composed of three lobes, the posterior, anterior and middle lobes.

The pituitary gland and the hypothalamus act as a unit. The hypothalamus has a direct controlling effect on the pituitary gland and an indirect effect on many others.

The pituitary gland has three parts: the anterior lobe, posterior lobe and intermediate lobe. The term neurohypophysis refers to the posterior lobe, while adenohypophysis refers to the anterior lobe.

Hormones of the Hypothalamus and the Anterior Pituitary Gland and their Targets

Hypothalamus	Anterior Pituitary	Target
Growth hormone releasing factor	Growth hormone	All tissues and very many glands
Growth hormone release inhibiting factors (Somatotrophin)	Growth hormone inhibition	All tissues, thyroid, pancreas
Thyroid releasing factor	Thyroid stimulating hormone	Thyroid gland
Corticotrophin releasing factor	Adreno-corticotrophic hormone	Adrenal cortex
Prolactin inhibiting factor	Prolactin	Breast
Luteinising Hormone releasing factor	Follicle stimulating hormone, luteinising hormone, prolactin	Ovaries and Testes Breast

The Posterior Lobe
The posterior lobe of the pituitary secretes two hormones: antidiuretic hormone and oxytocin. The antidiuretic hormone increases permeability to water of the distal renal tubules. You shall study this later. It also stimulates the contraction of the smooth muscles in blood vessels hence raising blood pressure. Oxytocin causes contraction of the uterus and cells in the lactating breast. You will study this in greater detail when dealing with Reproductive Health in module two.

Did you know that these two hormones are actually produced by the hypothalamus but stored in the posterior pituitary gland?

The Anterior Lobe
The Anterior Lobe produces several hormones. The growth hormone promotes fat metabolism while promoting fat mobilisation and catabolism. The thyroid stimulating hormone stimulates the synthesis and secretion of the thyroid hormones. The adrenocorticotrophic hormone stimulates the growth of the adrenal cortex and secretion of glucorcorticoids, for example, cortisol.

Follicle stimulating hormones cause the growth of the Graafian follicle and spermatogenesis. They also facilitate the secretion of oestrogen. Luteinising hormones are required for ovulation. They also stimulate the corpus luteum to secrete progesterone. You will revisit these hormones under reproductive health. Prolactin promotes breast development, stimulates progesterone secretion and promotes breast development during delivery

Thyroid Gland

The thyroid gland is situated in the neck in front of the larynx and trachea. It consists of two lobes one on either side of the thyroid cartilage.

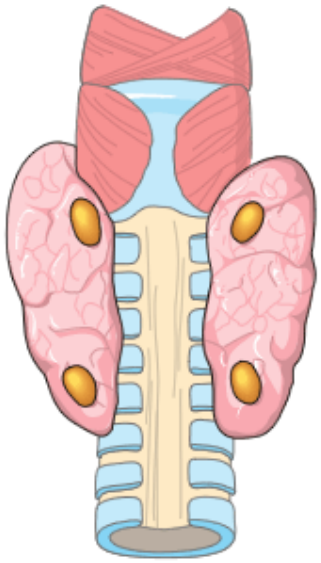
It's regulated by thyroid stimulating hormone from the anterior lobe.

Functions

The thyroid gland produces tetra-iodothyronine (thyroxine),triiodothyronine and calcitonin hormones.
The first two hormones may enhance the

affects of other hormones (adrenaline and noradrenaline),are essentials for physical growth and mental development and helps in regulating the metabolic rate of all body cells. Calcitonin controls calcium content of the blood by increasing bone formation and inhibiting bone breakdown and this results in decreased blood calcium levels.

Thyroid and Parathyroid Glands



Parathyroid Glands

There are four small parathyroid glands, two embedded in the posterior surface of each lobe of the thyroid gland.

Functions

- Secretes the hormone parathormone which is an antagonist to calcitonin.
- It increases the release of calcium and phosphate into the blood by causing less new bone to be formed and more old bone to be broken down. This helps in maintaining blood calcium within normal limits (9-11mg/dl or 2.25-2.74 mmol/L).

The Adrenal Glands

The adrenal glands are located on the upper side of each kidney. Each adrenal gland has a cortex and medulla. The cortex produces glucocorticoids, mineralcorticoids and sex hormones.

Adrenal Medulla

The adrenal medulla produces the two catecholamines, epinephrine and norepinephrine. These perform the functions of stimulating the breakdown of glycogen by skeletal muscle, increasing blood concentration of free fatty acids, constricting most blood vessels in the body and constriction of bronchial smooth muscle. You should be able to link this to the autonomic nervous system.

Adrenal Cortex

The cortex produces glucocorticoids, mineralocorticoids and sex hormones. These are steroids and are known as corticosteroids.

Glucocorticoids

The main glucocorticoids are cortisol and corticosterone. They perform the following main functions:

- Regulating carbohydrate metabolism
- Promoting utilisation of glycogen
- Raising blood glucose level through gluconeogenesis
- Promoting water and sodium re-absorption from the renal tubules

Mineralcorticoids

The main mineralocorticoid is aldosterone its functions are associated with the maintenance of the electrolyte balance in the body. It increases sodium reabsorption in the kidneys while increasing potassium excreted. The amount of aldosterone produced is influenced by the sodium level in the blood and the renin angiotensin mechanism.

Sex Hormones

In men, androgens are associated with deposition of proteins in muscles and retention of nitrogens. This will be covered again in the unit on Reproductive Health.

The Pancreas

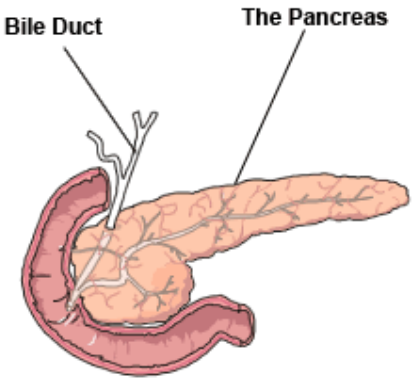
The Pancreas is an elongated gland with the head lying in the C shaped beginning of the small intestine (duodenum), with its body extending horizontally behind the stomach and its tail touching the spleen.

This gland is located behind the stomach in the abdominal cavity. It has both exocrine and endocrine properties. The Islets of Langerhans in the pancreas produce insulin, glucagon and somatostatin hormones.

Insulin produced by beta cells (B cells) promotes cellular uptake of glucose, stimulates intracellular synthesis of glycogen, fat and proteins, and stimulates uptake of sodium and potassium.

Glucagon produced by delta cells (D cells), on the other hand, antagonises insulin in the liver (breakdown of glycogen), inhibits protein

synthesis and induces hepatic fatty acid breakdown. Somatostatin inhibits the secretion of the other two hormones.
You will cover the disorder diabetes mellitus, which is related to these two hormones later.



Gonads
These are the primary sex organs in the male termed as the testes and in the female termed as the ovaries.

Ovaries

These are a set of paired glands in the pelvis that produce some of the following hormones:

Estrogens

This includes estradiol and estrone which are steroid hormones secreted by the cells of the ovarian follicles. They promote the development and maintenance of the female sexual characteristics and are also responsible for breast development and the sequence of events in the menstrual cycle. You will learn more details about estrogen and its functions in module two on reproductive health.

Progestrone

It is secreted by the corpus luteum (that is the tissue left behind after the rapture of a follicle during ovulation). Progestrone with oestrogen maintains the lining of the uterus which is necessary for successful pregnancy.

Testes

These are paired organs within a sac of skin called the scrotum which hangs from the groin area of the trunk.

They are composed mainly of sperm producing seminiferous tubules. Interstitial cells are found in areas between these tubules and they produce androgens (male sex hormones). The main androgen produced is testosterone. This hormone is responsible for the growth and maintenance of the male sexual characteristics and for sperm production

Thymus Gland
This is a gland in the mediastinum just beneath the sternum. It is large in children until puberty, when it begins to atrophy throughout adulthood. In old age the gland remains as a small amount of fat and fibrous tissue. It consists of two pyramidal lobes and each lobule is composed of a dense cellular cortex and an inner less dense medulla.

The thymus gland secretes the hormones thymosin and thymopoietin which are thought to stimulate the production of specialised lymphocytes called T lymphocytes necessary for cell mediated immunity.

Endocrine Disorders

The nervous and endocrine systems control most functions in the human body. Endocrine dysfunction may result from deficient or excessive hormone secretion, transport abnormalities, an inability of target tissue to respond to a hormone or inappropriate stimulation of the target tissue receptor.
You have studied some glands and their hormones in the preceding pages. You will now concentrate on the disorders affecting these glands.

The Hypothalamus
This is the mother gland and it controls the functions of most of the other glands. The disorders that can affect the hypothalamus are encephalitis, head injury, tumours in the brain and haematomas. Since it has many functions, the effects of disease on the hypothalamus will be varied. The effects include obesity, restlessness, disordered temperature regulation, diabetes insipidus and precocious puberty.
The nervous and endocrine systems control most functions in the human body. Endocrine dysfunction may result from deficient or excessive hormone secretion, transport abnormalities, an inability of target tissue to respond to a hormone or inappropriate stimulation of the target tissue receptor.
You have studied some glands and their hormones in the preceding pages. You will now concentrate on the disorders affecting these glands.

The Hypothalamus
This is the mother gland and it controls the functions of most of the other glands. The disorders that can affect the hypothalamus are encephalitis, head injury, tumours in the brain and haematomas. Since it has many functions, the effects of disease on the hypothalamus will be varied. The effects include obesity, restlessness, disordered temperature regulation, diabetes insipidus and precocious puberty.

The nervous and endocrine systems control most functions in the human body. Endocrine dysfunction may result from deficient or excessive hormone secretion, transport abnormalities, an inability of target tissue to respond to a hormone or inappropriate stimulation of the target tissue receptor.
You have studied some glands and their hormones in the preceding pages. You will now concentrate on the disorders affecting these glands.

Pituitary Disorders
If the posterior lobe of the pituitary is affected by either injury or disease, it can result in diabetes insipidus, which manifests with polyuria and polydipsia. The management will involve either surgery or hormone therapy. The most prominent disorders of the pituitary, however, are those that affect the anterior pituitary.

Disorders of the Anterior Pituitary Gland
This refers to the hyper-function of the pituitary. Excess of trophic hormones usually produce syndromes related to hormone excess from the target organ e.g if thyroid stimulating levels are excessive, hyperthyroidism develops while if adrenocorticotrophic hormone is involved, cushings diseases (hypercortisolism) results.

Enlargement of the anterior pituitary can lead to hyper-secretion of one or many of the hormones that we mentioned. When this happens, the function performed by the particular hormone is also affected. It can also lead to loss of temporal vision.

Hyperpituitarism
This is the hyper-function of the pituitary. It can result in:

- Excess prolactin, which leads to amenorrhoea and inappropriate secretion of breast milk. In males it leads to impotence.
- If it starts in childhood, hyperpituitarism can result in gigantism. When it occurs in adulthood it leads to acromegaly. In acromegaly individuals have enlarged hands, feet and lower jaw. They also have coarse facial features and impaired glucose tolerance. The clinical picture for somebody with this condition is typical and you are not likely to miss it if you are attentive.
- Cushing's syndrome, which you shall learn
  about later.

Since the hormones are many, several disorders can result which will vary the clinical picture.

Hypopituitarism
This is a rare disorder that involves a decrease in one or more of the anterior pituitary hormones. Primary hypofunction may be as a result of autoimmune disorders, infections, tumours, vascular diseases or destruction of the gland from trauma, radiation or surgical procedures but the most common cause is a tumour. This is the result of a deficiency of growth hormone, which produces retardation in children. Males may have testicular atrophy. Females will develop amenorrhoea.
Other effects include: decreased muscle strength, defective renal function, altered thyroid metabolism and reduced basal metabolic rate. Glucocorticoid and androgen abnormalities can occur.

Hyperaldosteronism
Excessive aldosterone leads to
hypernatraemia, hypertension and headache.

The treatment of hyperaldosteronism involves surgery, potassium supplements and sodium restriction. Nursing care involves assessing the patient and instituting interventions for hypokalaemia. These were covered under electrolyte imbalance. Maintenance therapy of the hormones may be given after adrenalectomy, that is, the removal of the adrenal gland.

Diabetes Insipidus and Syndrome of Inappropriate Secretion of Anti-diuretic Hormone (SIADH)

Diabetes insipidus results from a lack or a deficiency of ADH. The patient will present with polyuria and polydipsia, accompanied by hemoconcentration. It is managed by rehydration and electrolyte replacement.
On the other hand, SIADH is due to over-secretion of ADH and the patient presents with hemodilution, and decreased urinary output. These two conditions may be the result of an

injury or infection to the brain, pituitary and/or hypothalamus.
In SIADH the nursing interventions that you should put in place include:

- Restriction of fluid intake and maintenance of electrolyte balance
- Good positioning to enhance venous return
- Frequent patient turning to avoid dependent oedema leading to pressure ulcers
- Anti-seizure precautions because of the possibility of brain oedema and raised
  intracranial pressure
- Assistance with ambulation and provision
  of hygiene

The main goal of nursing intervention should be the restoration of fluid balance.
We have learnt that hyperfunction of the anterior pituitary may result in acromegally. This requires surgery to the pituitary gland. The pre and post-operative management will follow that of the patient undergoing intracranial surgery.
For the patient who undergoes surgery, hormone replacement therapy may be instituted afterwards. Radiation and drugs may be used to counter the effects of growth hormone. Meanwhile, treatment of hypopituitarism consists of surgery for tumour removal, permanent hormone replacement and a dietary plan to target nutritional deficiencies.

Adrenal Disorders

Adrenocortical insufficiency results in Addison's disease. This disease may be a result of an auto immune reaction or an infection which leads to hypofunction of the adrenal glands.

Addison's disease results in muscle weakness, loss of appetite and hypotension. The disease can be accelerated by stress and infections, resulting in what is referred to as Addison's crisis, which manifests as extreme weakness, severe hypotension, hypoglycemia, vomiting, diarrhoea and coma.

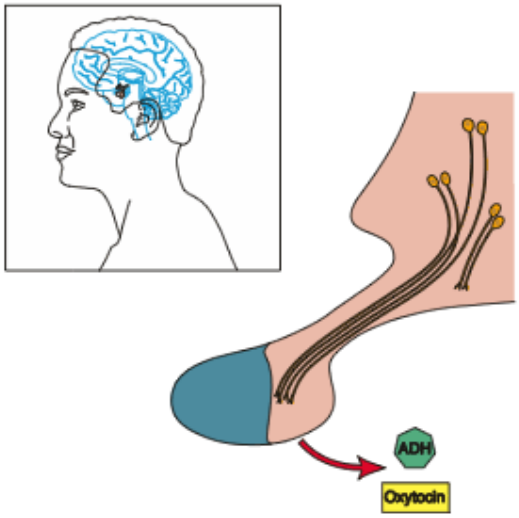
Care of the Adult with Addison's Crisis

The adult with Addison's crisis requires urgent assessment to ensure that the life-threatening manifestations such as hypoglycemia are managed. The main management will be supportive while investigations take place and, later, hormonal replacement may be considered.
When there is adrenal insufficiency, patients may receive steroid therapy. These steroids have some adverse effects.

General Management of Adrenocortical Insufficiency

You have learnt that adrenocortical insufficiency can result from the hypofunction of the gland, Addison's disease or the deficiency of corticosteroids and adrogens. When a patient with Addison's disease is hospitalised, vital signs and signs of fluid volume deficit should be monitored in addition to electrolyte imbalance. In addition, daily weights, diligent steroid administration, protection against exposure to infection and assistance with daily hygiene should be part of the management. This patient needs to be protected from noise, light and environmental temperature.

In the long term, the patient must learn about chronic use of steroids. The goals of nursing for this patient, therefore, should involve managing selfcare, relief of symptoms, adjusting medication to personal life situation, avoiding insufficiency and actively participating in the long-term treatment plan.


ADH
Oxytocin

For patients who have to undertake the long-term use of corticosteroids, interventions that are necessary include a diet high in protein, calcium and potassium but low in fat.
Other measures include:

- Sleep and rest and avoidance of caffeine
- Restriction of sodium and avoidance of oedema
- Blood sugar monitoring
- Frequent eye examination to avoid cataracts.
- General safety measures to avoid injury and good personal hygiene
- Activity to avoid muscle atrophy

Hypersecretion
Hypersecretion from the adrenal cortex can result in adrenogenital syndrome and Cushing's syndrome.
In adrenogenital syndrome, boys get premature (precocious) puberty and girls acquire male sexual characteristics.
If hypersecretion occurs in adulthood, women have musculinisation with atrophy of breasts and enlargement of the clitoris.

Cushing's Syndrome
Cushing's syndrome is a result of excessive corticosteroids, particularly glucocorticoids.

Clinical Features
The patient presents with several features which can be seen in most body parts. Glucocorticoids causes pronounced changes:

- Weight gain is the most common feature resulting from accumulation of adipose tissue in the trunk, face (main face) and cervical area (buffalo hump).
- Glucose intolerance because of cortisol induced insulin resistance and increased gluconeogenesis.
- Muscle wasting leading to muscle weakness especially in the extremities.
- Increased calcium resorption and inhibited collagen synthesis leads to pathological fractures, bone and back pain.

Clinical Features
Mineralocorticoids:

- In excess may cause hypertension
- In excess may cause acne and feminisation in men
- Menstruation disorders and impotence from adrenal carcinoma

Management of the Adult with Cushing's Syndrome

- Medications:
  This is required before surgery or radiation in cases where Cushing's syndrome results from pituitary tumor. Or in the case of inoperable pituitary or adrenal malignancies.

The aim is to control the symptoms and examples of drugs used include:

- Mitotane - Used in adrenal cancer directly suppresses activity of adrenal cortex
- Metyrapone or Ketoconazole (or both) inhibits cortisol synthesis
- Somatostatis (octreatide) suppresses ACTH secretion

Surgery

- Adrenalectomy is done if the disease is caused by adrenal cortex tumour (only one is usually involved)
- Bilateral adrenalectomy is done for an ACTH producing ectopic tumour
- Surgical removal of the pituitary gland is indicated if there is a pituitary disorder (Refer to nursing care of a patient after cranial surgery)

Care of the Adult with Cushing's Syndrome
You learned that Cushing's syndrome is a result of high corticosteroids secretion. This may result from prolonged administration of high doses of corticosteroids, ACTH secreting pituitary tumour, cortisol secreting tumour within the adrenal cortex and secretion of ACTH from carcinoma of the lungs.

Therapeutic management involves adrenal cortical adenoma, carcinoma or hyperplasia removal. Pre-operative or post-operative management will, therefore, be necessary. Administration of steroids may also be undertaken. The specific nursing management includes:

- Vital signs monitoring
- Taking and recording daily weights
- Monitoring for signs of infection, abdominal pain, thromboembolic phenomena, bone pain and arthritis
- Glucose monitoring

- Management of mental status especially depression

For the patient due for adrenalectomy, glucose and blood pressure monitoring is necessary. The patient requires a high protein meal before surgery. IV fluids, nasograstic suctioning, high doses of cortisone, close monitoring of vital functions are very critical in the immediate post-operative period. Always be alert for signs of glucocorticoid imbalance. Bed rest is important until blood pressure stabilises. Infection prevention should not be forgotten.

Thyroid Disorders

Thyroid disorders are manifested as hyperfunction (thyrotoxicosis), hypofunction, inflammation or enlargement. Two thyroid disorders are Goitre and Hyperthyroidism.

Goitre

This is an enlargement of the thyroid gland. It may be caused by a variety of factors, including hypofunction and tumours. Hypothyroidism, when occurring in infancy, can produce cretinism. Individuals with cretinism will have a vacant expression, protruding tongue and physical and mental retardation. The physical retardation is what we refer to as dwarfism. Myxoedema is the manifestation of hypothyroidism in adults. Patients have oedema of the skin, and a slowing down of mental and physical activity. There is normally intolerance to cold, muscle weakness, hoarse voice and weight gain.

Types of Goitre

- Simple goitre - There is no clear cause for enlargement of the thyroid which is usually smooth and soft.
- Multiple nodular goitre - Is the most common especially in older patients. It's the most common cause of tracheal and oesophageal compression and may cause laryngeal nerve palsy.
- Solitary nodular goitre (Plummers syndrome) - They are usually cystic or benign with a history of pain, rapid enlargement or associated lymph nodes.
- Fibroitic goitre (Riedel's thyroiditis) - Rare condition which is irregular and hard producing a 'woody' gland. It is often difficult to distinguish from carcinoma.
- Malignancy - It's a rare condition in the thyroid.

Causes:

- Hypertrophy caused by excess stimulation
- Growth stimulating immunoglobulins
- Goitrogens which inhibit synthesis of thyroid hormone only in individuals who live in an iodine deficient area

Clinical Features

- Majority are painless but pain or discomfort can occur in acute cases
- Diffuse or nodular goitre can cause dysphagia and difficulty in breathing, this may also result into oesophageal or tracheal compression

Investigations

- Thyroid function tests of thyroid stimulating hormone, thyroxine and thiodothyronine to determine whether a goitre is associated with hyperthyroidism, hypothyroidism or normal thyroid function.
- Chest and thoracic inlet x-rays to detect tracheal compression.
- Measurement of thyroid antibodies to assess for thyroiditis.
- Ultrasound to demonstrate whether the nodules are cystic or solid.
- Thyroid scan to determine whether the nodule is malignant.

Management

A goitre associated with normal thyroid function in pregnancy and puberty rarely requires intervention and patient needs to be reassured. Surgery to remove large goitres may be necessary.

Indications for Surgical Intervention

- The possibility of malignancy where there is a history of rapid growth, pain, cervical lymphadenopathy or previous irradiation.
- Pressure symptoms on the trachea.
- Cosmetic reasons.
- A large goitre may cause anxiety to the patient even if benign.

Aetiology and pathophysiology
Nearly 99% of all cases are caused by intrinsic thyroid disease and a pituitary cause is usually rare.
Graves disease (diffuse toxic goitre) is the most common cause and is due to autoimmune process. The patient develops antibodies that stimulate over production of thyroid hormones. Graves' disease is also characterised by remissions and exacerbations and if not treated it may progress to destruction of thyroid tissue causing hypothyroidism.

Clinical Features
In Grave's disease there is thyroid enlargement, increased metabolic rate, intolerance to heat and nervousness. Patients sweat profusely, there is atrial fibrillation, and loss of weight in the presence of a good appetite.

Nodular goitres which are characterised by small discrete autonomously functioning but not TSH dependent nodule that secretes thyroid hormone. If associated with signs of hyperthyroidism a nodule is termed toxic. Where there are multiple nodules they're called multinodular goitre or single nodule (uninodular goitre, thyroid adenoma).

Diagnosis
- Serum T4 and T3 are measured with immunoassay techniques and are elevated.
- T3 resin uptake (T3RU) is also elevated.
- Electrocardiogram (ECG) may show tachycardia, atrial fibrillation and alteration in R and T waves.
- In non pregnant and non lactating patients 24 hour radioactive iodine uptake may be done.

Toxic Nodular Goitre is more severe and patients have exophthalmos. Sometimes patients with thyrotoxicosis can also present with a thyroid crisis in which the symptoms are similar to those of thyrotoxicosis but more severe and acute.

Drug Therapy of Hyperthyroidism
The most commonly used drugs are:
- Antithyroid drugs like Thionamides, propylthiouracil (PTU) or carbimazole and methimazole (Tapazol). These drugs inhibit the synthesis of the thyroid hormones. Propylthiouracil also blocks the peripheral conversion of T4 to T3. Improvement usually begins one to two weeks after initiation of treatment. Therapy is continued for six months to two years.
- Iodine administered in large doses inhibits synthesis of active thyroid hormones and blocks the release of the hormone into circulation e.g solution of potassium iodide.
- B-adrenergic Blockers such as Propranol or Inderal is most frequently used. It relieves the symptoms of thyrotoxicosis, arrhythmias and hypertension.
- Also administer digoxin to prevent heart failure.
- If surgery is to be performed propylthiouracil with iodine therapy added for 10 days before surgery is recommended.
- Radioactive iodine-limits thyroid hormone secretions by damaging or destroying
  thyroid tissue.

Hyperthyroidism
This condition is also referred to as thyrotoxicosis (or thyroid overactivity). It is defined as sustained increased synthesis and release of thyroid hormones by the thyroid gland. It affects about 2-5% of all females between ages 20 and 40 years. It occurs as primary hyperthyroidism, also called Grave's disease, or as secondary hyperthyroidism, also called Toxic nodular Goitre.

Hypothyroidism Myxoedema
Is a disorder that results when the thyroid gland produces an insufficient amount of thyroid hormones. It is more common in women between ages 30 - 60 but the disorder can occur at any stage of life.

Types of Hypothyroidism
Hypothyroidism may be either primary or secondary.
Primary Hypothyroidism is more common and may be caused by:
- Congenital defects in the gland
- Loss of thyroid following treatment for hyperthyroidism with surgery or radiation
- Antithyroid medication
- Thyroiditis
- Endemic ion deficiency

Secondary Hypothyroidism may result from:

- Pituitary thyroid stimulating hormone deficiency
- Peripheral resistance to thyroid hormones

Pathophysiology
When the thyroid hormone production decreases, the thyroid gland enlarges in a compensatory attempt to produce more hormones. The goitre that results is usually a simple or non toxic form. People living in areas where the soil is deficient in iodine are ore prone to become hypothyroid.

Clinical Features
- Hypothyroidism affects all body systems
- Endocrine - goitre
- Neurological - Lethargy, confusion, slow speech and memory impairment
- Respiratory - Pleural effusion
- Cardiovascular - hypotension, body cardia, enlarged heart and anaemia
- Gastrointestinal - Constipation
- Musculoskeletal - Muscle stiffness, weakness, fatigue
- Reproductive - Menorrhagia (female), infertility (female), reduced libido (male)
- Integumentary - hair loss, brittle nails, coarse dry skin and non-pitting oedema
- Metabolic Processes - hypothermia, anorexia, weight gain, systemic oedema

Management of Hypothyroidism
Hypothyroidism is treated with an objective of restoring a normal metabolic rate. For this purpose, administration of the thyroid hormone (Levothyroxine, liotrix or thyroid extract) is one of the main treatment measures. At the time of administration, you must be on the lookout and observe for diuresis, exaggerated reflexes and high pulse rate. In severe hypothyroidism, you should endeavour to maintain vital functions through monitoring blood gases, assisted ventilation, monitoring fluid intake, replacement of the thyroid hormone and treating the precipitating factors.
Hospitalising the patient if they are in thyroid storm/crisis, administering sedatives and giving vitamin supplements can be used in the management of hyperthyroidism. Other drugs administered are digoxin for heart failure and propranolol (inderal) for arrhythmias and hypertension. Anti-thyroid drugs, including methimazole (Topazol) and Propylthiouracil, are also given.

Management of Hyperthyroidism
The patient is nursed using the nursing process. The therapeutic goals are to block the adverse effects of thyroid hormones and stop their over secretion. The choice of treatment is influenced by the patient's age, severity of the disorder, complicating features and patients preferences. Management involves drug therapy with antithyroid medication, use of B-adrenergic blockers, radioactive iodine and subtotal thyroidectomy

Drug Therapy of Hyperthyroidism
The most commonly used drugs are:
- Antithyroid drugs like Thionamides, propylthiouracil (PTU) or carbimazole and methimazole (Tapazol). These drugs inhibit the synthesis of the thyroid hormones. Propylthiouracil also blocks the peripheral conversion of T4 to T3. Improvement usually begins one to two weeks after initiation of treatment. Therapy is continued for six months to two years.
- Iodine administered in large doses inhibits synthesis of active thyroid hormones and blocks the release of the hormone into circulation e.g solution of potassium iodide.
- B-adrenergic Blockers such as Propranol or Inderal is most frequently used. It relieves the symptoms of thyrotoxicosis, arrhythmias and hypertension.
- Also administer digoxin to prevent heart failure.
- If surgery is to be performed propylthiouracil with iodine therapy added for 10 days before surgery is recommended.
- Radioactive iodine-limits thyroid hormone secretions by damaging or destroying thyroid tissue.

Nutritional Therapy
- High caloric diet of 4000 to 5000kcal per day to satisfy hunger and prevent tissue breakdown.
- Protein allowed in a meal should be 1 to 2g/kg of ideal body weight.
- Increased carbohydrate is required to compensate for disturbed metabolism, provide energy and spare protein.

Nutritional Therapy
- High seasoned and high fibre diet should be avoided because it stimulates the already hyperactive gastrointestinal

tract. Subtotal thyroidectomy should be performed only in patients who have been previously on medication. Antithyroid drug is stopped 10-14 days before operation and instead patient is given potassium iodide 100mg three times daily. This reduces the vascularity of the gland.

Particular indications for surgery:

- Patients choice
- A large goiter unlikely to respond to antithyroid medication

Indications for either surgery or radioactive treatment are:

- Persistent drug side effects
- Poor compliance with drug therapy
- Recurrent hyperthyroidism after drugs

Management of Thyroid Disorders

Once there is indication for surgery the patient must be adequately prepared pre-operatively to avoid post-operative complications.

All patients with hyperthyroid states require a calm and quiet environment. You will now look at the care of the adult undergoing thyroidectomy.

Care of the Patient Undergoing Thyroidectomy

The following steps should be taken when providing pre-operative care:

- Provide a restful, quiet environment.
- Regulate nutritional intake, that is, food should be high in carbohydrate and protein.
- Support the patient during investigations.
- Prepare the patient for surgery by sharing information, giving instructions on what to expect, consent and pre-medication.
- Signs and symptoms of thyrotoxicosis must be alleviated and cardiac problems must be controlled.
- The patient must be assessed for signs such as swelling of buccal mucousa and other mucous membranes, excessive salivation, nausea and vomiting and skin reactions. If toxicity occurs iodine administration should be discounted and doctor notified.
- Pre-operative teaching should include comfort and safety measures. Coughing and deep breathing exercises should be practiced including how to support the neck manually while turning in bed because this minimises stress on the suture line after surgery and exercises of the neck.

Post-operatively

When providing post-operative care for the patient who has undergone a thyroidectomy, you should ensure that you:

- Oxygen, suction equipment and a tracheostomy tray are readily available in case airway obstruction occurs. Place patient in Fowler's position and support head with pillows

Post-operatively

- Assess patient every two hours for 24 hours for signs of haemorrhage or tracheal compression e.g. irregular breathing, neck swelling, blood on the anterior and posterior dressing.
- Monitor vital signs temperature, pulse, respiration and blood pressure
- Check for signs of tetany secondary to hypothyroidism e.g. tingling in toes, fingers or around mouth, muscular twitching.
- Ensure control of postoperative pain by giving medications.
- Reassure the patient that some hoarseness is expected for three to four days after surgery because of oedema.
- Neck exercises should be performed three or four times daily to promote comfort and return of full range of motion.
- Fluids are administered as soon as the patient can tolerate them and soft diet is introduced by the second day.
- If the patient progresses well post-operatively ambulation is encouraged on the first day.

Complications include:

- Thyrotoxicosis crisis (thyroid storm) which is an acute but rare condition in which all the hyperthyroid manifestation are worsened and may include severe tachycardia, heart failure, hyperthermia, restlessness.
- Recurrent laryngeal nerve damage which may lead to vocal card paralysis.
- Difficulty in breathing due to swelling of neck tissues, haemorrhage, haematoma formation.

- Laryngeal stridor (harsh vibratory sound) may occur during respiration due to tetany from damaged or removal of parathyroid.
- Early post-operative bleeding
- Recurrent hyperthyroidism occurs in 1-3% within one year and then 1% per year
- Hypothyroidism occurs in about 10% of patients within one year.

Parathyroid Disorders

Hyperparathyroidism

This involves secretion of increased levels of parathyroid hormone. We have learnt that this hormone is involved in calcium metabolism. The objective of management is to relieve symptoms and prevent complications. The choice of therapy depends on the urgency of the problem, the degree of hypercalcemia, the underlying disorder, the status of renal and hepatic function, the patient's clinical presentation and the merits of each mode of treatment.

In severe cases, surgery is performed. In less acute cases, conservative management involving close monitoring, high fluid, and moderate calcium, sodium, and phosphorous supplementation are choice actions. Diuretics may also be administered. Diuretic medication will act on the kidney to cause fluid loss and hence lower the possibility of kidney stone formation. One of the drugs used as a diuretic is Frusemide (e.g. lasix). Some drugs, for example, mithramycin lower serum calcium. Oestrogen therapy for post-menopausal women can also be helpful. Strict monitoring of intake and output and levels of calcium, potassium and phosphate are necessary.

Hypoparathyroidism

In hypoparathyrodism, the main objectives of treatment are to treat tetany when present and prevent long-term complications of low calcium levels in plasma. IV calcium gluconate and vitamin D are used in this case.
Digitalisation and the use of side rails are important nursing alerts to prevent cardiac arrest and falls during tetany. Anti-seizure precautions should be instituted.

Diabetes Mellitus

You learnt that insulin is a hormone involved in glucose metabolism. The other hormones involved in glucose metabolism are glucagon, adrenaline, growth hormone and somatotrophin. Try to remember them and their functions.
Diabetes mellitus can be divided into:

- Type I or Insulin Dependent Diabetes Mellitus (IDDM).
- Type II or Non-insulin Dependent Diabetes Mellitus (NIDDM).
- Type III, due to excessive corticosteroids, for example in Cushing's syndrome or over enthusiastic treatment of addison's disease with corticosteroids
- Type IV, also called gestational diabetes. It's due to the presence of a hormone called human placental lactogen, which antagonises the effects of insulin.

Management of Diabetes Mellitus

In the management of diabetes mellitus, the goals are:

- Maintenance of as near-normal blood glucose level as possible
- Achievement of optimal serum lipids
- Provision of adequate calories for attaining reasonable weight
- Prevention and treatment of complications
- Avoidance of hypoglycaemia

The three modalities utilised in the management are drugs, including insulin and oral hypoglycaemic drugs such as diabenese, diet and exercise. These three have to be well balanced to avoid complications. Patient education is also important to decrease complications. Patients require education, which cover medication, injection sites, use of foods, blood glucose monitoring, exercise and activity home management and lifestyle improvement.
Both short-term and long-term complications may arise. Short-term complications include hyperglycemia, hypoglycaemia, ulcers, and coma, while long-term effects are nephropathies (kidney involvement), neuropathies (involvement of the nervous system) and visual problems.
Administering oxygen, establishing IV access, determining blood sugar levels and monitoring vital signs manage Ketoacidosis. IV glucose and glucagon can also be administered as necessary.
Hyperosmolar nonketosis is treated with IV fluids and insulin. Electrolyte and vital signs are then

closely monitored. Micro-vascular complications are best treated by preventive measures. Care of the eyes, care of the feet and avoiding injurious substances to the kidney will improve the patient's life.

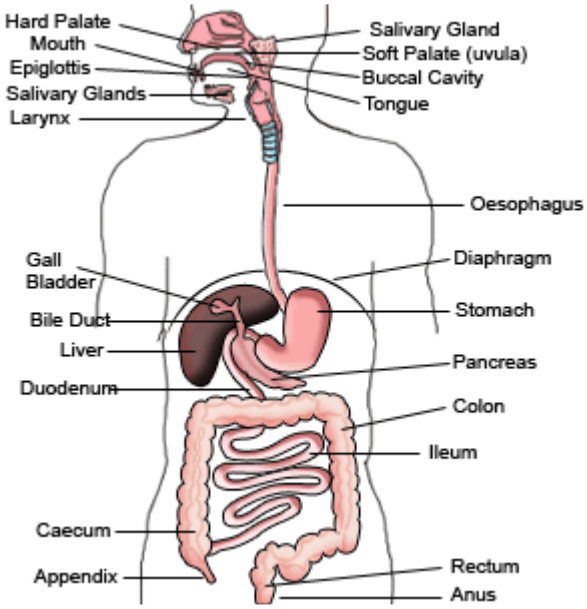
Type I Diabetes
This type of diabetes has no clearly known cause. It is thought that some individuals have antibodies against cells producing insulin. It is also thought that hypersensitivity reactions may destroy the part of the pancreas involved in secretion of the hormones (the Islets of Langerhans). In this disorder, patients do not produce their own insulin. Hyperglycemia, ketoacidosis, polyuria and polydipsia, and loss of weight are characteristic manifestations.

Type II Diabetes
Individuals with Type II diabetes have insulin, which may be low, normal or high, but they may have insulin resistance. In Type II diabetes, there is glycosuria (sugar in urine) and hyperglycaemia. It can complicate with hyperosmolar non-ketosis with or without coma, susceptibility to infection, vascular, renal and ophthalmic disorders. Some of the patients with Type II diabetes may be obese. Type II diabetic patients can generally be well managed throughout their lives

SECTION 4:DIGESTIVE SYSTEM

Introduction
This section is about the structure and function of the digestive system. This system consists of the gastrointestinal tract and accessory organs of digestion which include the liver, gall bladder and pancreas.
The management of adults with disorders of the digestive system and associated organs will also be covered.

The Digestive System



Objectives
At the end of this section you will be able to:

- Describe the structure and function of the digestive system
- Describe the function of the accessory structures of digestion
- Describe food metabolism
- Describe the disorders of the digestive organs and associated organs
- Utilise the nursing process in the management of adults with disorders of the digestive system and associated organs

The Gastrointestinal Tract
The gastrointestinal tract is a long tubular structure, which starts at the mouth and ends at the anus. The walls of the tract from the oesophagus onwards form four layers of tissues. The layers are the adventitia or outer covering, muscle layer, submucous layer, and mucous membrane lining. The tract is well supplied with nerves and blood vessels.

The Mouth
This is also called the oral cavity. Food taken in is chewed and mixed with saliva that contains the enzyme amylase (ptyalin). The tongue, which performs taste functions, turns the food in

the mouth that is called mastication and also assists in swallowing.
The pharynx is also involved in food swallowing before the food moves into the oesophagus

The Pharynx
This is a tube like passageway about 12-14cm that connects the mouth and oesophagus and is important in swallowing.
As food and fluids pass through the pharynx into the oesophagus the trachea is closed by the epiglottis to prevent aspiration into the lungs.

The Oesophagus
This is a pliable muscular structure approximately 25cm long that extends from the pharynx to the cardiac end of the stomach. Swallowed food is propelled to the stomach by peristalsis (sequential contraction and relaxation of outer longitudinal and inner circulation layers of muscles). It is the presence of food in the pharynx which triggers peristalsis.
The oesophagus has a lower sphincter, which prevents regurgitation of food. Food is also prevented from regurgitating by the acute angle of attachment of the stomach to the oesophagus via the diaphragm, and increased muscle tone of the oesophageal sphincter.

The Stomach
The stomach is a dilated pouch, which occupies the upper abdomen, and lies slightly to the left. It consists of a fundus, body and antrum. At the lower end, the stomach has a sphincter called the pylorus. There are special secretor glands on the walls of the stomach, which secrete gastric juice. This juice contains enzymes, hydrochloric acid, intrinsic factor, mucous, water and mineral salts. The Intrinsic factor is a protein essential for absorption of vitamin B12 which is essential for erythropoiesis (RBC formation). In the stomach a gastric hormone is also manufactured and this hormone regulates enzyme production to facilitate digestion.

Functions of the Stomach
- Temporary reservoir
- Production of gastric juice
- Absorbing water, vitamins and alcohol
- Moving the food into the next point in the digestion process, which is the intestine

To be able to understand the functions of the stomach in more detail, read further on gastric motility, gastric emptying and gastric secretion.

Functions of the Gastric Juice
- Liquifying of food by the water
- Digestion, where hydrochloric acid acidifies the food and stops action of ptyalin that comes with saliva, kills micro-organisms and provides an environment for digestion of proteins by the pepsin
- Assisting in absorption of vitamin B12 through intrinsic factor
- Mucus, which prevents autodigestion by the hydrochloric acid
- Lubricating the contents

The Small Intestines
This is a tube about 5m long, which is divided into three parts: the duodenum, at which the pancreatic duct and common bile duct open, the jejunum which is the middle part, and the ileum. The intestines have four layers as you saw earlier.
The mucous membrane has folds and finger-like projections called the villi. These increase the surface area for absorption. This part of the GastroIntestinal Tract (GIT) is involved in continuing the movement of the food as it gets absorbed. Digestion (the actual chemical breakdown of food) also takes place here, as does the secretion of certain hormones. These hormones are cholecystokinin, pancreozymin and secretin.

The Large Intestines
The small intestine gives way to the large intestine, that is, the colon, the rectum and anal canal. The colon is divided into the caecum, ascending colon, transverse colon, descending colon and sigmoid colon. From the caecum is the blind-ended tube, the appendix, which has no known function. The rectum and anus are the distal ends of the gastrointestinal tracts. The anus has an internal sphincter, which is under autonomic nervous control, and the external sphincter, which is under voluntary control.

Functions of the Large Intestines
- **Absorption**
  An important function of the large intestine is absorption of water and electrolytes e.g. potassium. Absorption of water continues until the familiar semisolid consistency of fences is achieved. Other substances which are also absorbed into the blood capillaries from the large intestine are mineral salts, vitamins and some drugs.

- **Microbial activity**
  There are micro-organisms which colonise the large intestine and they synthesise vitamin K and folic acid. Examples are Escherichia coli, enterobacter aerogenes, streptococcus faecalis and clostridium perfringens. The micro-organisms also breakdown proteins which were not digested in the small intestines and amino acids which are produced are deaminated and ammonia is transported to the liver for conversion into urea.

- **Mass movement**
  At fairly long intervals (about twice an hour) a strong peristaltic wave sweeps along the transverse colon forcing contents into the descending and sigmoid colons. This mass movement is often precipitated by entry of food into the stomach. This combination of stimulus and response is what is referred to as the gastrocolic reflex.

Associated Structures of the GIT

The associated structures of the digestive tract include the liver, the gall bladder (which is also called the biliary tract) and the pancreas.

The Liver

The liver is the heaviest internal organ in the human body weighing between 1200gm to 1600gm in an adult. It is located under the right diaphragm. It occupies the greater part of the right hypochondriac region, part of the epigastric region and extends into the left hypogastric region.

Most of the liver is enclosed in the peritoneum and has a fibrous capsule, which divides it into the right and left lobes. These are further subdivided into lobules that are composed of rows of hepatic cells. There are sinusoids or capillaries that are located between the rows of cells.

Phagocytic cells called Kupffer cells, which perform phagocytosis of bacteria and toxins, line these sinusoids. There are also bile ducts formed from bile capillaries (the canaliculi), which carry bile secreted by hepatic cells. Blood supply to the liver is by the portal circulatory system.

Functions of the Liver

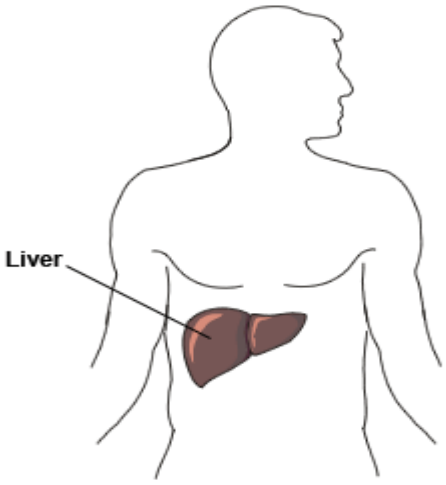
- Carbohydrate metabolism - the main function of the liver in carbohydrate metabolism is maintenance of blood glucose concentration. This involves conversion of glucose to glycogen in the presence of insulin and converting liver glycogen back to glucose in the presence of glucagons.
- Protein metabolism - In deamination of amino acids, the nitrogen portion is removed and this amino acid breakdown leads to formation of urea, synthesis of plasma proteins and non essential amino acids. Most of the blood clotting factors occur in the liver.
- Mononuclear phagocyte functions - This is carried out by Kupffer cells which line the sinusoids and the breakdown of erythrocytes and phagocytosis of microbes occur.

When haemoglobin is broken down, bilirubin is formed. Since it is insoluble in water, it is bound to albumin for easy transport to the liver. In this form it is called unconjugated bilirubin. It is then conjugated with glucuronic acid to make it soluble (conjugated) and excreted in bile. The bile contains water, cholesterol, bile salts, pigments and other substances. This bile enters the intestines. Most bilirubin is broken down to stercobilinogen and excreted in faeces. This gives stool its brown colour and characteristic odour. Some small amounts of bilirubin are excreted in urine and the rest is reabsorbed to go back to the liver and begin the process all over. If there is a problem in the excretion of bilirubin, then it may get to the skin and mucous membranes and give a yellow colour. .

- Fat metabolism: Fat is desaturated and converted to a form that can be used by the tissues to provide energy
- Production of heat
- Detoxification of drugs and noxious substances
- Inactivation of hormones such as insulin, glucagon, cortisol, aldosterone, thyroid and sex hormones
- Synthesis of vitamin A from carotene
- Secretion of bile
- Storage of vitamins and ions. Fat soluble vitamins stored in liver are A,D,E,K
  Water soluble vitamins include riboflavin, niacin, pyridoxine, folic acid

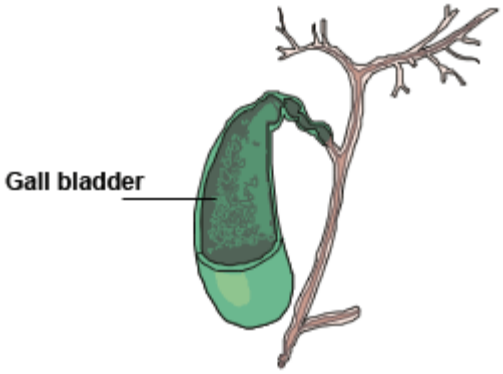
and vitamin B12, Ions are ions and copper

- Metabolism of ethanol



The Gall Bladder

The gall bladder and its duct system are called the biliary tract. This is a sac located below the liver. Its function is to concentrate the bile produced by the liver and store it. The ducts begin right from the liver where the inner lobular ducts unite to form the two main right and left hepatic ducts. These also join with the cystic duct from the gall bladder to form the common bile duct that finally enters the duodenum. A sphincter keeps the entry point closed except when stimulated by food present in the gastrointestinal tract. The functions of the gall bladder include storage of bile, adding mucous to bile, concentrating bile and, by contraction, expelling bile.



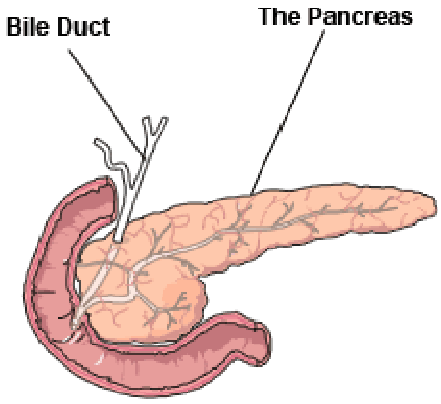
The Pancreas

The pancreas is a long slender organ that is about 12 to 5cm long. The head of the pancreas is tucked into the curve of the duodenum and its tail touches the spleen. It is divided into lobes and lobules. The pancreas has both exocrine and endocrine functions. By exocrine action, pancreatic enzymes are released to aid in digestion, and by endocrine action the cells of Islets of Langerhans secrete insulin, glucagon and somatostatin hormones. These are hormones you have already learnt about. The pancreatic duct extends the whole length of the pancreas and opens into the duodenum. However, before it opens into the duodenum, it joins the common bile duct to form the Ampulla of the bile duct.

Remember:

The pancreas has the function of producing the pancreatic juice, which aids in the digestion of carbohydrates, proteins and fats.

Some of the pancreatic enzymes include chymotrypsin, peptidase, pancreatic amylase and lipase. Having studied the various structures involved in digestion, you shall now proceed to look at the process of food metabolism.



Food Metabolism

You are now going to look at the process of food metabolism by summarising the process of digestion, absorption and utilisation of various food nutrients.

Carbohydrates

The digestion of carbohydrates begins in the mouth where salivary amylase converts cooked starch into disaccharides. In the stomach, the hydrochloric acid in the gastric juice stops the action of the salivary amylase. In the small intestines, pancreatic juice, which contains amylase, sucrase, maltase and lactase, completes the digestion from disaccharides to monosacharides, mainly glucose. Glucose is absorbed into capillaries of the villi and transported to the portal circulation to the liver. Insulin and glucagon are involved in the utilisation and storage of glucose.

Carbohydrates are broken down by use of oxygen in aerobic oxidation to liberate energy. In the absence of oxygen, anaerobic respiration takes place. The energy liberated is in the form of Adenosine Triphosphate (ATP). Molecules in the form of lactic acid can also be produced in anaerobic oxidation. The other products include carbon dioxide and water. Excess glucose is stored as fat, or glycogen in the liver.

Proteins

Protein digestion begins in the stomach where hydrochloric acid in gastric juice works on pepsinogen to make pepsin, which in turn converts all proteins to smaller molecules, the polypeptides. Then trypsin and chymotrypsin from the pancreatic juice reduce the polypeptides further to dipeptides and tripeptides.

In the small intestines, peptidase converts these into amino acids, which are absorbed and transported to the liver. In the liver the amino acids form albumin, globulin, prothrombin and fibrinogen. You may remember that some of these are utilised in the clotting of blood. Amino acids also aid in cell repair and replacement, production of hormones, enzymes, and antibodies. Deamination is done in the liver to produce urea, which is excreted in urine. Proteins can also provide energy when there is starvation or be deposited as fats after conversion.

Fat

Digestion of fat begins in the small intestines where bile salts emulsify fats and pancreatic juice converts fats to fatty acids and glycerol. The digestion is completed in the small intestines.
Fatty acids and glycerol are absorbed and transported to the liver. They can be broken down to produce energy, carbon dioxide and water, or stored. In the process of fat breakdown, ketone bodies are produced which can be excreted in urine or expired in air. An example of a ketone body is acetone.
Fat can also be synthesised from carbohydrates and proteins for storage purposes.

Vitamins and Minerals

Vitamins and minerals form the coenzymes that are so important in chemical reactions. Deficiency of vitamins leads to many nutritional diseases which include: scurvy, rickets, and pellagra.

Minerals make up the electrolytes which were mentioned at the beginning of this unit.

Disorders of the Gastrointestinal Tract

Disorders of the Gastrointestinal Tract include disorders of the mouth, oesophagus, stomach, small and large intestines, liver, gall bladder and the pancreas. You will also read about management and care of patients who suffer from these disorders.

Disorders of the Mouth

The mouth is the first port of call for food in the body. In the mouth, various disorders can give patients problems. The most common mouth disorder is dental caries. This is destruction of the teeth by bacteria and their products. The process starts with the enamel, and as it progresses, toothache ensues.

Bacterial and fungal infections also affect the mouth. Oral thrush (candidiasis) commonly affects children and immuno-compromised clients. Disorders of the oral cavity are better off prevented. Good oral hygiene is recommended for all individuals. Antifungal medication and betadine gargles are used in the treatment of mouth infections.

Cancer of the oral cavity occurs predominantly in persons with a history of alcohol abuse and smoking. It presents with alteration in taste and later pain.

On examination, the patient will have white patches on the oral mucosa, ulcers and bleeding.

The management includes surgery, radiation and proper nutrition. As the condition proceeds, the patient may require maintenance of a patent airway, fluid, electrolyte and nutrition balance. Frequent saline mouthwash is necessary to relief the dryness. Cysts and other tumours of the oral cavity are also common. These may require the same management.

Disorders of the Oesophagus

There are several disorders that may occur in the oesophagus.

Oesophagitis

Oesophagitis is the inflammation of the oesophagus. It is caused by chemical injury, infections and trauma. Consuming hot and spicy food can cause the injury. Oesophagitis is also caused by reflux of gastric contents. It manifests with heartburn and pain, which is retro-sternal and radiates to the shoulder and the back.

A patient who has oesophagitis would require treatment of the underlying cause, use of antacids and avoidance of foods and substances which can cause limitation. In severe cases, surgery may be undertaken.

General Care of the Adult with Oesophageal Diseases

One of the most common disorders is gastro-oesophageal reflux disease. The measures necessary to prevent reflux are:

- Eating small frequent meals that are high in protein and low in fat
- The patient should not lie down immediately after eating and should elevate the head of the bed
- Avoidance of alcohol, smoking and beverages that contain caffeine. These beverages can weaken the lower sphincter and hence contribute to reflux

The conservative management includes the above measures in addition to antacids, cholinergic and other drugs that act on the lower oesophageal sphincter to make it firmer. Surgery is always used as a last resort.

Hiatus Hernia

Some individuals have the stomach herniating through the diaphragm into the thoracic cavity. This is referred to as hiatus hernia. The hiatus hernia results in reflux of gastric contents and symptoms like those of oesophagitis will ensue. Congenitally weak muscles, obesity, pregnancy, tight fitting clothes and other conditions that raise the intra abdominal pressure contribute to it. Hiatus hernia leads to gastro-oesophageal reflux disease and the management will entail the same measures. The patient should also avoid constricting clothes and heavy lifting.

Carcinoma of the Oesophagus

Carcinoma of the oesophagus is usually squamous cell carcinoma .It can occur at any level of the oesophageal tract but are most common at the gastro esophageal junction The pathogenesis of oesophageal carcinoma is facilitated by:

- Alterations of oesophageal structure and function that permit food and drink to remain in the oesophagus for prolonged periods.
- Ulceration and metaplasia caused by oesophageal reflux.
- Chronic exposure to irritants such as alcohol and tobacco.

Risk Factors

- Tobacco use
- Alcoholism
- Dietary deficiencies of trace elements and malnutrition associated with poor economic conditions
- Reflux oesophagitis
- Sliding hiatal hernia

Clinical Manifestations

- Chest pain
- Dysphagia - This usually progresses rapidly and swallowing is mostly painless during early stages of oesophageal carcinoma. Initially, dysphagia starts with solid food and eventually with the fluids. This is then followed by a feeling of a lump in the throat, painful swallowing substernal pain or fullness and later regurgitation of undigested food with foul breath and hiccoughs.

Diagnosis

This is done by oesophagoscopy with biopsy.

Management

Treatment includes surgery, radiation and chemotherapy.

The patient may be treated by surgical excision of the lesion, radiation or both. Surgery is preferred for lower esophageal tumours whereas irradiation is favoured for upper esophageal lesions.

General Care of the Adult with Oesophageal Diseases

Cancer of the oesophagus (Ca oesophagus) is one of the disorders that you are likely to meet in your practice. Depending on the stage at which it is discovered, the management modalities include: radiation, gastrostomy and simple palliative measures such as dilatation. Gastrostomy is the creation of a stoma into the stomach to assist in delivery of nutrients to the patient. In patients undergoing surgery of the oesophagus, there are several nursing actions that are necessary. They include:

- Maintenance of a patent airway
- Monitoring vital functions
- Providing oral care
- Maintaining nutritional status by providing total parental nutrition, tube feedings, and vitamin and mineral supplements
- Those with severe oesophageal disease may also require these actions, even if they have not undergone surgery

Prognosis

Mortality among patients with cancer of the esophagus is high owing to three factors:

1. The patient is an older person usually with other disorders e.g. cardiovascular and pulmonary disorders.
2. Symptoms are more evident when the tumour has invaded surrounding structures.
3. The unique relation of the oesophagus to the heart and lungs makes the organs easily accessible to extension of the tumor.

Diverticuli

These are pouches on the wall of the GIT, which occur as a result of weakness of the muscles. The diverticuli make the patient feel as if the food is sticking in the Oesophagus. They may also contribute to the development of cancer of the oesophagus.

Patients with diverticular disease need to be given blended foods. Surgery may also be indicated and these patients would require pre and post-operative management. Generally pre and post-operative care is the same in most cases.

Gastritis

Gastritis is an inflammatory disorder of the gastric mucosa. This is the mucosa that protects the stomach from the actions of the hydrochloric acid.

Acute gastritis is the irritation of the gastric mucosa by alcohol, bacterial toxins, or acids. The surface epithelium is eroded in a diffuse or localised pattern and erosions are usually superficial. These acids may be hydrochloric acid or from drugs such as aspirin. Antinflammatory drugs cause gastritis perhaps because they inhibit prostaglandins which normally stimulate the secretion of mucous. The onset is insidious and patients begin vomiting with haematemesis and bleeding, if the disease is severe. Normally, the disease is self limiting.

Chronic gastritis on the other hand involves the atrophy of the epithelium in the stomach. This results in less hydrochloric acid being

produced. The atrophy may be caused by chronic alcoholism or autoantibodies. This disorder produces pernicious anaemia. This is because the production of intrinsic factor is affected. Hence the absorption of vitamin B12 is affected. The condition also predisposes to gastric ulceration and cancer of the stomach. Clinical manifestations of chronic gastritis include vague abdominal discomfort, epigastric tenderness and bleeding. The management involves removal of the predisposing factors by educating patients on foods and drinks that they should avoid. If severe, surgery may be performed to bypass the diseased area, and deliver nutrients directly into the small intestines.

Peptic Ulcers

A peptic ulcer is a break/ulceration in the protective mucosal lining of the lower oesophagus, stomach or duodenum. This term encompasses both gastric and duodenal ulcers. Peptic ulcers occur in those areas of the GI tract exposed to HCL acid and the proteolytic enzyme (pepsin).

These can occur in any area of the gastrointestinal tract. They are associated with acid pepsin secretions. The ulcers can occur in the oesophagus, stomach or any part of the intestines particularly the duodenum. May be you have heard of such terms as gastric ulcers, duodenal ulcers and Zollinger-Ellison syndrome.

Risk factors for peptic ulcer

- Smoking
- Habitual use of non steroidal anti-inflammatory drugs
- Alcohol
- Chronic diseases
- Infections of the gastric and duodenal mucosa and helicobacter pylori

The predisposing factors to peptic ulceration are related to imbalance between acid and pepsin production, and the mucosal barrier. Destruction of the mucosal barrier leads to ulceration. Increased acid-pepsin production is associated with increased numbers of acid producing cells and increased sensitivity of parietal cells to stimuli like alcohol, caffeine and so on.

Lack of gastric secretion inhibition and excessive stimulation of the vagus nerve are also associated with increased stimulation. A gastrin secreting tumour of the pancreas causes the Zollinger-Ellison syndrome. Once the gastric juice is produced, it affects the gastric mucosal barrier. The bacteria Helicobacter Pylori has also been associated with peptic ulceration in the stomach. It is thought that once ulceration occurs, the bacteria colonise the ulcer and make the healing process difficult.

Zollinger-Ellison Syndrome

This is a rare condition caused by a gastric secreting tumour. Gastric acid secretion reaches such levels that ulceration becomes inevitable. The increased gastric secretions cause symptoms related to peptic ulcer. Diarrhoea may result from hypersecretion or from inactivation of intestinal lipase and impaired fat digestion. Diagnosis is based on elevated serum gastric levels.

Proton pump inhibitors are used to control gastric acid secretions.

Uncomplicated peptic ulcer manifests with discomfort and pain, which occurs when the stomach is empty. The pain is at the epigastrium and radiates to the back. Patients can also pass loose tarry stools. The ulcer can complicate with haemorrhage, intestinal obstruction and perforation. You will now learn how to manage this disorder.

Types of Peptic Ulcer

Oesophageal Peptic Ulcers

These are erosions or ulcerations of oesophageal mucosa which can occur in patients with reflux oesophagitis. Presence of an incompetent lower oesophageal sphincter or hiatal hernia predispose to reflux of acidic gastric contents into the lower portion of the oesophagus, which then causes the erosion.

Clinical Manifestations

- Heart burn
- Epigastric distress that may radiate to the back or lower abdomen
- Oesophageal structure (due to recurrent oesphagitis and replacement of mucosa with scar tissue

Gastric Ulcers

They can develop on any part of the stomach and occur about equally in males and females. Patients with gastric ulcers are generally older than patients with duodenal ulcers.

Pathophysiology

Gastric ulcers frequently develop in the antrum of the stomach and usually the ulcer is round or oval shaped and has the appearance of a

punched-out cavity with an inflammatory base. The primary defect is usually an abnormality that increases the mucosal barrier permeability to hydrogen ions.

Pathophysiology

Other factors in the causation of gastric ulcers include:-

- Duodenal reflux of bile
- Use of ulcerogenic drugs
- Decreased mucosal synthesis of prostaglandins.
- Chronic gastritis

Duodenal Ulcers

Ulcers involving the duodenum are common than gastric ulcers. Duodenal ulcers are characteristically deep, penetrating through the submucosal layers of the intestinal wall. Duodenal ulcers tend to develop in younger persons and in persons with type O blood.

Pathophysiology

These ulcers may result from increased gastric acid secretion, defective duodenal alkalinisation or decreased resistance of the duodenal mucosa to acid.
Stress with its activation of the autonomic nervous system and increase in acid secretion may aggravate ulcer disease or encourage ulcer development. Other factors associated with duodenal ulcer disease include cigarette smoking, cirrhosis and chronic renal failure.

Clinical Manifestations of Peptic Ulcers

- Epigastric pain which may radiate to the lower abdomen, sternum or back.
- Pain follows a pain-food-relief cycle (food relieves the pain by buffering HCL).
- Pain occurs one to three hours after a meal and is relieved by food or antacid.
- Pain associated with gastric ulcers located high in the epigastrium and occurs spontaneously about one to two hours after a meal.

If the ulcer has eroded through the gastric mucosa food tends to aggravate rather than alleviate the pain.
In duodenal ulcers the pain usually occurs two to four hrs after meals and is relieved by antacids and foods that neutralise and dilute HCL acid.

Complications of Peptic Ulcer

- Intractability
- Haemorrhage
- Perforation
- Stenosis and obstruction

Diagnosis of Peptic Ulcer

This is done by endoscopy and barium studies.

Caring for the Adult with Peptic Ulcers

When planning care for the patient with peptic ulceration, the goals of care should include:

- Reduction of pain and discomfort
- Reduction in complications
- Complete healing of the peptic ulcer
- Changes in the lifestyle which led to the ulcer
- Compliance with management regime

It was mentioned earlier that peptic ulcers might affect any part of the gut. The care of patients suffering from peptic ulcers involves first investigating and ascertaining that the patient has peptic ulceration.
Conservative management is done by giving the patient adequate bed rest, a bland diet of six small meals a day and stress reduction. The patient should cease smoking. They will also be given drugs that will protect the ulcer, neutralise the acid, or decrease the production of acid. The drugs are antacids, H2 receptor blocking agents, anticholinergics, cytoprotective drugs, sodium-potassium ATPase inhibitors and misoprostol. Do not worry about the names of the dugs. You may be more familiar with their proprietary names.

The patient with acute exacerbation and no accompanying complications requires nil per oral. They also requires naso-gastric suction and bed rest to moderate light activity. They should receive IV fluids, medication and sedation.

Drug Therapy

1. Antacids - they decrease gastric acidity and acid content of chyme reaching the duodenum.
2. Histamin H2 - receptor antagonists. These include cimetidine (tagamet), ranitidine (zantac), famotidine (pepcid) and nizatidine (axid). These drugs block the action of histamine on the H2 receptors and this reduce HCL secretion and accelerates ulcer healing.

3. Proton pump inhibitors - These include omeprazole (prilosec), lansoprazole (pruscacid) and pantoprazole (pantoloc). They block the ATPase enzyme that is important for the secretion of gastric acid.
4. Antibiotic therapy - This is given when presence of helicobacter pylon has been confirmed.

Other Drug Therapies

- Cytoprotective drugs e.g. sucralfate. It accelerates ulcer healing as a result of the formation of an ulcer adherent complex that protects the ulcer from erosion by pepsin, acid and bile salts.
- Colloidal bismuth facilitates healing of peptic ulcer and is thought to be partially effective against Helicobacter pylori infection.
- Misoprostol (cytotec) is a synthetic prostaglandin that has protective and some antisecretory effects on gastric mucosa.

Cancer of the Stomach

This is also a common neoplasm in many populations. Malignant tumors of the stomach may be present for a long time and may have spread to adjacent organs before any distressing symptoms occur. In this case the tumour may have grown to large dimensions without obstructing the lumen of the stomach because the lumen is large. This delay is attributed to the vague intermittent experienced by the patient. Diagnosis can be confirmed from a biopsy obtained through gastroscopy.

Clinical manifestations include:

- Signs and symptoms of anaemia, this is due to chronic blood loss or as a result of pernicious anaemia
- Symptoms similar to those of peptic ulcer disease
- Vague epigastric fullness, weight loss, nausea, vomiting, haematemisis
- The stool may be positive for occult blood
- Poor appetite and weight loss
- An abdominal mass can be detected beneath the abdominal wall

The patient with cancer of the stomach may require surgery and adjuvant therapy in the form of radiation, chemotherapy or a combination of these. The surgical aim is to remove as much of the stomach as is necessary to remove the tumour and a margin of normal tissue. The condition is common in the elderly. These patients may be unfit for surgery in many cases hence the need for conservative management. The nutritional management may require that the patient have a stoma for delivery of food to the stomach. Nutrition, fluid and electrolyte balance, and treatment of anaemia are all very important.

Peritonitis

Peritonitis is an inflammation of the peritoneum that occurs as a result of bacterial or chemical contamination. It can result from entry of gastrointestinal cavity into the peritoneal cavity following perforation along the GI tract or in any of the abdominal organs. Other causes are post-operative complications and abdominal trauma. The organisms that are commonly associated with peritonitis include Escherichia coli, streptococci, staphylococci and pseudomonas.

Clinical manifestations include:

- Patient may present with fever, nausea and vomiting
- The abdomen is rigid and tender to touch. Pain is usually intensified on movement.
- Abdominal distension may be present due to movement of fluid into the abdominal cavity.
- Signs of shock may be present e.g. tachycardia, low blood pressure, tachypnoea
- Patient may have hiccups due to irritation of the phrenic nerve.

Management of peritonitis aims at arresting the infection, relieving abdominal pain and correcting fluid and electrolyte imbalance.

If peritonitis is a result of perforation, surgical intervention is indicated to close the intestinal wall and to remove exudative material from the peritoneum.

Disorders of the Small and Large Intestines and their Management

Many disorders disrupt the normal functioning of the small and large intestines. They include inflammatory bowel disease, diverticulitis, appendicitis and cancer of the bowel and rectum. Inflammatory bowel diseases include Crohn's disease and ulcerative colitis. These are rare conditions whose causes are not known but which are thought to affect other organs.

Crohn's Disease

This is a chronic inflammatory disease that can affect any segment of the GI tract. It may occur

at any age and being chronic, it is marked by exacerbations and remissions. The cause is unknown.
It commonly affects the distal ileum which is characterised by a slow intestinal flow and therefore increased exposure of the intestinal epithelium to irritants.
All layers of the intestinal wall are affected and this predisposes patients to fistula formation.

Clinical manifestations include:

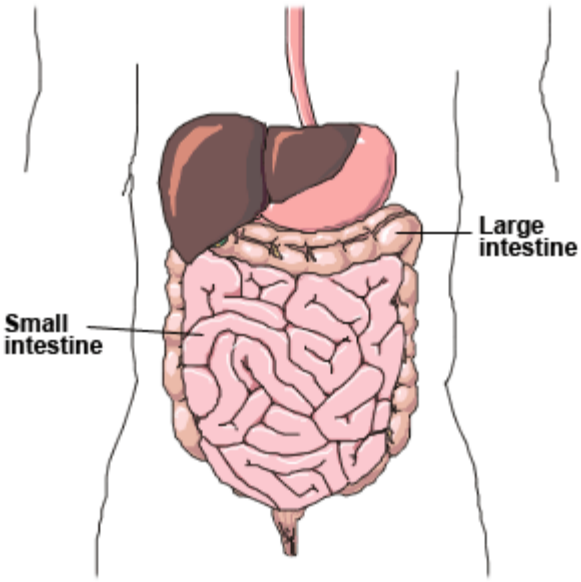
- Crohn's disease manifests with intermittent diarrhoea, pain, weight loss, malaise and sometimes fever
- Depending upon the area of intestine involved, the stool may contain occult blood
- Where there is involvement of the upper GIT, symptoms similar to those of peptic ulcer disease may be experienced
- Malnutrition may be present when the distal small intestine is involved due to inadequate absorption of nutrients

Management

Treatment is aimed at reducing inflammation and infection and alleviating symptoms. This is achieved by use of antimicrobial drugs and steroids. The patient needs a high calorie, high vitamin, high protein, low residue and milk free diet.
Complications include perforation, fistula formation, haemorrhage, toxic megacolon, obstruction, malabsorption and susceptibility to neoplasia.

Ulcerative Colitis
This inflammatory disease affects the colon and the rectum. The inflammation is usually limited to the mucosal and sub mucosal layers of theintestinal wall.

Clinical Manifestations
These include diarrhoea, which is sometimes bloody. Other symptoms include pus in the stool, lower abdominal pain and abdominal tenderness. The patient may also present with fever, anorexia, weight loss, nausea and vomiting.



Management
The patient with ulcerative colitis will be managed and cared for depending on whether their case is considered mild, or whether they presented with severe disease. The patient with mild disease requires a low roughage diet, and no milk or milk products. They receive anti-microbial drugs, corticosteriod to decrease inflammation, and anti-cholinergics and anti-diarrhoea drugs.
Those with severe disease may be given IV fluids with electrolytes, blood transfusion, NPO status, NG use and low suction in addition to the measures that have been mentioned for mild disease. If there is no improvement, these patients may be operated on and have a colostomy.

Appendicitis
Appendicitis is inflammation of the appendix. This is a common disorder in the five to 30 years age group.
The cause is not clear but is related to obstruction or twisting of the appendix. In appendicitis, all layers of the wall of the appendix are inflamed. The obstruction usually results in swelling and inflammation and it can result to gangrene and perforation. In case of perforation, peritonitis occurs.

Clinical Manifestations

At the onset, the patient may have low grade fever. Abdominal pain is initially peri-umbilical but gradually localises to the right lower

quadrant. Other features include rebound tenderness, vomiting and an elevated white blood cell count.

Management

This involves surgical removal of the appendicitis (appendicectomy).

Nursing care should aim at pain relief, maintaining vital signs within normal limits, preventing infections and ensuring that the patient returns to routine dietary intake, activity level and normal bowel function.

Cancer of the Colon

Tumours of the colon are relatively common and their incidence increases with age. In most cases, the patients are asymptomatic for long periods and only seek medical help when they notice a change in bowel habits or rectal bleeding.

The Risk Factors of Colon Cancer

- Age (40 years+)
- Blood in the stool
- History of rectal polyps
- Family history of colon cancer

Clinical features relate to tumour size and location. Symptoms of cancer of the colon include changes in bowel habits, passage of blood in stool, rectal/abdominal pain, anaemia, weight loss, obstruction and perforation. Tumours of the right colon usually present with vague symptoms of abdominal pain and mild anaemia. The stool is usually positive for occult blood. On examination, most patients have a palpable mass on the right lower quadrant. Obstruction resulting from right colon tumours is uncommon.

Patients with tumours affecting the left colon present with symptoms of obstruction. The pain which is usually due to gradual progressive obstruction is often relieved with defaecation on or the passage of flatus. Overt bleeding and change in the calibre of stool are common with left sided tumours.

In rectal carcinoma, rectal bleeding is the main complaint. The bleeding may be evidenced as blood mixed with faeces, blood on the sides of the faeces, or rectal bleeding if the patient strains when passing stool. Changes in bowel habits are common in rectal carcinoma and there is usually alternating constipation and diarrhoea, tenesmus, and a feeling of incomplete rectal evacuation. Rectal carcinoma is often palpable on careful rectal examination.

In diagnosis of colon cancer, a rectal examination is necessary. Patients who are suspected of colon cancer should undergo proctosigmoidoscopy. A Barium enema is useful in delineating the extent of the pathology and in ruling out other colonic lesions. Colonoscopy can also be done to visualise the entire colonic mucosa.

Management

The tumour site and extent determine the surgical approach to be used in treatment of the carcinoma. When the tumour is removed, the involved colon is excised for some distance on each side of the growth to remove the tumour and the area of its lymphatic spread. The intestine is then re-united by an end-to-end anastomosis of the colon. It the tumour is located low in the sigmoid or rectum, the colon is cut above the growth and brought out through the abdominal wall. This abdominal anus is called a colostomy. Radiation is recommended for lesions that may not be operable. A combination of radiation and chemotherapy has been shown to result in longer survival rates.

Care of a Patient with a Colostomy

Before the procedure, the patient requires psychosocial support in order to accept a colostomy and adjust to a new life style. This support is necessary given that the patient and their family are dealing with two issues; diagnosis of cancer and the shock of a colostomy. Prior to the surgery, intestinal antibiotics may be given to reduce the bacterial content of the colon. Mechanical cleansing may be done by use of laxatives, enemas or colonic irrigation. Preoperative nasogastric intubation facilitates performance of intestinal surgery and minimises post operative distension. An indwelling catheter is inserted to ensure that the bladder is empty during surgery.

After surgery, the patient should be monitored for signs of complications which include prolapse of the stoma, perforation, leakage from an anastomotic site, stoma retraction, faecal impaction, skin irritation and pulmonary complications. The colostomy is opened on the second or third post operative day.

Since the stoma on the abdomen doesn't have voluntary muscular control, emptying may occur at irregular intervals. This can be regulated by irrigation or by training the bowel to evacuate naturally without irrigation. This usually depends on an individual and on the nature of the colostomy. Irrigating a colostomy aids in emptying the colon of gas, mucus and faeces. When this is done regularly, there is less retention of gas and irritating fluids. Irrigation is best done after a meal as ingestion of food usually stimulates defaecation. The peristomial skin should be washed frequently to avoid irritation.

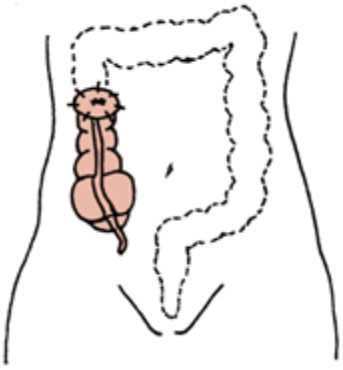
The Risk Factors of Colon Cancer

- Age (40 years+)
- Blood in the stool
- History of rectal polyps
- Family history of colon cancer

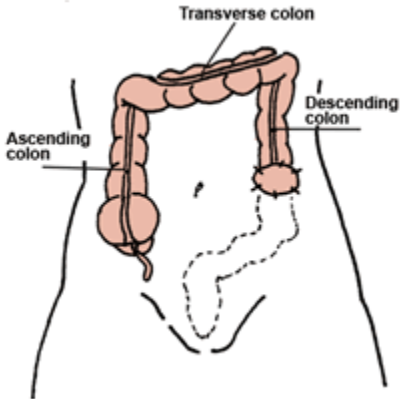
Clinical features relate to tumour size and location. Symptoms of cancer of the colon include changes in bowel habits, passage of blood in stool, rectal/abdominal pain, anaemia, weight loss, obstruction and perforation. Tumours of the right colon usually present with vague symptoms of abdominal pain and mild anaemia. The stool is usually positive for occult blood. On examination, most patients have a palpable mass on the right lower quadrant. Obstruction resulting from right colon tumours is uncommon.

Patients with tumours affecting the left colon present with symptoms of obstruction. The pain which is usually due to gradual progressive obstruction is often relieved with defaecation on or the passage of flatus. Overt bleeding and change in the calibre of stool are common with left sided tumours.

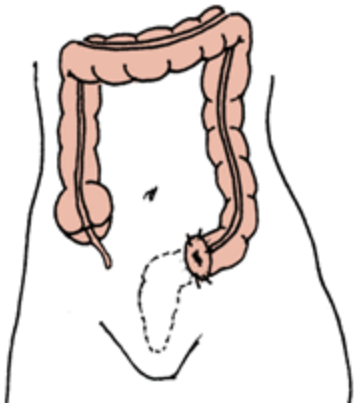
In rectal carcinoma, rectal bleeding is the main complaint. The bleeding may be evidenced as blood mixed with faeces, blood on the sides of the faeces, or rectal bleeding if the patient strains when passing stool. Changes in bowel habits are common in rectal carcinoma and there is usually alternating constipation and diarrhoea, tenesmus, and a feeling of incomplete rectal evacuation. Rectal carcinoma is often palpable on careful rectal examination.



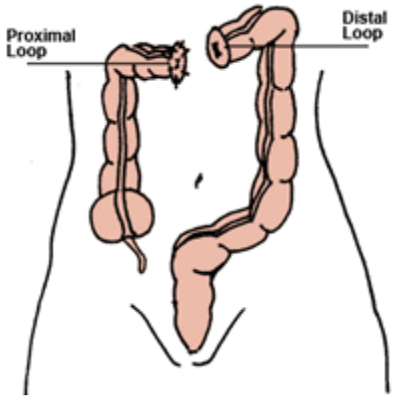
Ascending Colostomy



Descending Colon



Sigmoid Colostomy Single Barrelled



Transverse Colostomy Double Barrelled

Ileostomy

Acute Abdomen

This term refers to a group of abdominal conditions for which prompt surgical treatment must be considered to treat perforation, peritonitis, vascular and other intra-abdominal catastrophes.

Causes of acute abdomen include:

- **Bowel - Acute appendicitis,** perforated peptic ulcer, diverticular disease, intestinal obstruction and strangulation
- **Vascular** - Acute vascular insufficiency, ruptured aortic aneurysm
- **Gynaecological** - Ruptured ectopic pregnancy, ruptured ovarian cyst, acute salpingitis
- **Others** - Cholecystitis, pancreatitis, penetrating injury

Clinical Features

Abdominal pain is the most prominent symptom with the pain being localised to the area of abdomen affected. Other features depend on the
underlying cause.

Management

The emergency management of the patient with acute abdomen involves monitoring the airway, administering oxygen, establishing intravenous access and monitoring vital signs. An indwelling catheter should be inserted. Pain, intake and output should be monitored while observing for vomiting. The specific nursing interventions will depend on the medical or surgical management of the client.

Acute abdomen as a result of gynaecological problems would require the management to focus on the cause. The gynaecological causes include a ruptured ectopic pregnancy, pelvic inflammatory disease and torsion of ovary. You will cover these conditions in Reproductive Health.

The patient with abdominal trauma should receive the same management as indicated for acute abdomen. In addition they may undergo exploratory laparotomy and any other operations that are necessary. You should, therefore, provide these patients with pre and post-operative care.

Adults with peritonitis and inflammatory bowel diseases receive fluid replacement, antibiotic therapy, NG suction, analgesics and preparation for surgery. They may also require total parenteral nutrition in addition. Post operatively, the patient receives nil per oral and low intermittent suction. Always nurse the patient in Semi-Fowler's position. The patient should be on fluid replacement, antibiotics and sedations.

Disordered Motility

Diarrhoea

The most common disorders of the gastrointestinal tract in our setup are those that result in disordered motility. Diarrhoea is one of the disorders. This is excessive passage of loose stools that take the shape of the container. It can result from lactase deficiency, excess bile salts or fatty acids in the gut and bacterial growth.

Constipation

This is decrease in the frequency of passing stools. It can be caused by failure to respond to the urge, decreased fibre content in food, decreased fluid intake, weakened abdominal wall muscles, haemorrhoids, and certain drugs like the aluminium containing antacids.

Anal Rectal Problems and Haemorrhoids
These include anorectal abscess, fistula in ano, fissure in ano and haemorrhoids.

Anorectal Abscess
This is an infection localised in the anorectal region. The abscess is often painful and contains foul smelling pus. For superficial abscesses, swelling, tenderness and redness are observed. Deeper abscesses result in toxic symptoms, lower abdominal pains and fever. Fistulas may result from the abscesses. The abscess can be incised and drained surgically. Palliative therapy consists of sitz baths and analgesics.

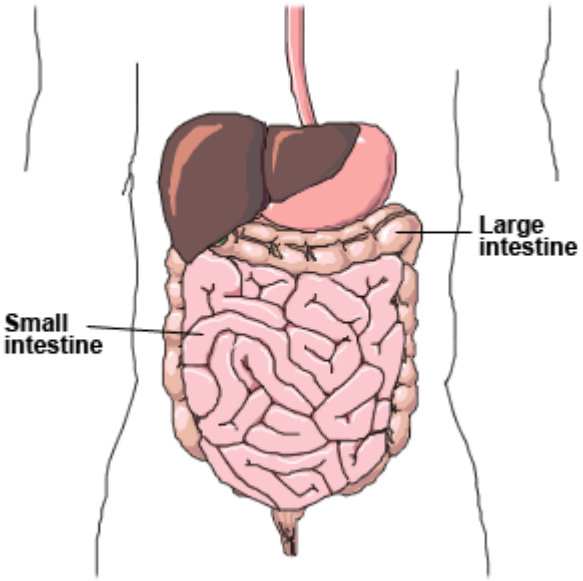
Fissure in Ano
This refers to a longitudinal ulcer in the anal canal. They are caused by diarrhoeal stools and persistent tightening of the anal canal. They can also occur during child birth, trauma to after cathartic abuse. There is usually pain and bleeding during defaecation. These usually heal on their own though minor surgery for repair may be necessary in others. Stool softeners and increased intake of water helps in easing the defaecation process. A suppository combining an anaesthetic with steroid may be comforting.

Fistula in Ano
This is a tiny tubular tract that extends into the anal canal from an opening located outside the anus. Fistulectomy is the recommended surgical procedure for repair of the fistula.

Haemorrhoids
These are varicose veins in the anal canal. Those occurring above the internal sphincter are referred to as internal haemorrhoids and those appearing outside the external sphincter are called external haemorrhoids.

Clinical Features and Management
Haemorrhoids cause itching, bleeding during bowel movements and pain. Internal haemorrhoids are usually not painful until they prolapse or bleed due to enlargement.
Symptoms of discomfort are relieved by personal hygiene and avoiding excessive straining during defaecation. Straining can be reduced through intake of a diet that contains roughage and increased fluid intake.
Ice packs alternated with warm packs are useful for thrombosed haemorrhoids. Internal haemorrhoids can be legated in addition to anal dilatation. A patient whose problem persists may have to have surgical excisions of the haemorrhoids.
Nursing care must include pain management, teaching the patient to avoid prolonged standing or sitting, use of sitz baths and stool softeners.

Malabsorption
This is a term which refers to the failure to transport substances like proteins, vitamins, fats or carbohydrates from the lumen of the intestines to be used by the body. The condition may affect only one constituent or many. It can also be due to surgery to some parts of the gut or the disorders mentioned earlier; Crohn's disease or ulcerative colitis.
Symptoms include fatty diarrhoea, weight loss, abdominal pain and flatulence. These patients need supplementation of the required nutrients. When the disease is severe, surgery is performed.



Intestinal Obstruction
Intestinal obstruction is a condition that can be considered as part of acute abdomen. However, because of the increasing frequency with which it occurs, this will be covered separately. Intestinal obstruction can either be caused by mechanical obstruction due to hernia, twisting of intestines, faecal impaction, tumours or

adhesions or by paralytic ileus, which sometimes follows abdominal surgery or peritonitis.
When there is obstruction, the blockage leads to strangulation and formation of gangrenous tissue. There follows pain, constipation, abdominal distension and vomiting. At first, the intestines try to remove the obstruction by hyper-peristalsis. Abdominal sounds can be heard at this time as rumbles. Later the rumbling disappears with strangulation. The pain also changes character. There is abdominal rigidity; the patient is weak, anxious and restless. This condition requires urgent attention before the gut becomes gangrenous.

Management of Intestinal Obstruction
In the patient with intestinal obstruction, treatment and care is directed towards decompression of the intestines by removal of gas and fluid. Correction and maintenance of fluids and electrolyte balance and relief or removal of the obstruction is also necessary. An NG tube is fixed and enemas, rectal tubes, sigmoidoscopy and colonoscopy may be used. In most mechanical obstructions, necrosis is present.
This, therefore, means that surgery is inevitable.

Whenever you perform such procedures as gastric lavage, NG tube fixing, giving enema, irrigation and care of colostomies and ileostomies you must remember to obtain informed consent from the patient.

On the other hand, you yourself must understand the preparation, necessary steps of the procedure and complications to be anticipated before you get started.
The post-operative care of a patient who has gastric surgery should focus on assessing the wound or stoma, protecting the skin, and assisting the patient to adapt physiologically and psychologically to their wounds. The patient's nutrition is also an important aspect. You must ensure that the patient receives all the necessary nutrients.

Disorders of the Liver
Normal function of the liver is disrupted when regeneration of hepatocytes does not keep up with damage resulting in hepatocellular failure and also when there is gradual replacement of damaged cells with fibrous tissue. Diseases that lead to hepatocellular dysfunction may be caused by bacteria and viruses. Other causes include metabolic disorders, toxins and drugs and nutritional deficiencies. Once the liver cells have been destroyed, cell regeneration can occur only if the disease process is not too toxic for the cells. The end result of chronic damage is a shrunken fibrotic liver.
Manifestations of liver disease are mainly due to an alteration of metabolic and excretory functions of the liver. Jaundice is present due to an increase in serum bilirubin levels. Abnormal protein metabolism results in decreased serum albumin concentration and oedema. Serum ammonia levels increase leading to signs of central nervous impairment. Ascites occurs due to increased portal vein blood pressure which results in leakage of fluid into the peritoneal cavity. The patient may also have easy bleeding due to lack of production of blood clotting factors.
Acute liver damage may be completely reversible or may progress to cirrhosis whereby the parenchymal cells are replaced with fibrotic tissue. When the ability of the liver to carry out its excretory and metabolic function falls below the needs of the body, the patient is said to be in Liver failure. Hepatic coma results when liver dysfunction is so severe that the liver is unable to remove end products of metabolism from the blood stream.

Acute Hepatitis
This may be a result of viral infection or ingestion of toxic substances.

Viral Infections
Hepatitis A, also called infectious hepatitis is caused by the Hepatitis A virus and is transmitted through the fecal oral route. The incubation period is 15 to 40 days and the viruses are excreted in feaces. It is commonly transmitted sexually in homosexual men.
Hepatitis B, also called serum hepatitis is the more serious of the viral hepatitis. The incubation period is 50 to 180 days. It is spread by blood and blood products, thus making it common among persons whose occupation involves contact with blood and blood products and also among intravenous drug addicts and male homosexuals. The virus is also spread by body fluids e.g. saliva, semen, vaginal secretions and from the mother to the foetus. Infection usually leads to severe illness lasting 2 to 6 weeks. On infection, antibodies are formed and immunity persists after recovery. Type B virus may cause massive liver necrosis and

death. This condition can result in hepatocellular carcinoma and liver cirrhosis.
Hepatitis C virus is also spread by blood and blood products and is therefore prevalent in IV drug abusers. The infection can be asymptomatic but when hepatitis develops, it is often recurrent and may result in chronic liver disease.
Toxic substances: The extent of the damage usually depends on the dose and duration of exposure. Some substances also cause liver damage while others do so only when hypersensitivity occurs. Alcohol toxicity also causes hepatitis. This occurs after chronic abuse of alcohol and the symptoms include jaundice, hepatomegally, anorexia and malaise.

Chronic Hepatitis
This is where hepatitis persists for more than 6 months.

Diagnosis of Liver Disease
Liver function is measured using liver function tests. However, these tests are not sensitive indicators as many other disorders can influence the results. On physical examination, the liver of a patient with cirrhosis is small and hard, while the liver of a patient with acute hepatitis is quite soft. Tenderness of the liver is a sign of recent acute enlargement with consequent stretching of the liver capsule. The absence of tenderness may imply that the enlargement is longstanding. The liver of a patient with viral hepatitis is tender, while that of a patient with alcoholic hepatitis is not. Liver enlargement is an abnormal finding that requires further evaluation. Liver biopsy facilitates sampling of the liver tissue by needle aspiration and this aids in diagnosis of hepatic disorders.

Liver Cirrhosis
This is a disease characterised by fibrosis and formation of abnormal nodules of liver tissue. The disorder is commonly associated with alcoholism, but it can also follow such other conditions as hepatitis, toxic reactions, and iron and copper deposition. Cirrhosis can be post necrotic, that is, following an infection like viral hepatitis or it can be biliary which is preceded by obstruction to bile flow.
Patients present with pruritus, hepatomegally, pain, ascitis and easy bleeding because of decreased production of clotting factors. Toxic substances of metabolism will also accumulate and patients can have many other symptoms. Anaemia, peripheral oedema, oliguria, malabsorption, drug toxicities and hepatic encephalopathy develop. These manifestations affect the endocrine system, skin and haematological functions. It therefore, requires serious consideration during management.

Management of Liver Disease
Viral hepatitis is treated with a low protein, high carbohydrate and low-fat diet. Vitamin supplements and rest will help the patient recover faster. No drugs are given to these patients because the liver may be unable to metabolise them. However, supportive therapy can be included. General infection prevention measures are necessary to avoid the spread of viral hepatitis. Immunisation and use of immune globulin may also be useful.

Toxic and drug induced hepatitis are largely managed with support to the patient in terms of nutrition, rest, fluids and electrolyte monitoring. The patient with liver cirrhosis needs at least 300 calories in the diet per day. High carbohydrate intake, low proteins (depending on the stage), low fat diet, low sodium (for the patient with ascitis) is all indicated.

Should the condition get worse, proteins should be limited to avoid accumulation of ammonia in the body leading to hepatic encephalopathy. This particular patient should receive complete bed rest, diuretics and B-complex vitamins. They should abstain from alcohol totally.

The complications of cirrhosis that should be managed at the same time are portal hypertension and oesophageal varices, peripheral oedema, ascitis, hepatic encephalopathy and the hepatorenal syndrome. No doubt you have nursed patients with these complications. Hypertension is managed with antihypertensive medication. Anaemia should be treated with transfusion if it is severe or with haematinic drugs.

Portal Hypertension
This is a condition characterised by an elevation of portal venous pressure. Portal venous pressure is determined by the portal blood flow and the portal vascular resistance. In many instances, increased vascular resistance is usually the main factor in the aetiology of portal hypertension. In childhood, extrahepatic portal vein obstruction is frequently the cause of portal hypertension while in adults, cirrhosis is the

main cause. Schistosomiasis also causes portal hypertension in endemic areas.
Increased portal vascular resistance results in a gradual reduction in the flow of portal blood to the liver and simultaneously to the development of collateral vessels which allow portal blood to bypass the liver and enter the systemic circulation directly. Collateral vessel formation is widespread but occurs predominantly in the GIT, mainly in the oesophagus, stomach, rectum, anterior abdominal wall and in the renal, ovarian and testicular vasculature.

Clinical features result from portal venous congestion and from collateral vessel formation. These include splenomegally and hypersplenism. Collateral vessels may be visible on the anterior abdominal wall and occasionally radiate from the umbilicus to from a caput medusae. Collateral vessels in the stomach, oesophagus and rectum cause bleeding. This condition can lead to ascites, renal failure and hepatic encephalopathy. Diagnosis of portal hypertension is via ultrasonography and portal venography.

Hepatic Encephalopathy

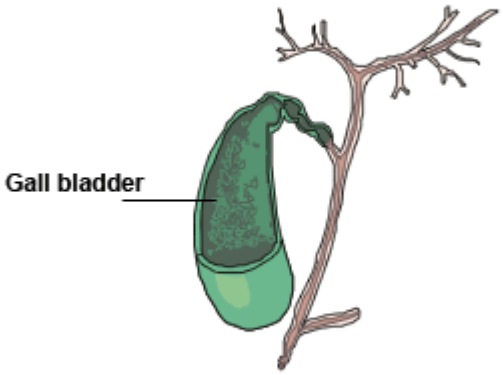
This is a neuropsychiatric syndrome caused by liver disease that is thought to result from accumulation of toxic substances such as ammonia within the brain. This occurs when these substances are not metabolised in the liver as occurs in cirrhosis.

Clinical features include changes of intellect, personality, emotions and consciousness, with or without neurological signs. In early stages, features are mild but as the condition becomes more severe, the patient has inability to concentrate, confusion, disorientation, drowsiness, slurring of speech and sometimes convulsions. Overt psychosis and convulsions may also occur.
Episodes of encephalopathy are usually reversible until terminal stages of cirrhosis. In managing this condition, the aim is to reduce or eliminate protein intake, and to suppress production of neurotoxins by bacteria in the bowel. Lactulose is also given and it produces an osmotic laxative effect, reduces the pH of the colonic content thereby limiting colonic ammonia absorption and promotes the incorporation of nitrogen into the bacteria. Neomycin is also used as it acts by reducing the bowel flora.

You should read further on hepatic coma and the hepatorenal syndrome.

Diseases of the Gall Bladder
The gall bladder is most commonly affected by gallstones (cholelithiasis) and inflammation (cholecystitis). Gallstones are formed through precipitation of constituents of bile. Abnormal composition of bile, stasis of bile and inflammation of the gallbladder contribute to the process of precipitation. Gallstones start manifesting symptoms when they block the ducts. Pain is common.
Factors that predispose to gallstones include:

- Changes in bile composition
- High levels of blood and dietary cholesterol
- Cholecystitis
- Diabetes Mellitus when associated with high blood cholesterol levels
- Haemolytic disease
- Female gender
- Obesity
- Long term use of oral contraceptives



Diagnosis of gallstones is by ultrasonography, cholecystography and percutaneous Transhepatic Cholangiography.
Complications of cholelithiasis include biliary colic, inflammation and inpaction.
Cholelithiasis commonly occurs together with cholecystitis. The manifestations of cholecystitis include:

- Intolerance of fatty foods
- Belching
- Vomiting
- Jaundice

- Fever

Cholecystitis can be acute or chronic. If chronic, it can contribute to cancer of the gall bladder.

Care of the Patient with Gall Bladder Disease

The management of an adult with gall bladder disease should start with a primary assessment. The data will be obtained by finding out about the clinical presentation of the disease, which has already been mentioned. In those patients with gall bladder disease, it is advisable to concentrate on certain goals to be able to achieve desired results. These goals include:

- Relief of pain and discomfort
- Prevention of complications after surgery
- Prevention of recurrent attacks and maintenance of desired lifestyle

The patient with cholelithiasis (gall stones) may be put either on conservative or surgical treatment. Conservatively IV fluids, nil per oral, NG tube feeding, low fat diet, antiemetics, analgesics and fat soluble vitamins (ADE and K) are used. Anticholinergics, bile salts, antibiotics and bile acid therapy will benefit the patient. The Anticholinergics will affect the contraction of the bile duct.

The surgical management involves cholecystectomy. When one has cholecystitis, treatment is mainly supportive and symptomatic. For instance, if nausea and vomiting are severe, gastric decompression is done to prevent gall bladder stimulation. Anticholinergic and analgesics may be given to these patients to decrease the pain.

Pancreatitis

Pancreatitis is an inflammation of the pancreas. Acute pancreatitis is when the structure and function of the pancreas usually return to normal after the acute attack.

Chronic pancreatitis results in permanent abnormalities of pancreatic function. Acute pancreatitis occurs after digestion of this organ by the very enzymes it produces, especially trypsin. Other associated causes of pancreatitis include bacterial or viral infections, blunt abdominal trauma, ischemic vascular disease and use of drugs such corticosteroids, oral contraceptives, narcotics and thiazide diuretics.

Management of Pancreatitis

The objectives of therapeutic management of acute pancreatitis include:

- Relief of pain
- Prevention or treatment of shock
- Reduction of pancreatic secretions
- Control of fluids and electrolyte balance
- Prevention and treatment of infection
- Removal of the precipitating cause

The patient should therefore minimise physical activity through bed rest, receive a strong analgesic, nil per oral with NG tube suction, and IV fluids. The use of anti-cholonergic drugs can decrease pain.

The patient with chronic pancreatitis requires prevention of attacks and frequent doses of analgesics. Pancreatic exocrine and endocrine insufficiency should be assessed and modes of management considered. Diet, pancreatic enzyme replacement and control of the diabetes are measures used to control the insufficiency. The patient may not tolerate fatty, rich and stimulating foods and, these must be avoided. You should stress that the patients avoid alcohol totally. Antacids and anti-cholinergic drugs are given to decrease hydrochloric acid secretion. Surgery may be used to treat chronic pancreatitis. Patients who have surgery should have replacement of the hormones.

Always remember to manage this patient for the potential of development of diabetes mellitus.

PART TWO: ADULT NURSING

Part two will start with the respiratory system and will highlight topics that have not been covered in part one. The nursing process from the previous units has been used, as this should be applied in patient care.
Adult nursing involves the provision of care to all individuals aged above twelve years of age. It forms the core of general nursing practice. As a nurse, you must have cared for many adult patients. This unit will equip you with additional knowledge, skills and attitudes to give better quality care to your patients.
This unit is composed of four sections:
Section One: Respiratory System.
Section Two: Circulatory System.
Section Three: Genitourinary System and the Integuments.
Section Four: Palliative Care.

Unit Objectives

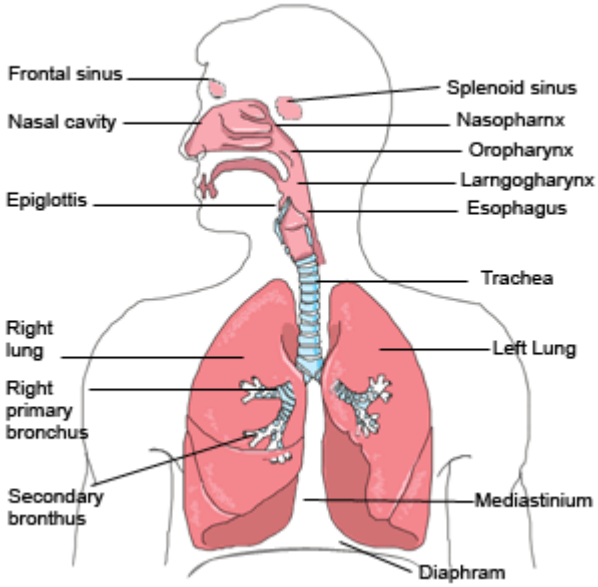
At the end of this unit you will be able to:

- Describe the management of patients with respiratory disorders
- Describe the management of patients with circulatory disorders
- Describe the management of patients with genitourinary disorders
- Describe the structure and functions of the integuments
- Describe concepts and principles of palliative care

SECTION 1: RESPIRATORY SYSTEM

Introduction

Respiration is a very important body function. It ensures that the oxygen required for the breakdown of materials is delivered to the body tissues and waste gas (carbon dioxide) is excreted.
This process will be covered in detail in this section.



Objectives

By the end of this section you will be able to:

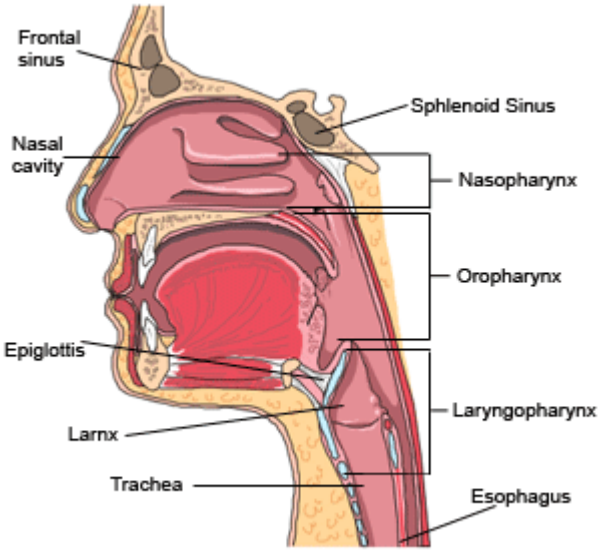
- Describe the structures and functions of the respiratory system.
- Describe respiratory disorders and diseases.
- Utilise the nursing process in the management of adults with conditions affecting the respiratory system.

The Structures and Functions of the Respiratory System

The most important function of the respiratory system is to facilitate intake of air in the body, enabling the gaseous exchange and excretion of waste gases.
The structures of the respiratory system will be divided into upper and lower airways. You will start with the upper airway.

The Upper Airway

The job of the upper airway is to filter, moisten and warm air entering the body during respiration. This is done through the mucocilliary action of cilia in the upper airway.
The upper part of the respiratory tract consists of the nose and pharynx.



The Nose
The nose has both the functions of respiration and olfaction (to smell). The respiratory function of the nose is the conditioning of the air through warming, filtering, clearing and humidification.
The nasal cavity is divided into two by a septum. The cavity has a roof, a floor, lateral walls and a posterior wall followed by a posterior pharynx. Mucous secreting cells line it. There are openings into the nasal cavity. The anterior nostrils open into the nasal cavity, while posterior naris open from the nasal cavity into the pharynx.
Adjacent to the nasal cavity are air filled cavities located within the bony structure. These are called sinuses. The main sinuses include the maxillary sinuses in the maxillary bone, frontal, sphenoidal and ethmoidal sinuses in the respective bones.

The Pharynx
The pharynx is the tube that extends from the nose at the base of the skull to the 6th cervical vertebra and is 12-14cm long. It is divided into the nasopharynx, the oropharynx and the laryngeopharynx. The eustachian tube from the ear empties into the nasopharynx and, therefore, infection from the ear can also involve the pharynx and vice versa. There is a mass of lymphoid tissue within the pharynx called the tonsils. The three groups of tonsils are the palatine tonsils, the bilingual tonsils and the pharyngeal tonsils, also referred to as adenoids.
The functions of the pharynx include:

- Passage of air and food. It allows passage of air and food
- Taste
- Hearing
- Protection through presence of lymphatic tissue
- Warming and humidification of air
- Speech

The tonsils filter bacteria from circulating lymph fluid and trap any particles as the inhaled air passes through. Inflammation of the tonsils is referred to as tonsillitis.
The other part of the upper airway is the larynx also known as the voice box. The larynx is a tube made up of cartilage, fibrous membranes and muscles. Its function is to produce sound and also to protect the lower airway from foreign objects.
Finally in the upper airway, there is a triangular space between the vocal cords and the opening of the larynx called the glottis. To have a clear picture of the structure and function of the respiratory tract, please study the diagram on the left.

The Lower Air Way
The lower air way enables gaseous exchange to take place.
It consists of the trachea, bronchi, and lungs.

Trachea
It is referred to as the wind pipe and extends from the larynx to the level of the fifth thoracic vertebrate where it bificates into the left and right bronchus. It is made of the C-shaped cartilages which prevents it from collapsing thus effecting its function of air passage.
Its functions, include conditioning of the air, are filtering, warming, and humidifying, removing of particles and mucus through its ciliary function and cough reflex.

Bronchi and Bronchioles
The bronchus sub divides into smaller branches thus forming different lobes of the lung. They further sub-divide to form the bronchioles and respiratory bronchioles. Their main function is to provide air passage and control the amount of

air passing through into the alveoli, conditioning of air is maintained as it enters into the alveoli.

The Alveoli
At the distal end, the respiratory tract terminates with the blind end of alveolar ducts and alveoli which is a sac like structure where air interchange takes place. Alveoli are well supplied with blood supply to allow for diffusion of oxygen and carbon dioxide. Surfactant factor is produced here, which is important in maintaining the air sac open.

Lungs

The lungs are elastic organs, made up of conducting airways. There are millions of gas exchange units called acini. An acinus is composed of respiratory bronchioles, alveolar ducts and alveoli. This is where the gas exchange takes place.
The lungs are contained within the bony thoracic cage. This comprises the ribs, the sternum and clavicles, spinal column and scapulae. In part one of this unit the topics of support and locomotion were covered. Below the lungs is the diaphragm, which also takes part in the process of respiration. The lungs are enclosed within an elastic membrane called the pleura. The pleura has two parts; the one adjacent to the lungs is called the visceral pleura and the other, adjacent to the thoracic cavity, is called the parietal pleura. In between the two is a space, the pleura space, which has a thin film of serous fluid.

The respiratory tract is generally supplied by blood from the pulmonary and bronchial arteries. Oxygen diffuses into blood in the capillaries from where it is carried to the heart to be pumped to other tissues. The pulmonary artery carries deoxygenated blood from the heart to the lungs for oxygenation while the four pulmonary veins carry oxygenated blood from the lungs to the heart for onward delivery to the rest of the body.

Mechanism of Respiration
The respiratory centre in the brainstem controls breathing. This is stimulated by an increase in the acidity (pH) of the blood.
Movement of air into and out of the lungs comprises the respiratory cycle. This cycle occurs about 15 times in a minute, and consists of inspiration, expiration and a pause. Pressure differences are created by changes in the thoracic cavity, which make movement of air into and out of the lungs easier.
Some of the structures, which participate in the movement of the thoracic cavity to create the pressure differences, include the inter-costal muscles and the diaphragm.
During respiration the lungs and passages are never empty. Since exchange of gases takes place only across alveolar ducts, the rest of the passage is called anatomical dead space.

Tidal Volume
Tidal volume is the amount of air that comes into and out of the lungs with each cycle of respiration. This is normally about 500mls.

Expiratory Reserve Volume

Expiratory Reserve Volume (ERV) is the largest additional volume of air that can be forcibly expired after a normal inspiration and expiration. ERV is about 1000-1200mls.

Inspiratory Reserve Volume
Inspiratory Reserve Volume (IRV) is the largest additional volume of air that can be forcibly inspired after a normal inspiration. Normal IRV is 3000-3300mls.

Residual Volume
Residual volume is that air that cannot be forcibly expired from the lungs. It is normally about 1200mls.

Forced Expiratory Volume
Forced expiratory volume is the volume of air that can be forcibly exhaled within a specific time normally 1-3 seconds.

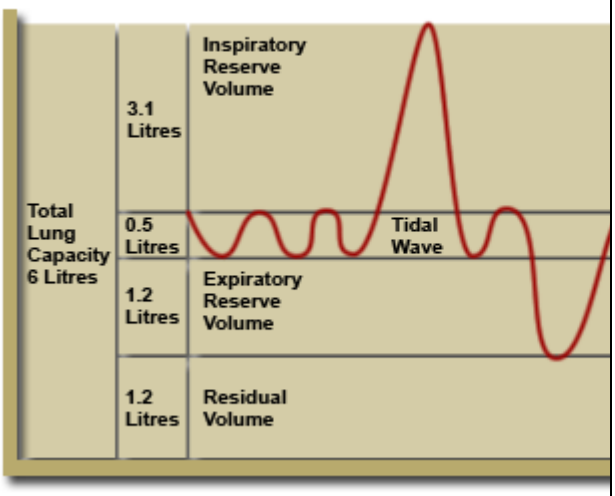
Inspiratory Capacity
This is the amount of air that can be inspired with the maximum effort. It consists of tidal volume and inspiratory reserve volume.

Functional Residual Capacity
Functional residual capacity is the amount of air that remains in the air passages and alveoli at the end of a quiet inspiration. This prevents collapse of the alveoli during expiration. It comprises of expiratory reserve volume and the residual volume.

Vital Capacity

Vital capacity is the amount of air that can be forcibly expired after forcible inspiration. This varies with the size of the thoracic capacity. It is made up of the tidal volume, inspiratory reserve volume, and expiratory reserve volume.

Lung Volumes and Capacities



General Clinical Features of Patients Suffering From Respiratory Conditions

Patients suffering from conditions that affect the respiratory system will present with various clinical features.

Cough

The cough is very common from irritation of respiratory mucosa. The cough reflex protects the patient from accumulation of secretions and irritant substances. Therefore, a cough may arise from inflammation and exudation of secretion or irritation by foreign materials or irritants. A cough may be described as dry, brassy, high pitched, wheezy, hackling, loose or severe.

Sputum

This results from over production of secretion which may result from the inflammatory process. Sputum is examined for consistency and colour

Chest Pain

This can be associated with pathological process on the affected area. However, note that the lung and viscera have no sensory nerve ending and are unlikely to produce much pain except when parietal plural is affected. It produces sharp pain called pleuric pain.

Wheeze

It is associated with bronchospasms and constriction of the airway. It is usually heard without the help of a stethoscope and is usually on expiration.

Hemoptysis

Here, blood may be expectorated with sputum. This ranges from blood stained to hemorrhage. It is usually associated with bronchitis, pulmonary tuberculosis, bronchial asthma, carcinoma of the lung, pulmonary embolism and infarction.

Clubbing of Fingers

It results from hypoxic lung disease like malignancies or bronchiectasis.

Cyanosis

It appears when circulating haemoglobin carries less oxygen than 2/3 of the expected amount. It can be either central or peripheral.

Dyspnoea

This is laboured or breathing in increased lung rigidity and airway resistance. Dysponea may lead to tachypnoea.

Mechanism of Breathing

There are chemoreceptors in the walls of the aorta and carotid arteries which sense changes in partial pressures of oxygen and carbon dioxide. These will determine the rate of breathing. For example, now while you are seated reading, you breathe quietly. However, if you stop reading and start doing some exercise, the breathing will become faster and deeper in response to the need for more oxygen and to get rid of carbon dioxide.

Now, take a deep breath and make a mental note of how your ribs and diaphragm move.

While you are breathing quietly, you are using your inter-costal muscles and diaphragm. In difficult breathing accessory muscles, such as the abdominal muscles, may be used.

Following phrenic nerve stimulation, the diaphragm and respiratory muscles will start to contract. The thoracic cavity increases; the lungs follow the move and begin to expand. Air rushes from positive pressure outside to negative pressure in the lungs. The inspiration is completed and expiration starts with the reverse process.

Control of Respiration

Alveolar stretch receptors on the walls of the lungs send messages to the brain to prevent over distension of the lungs. Blood pH stimulates the respiratory centre directly. Blood pCO2 and pO2 stimulate receptors to control the rate of breathing.
In the body tissues, gas exchange occurs by diffusion from high concentration to low concentration. Oxygen binds to haemoglobin to be transported to tissues for use in producing energy.
You will now look at the disorders affecting the respiratory function.

Respiratory Disorders

Disorders of the Upper Respiratory Tract

Many of the patients you have been nursing may have been suffering from upper respiratory tract infections. Others may also have had inflammation, trauma or tumours.
Another common disorder, especially among young people, is epistaxis. This is nose bleeding. The most common causes of epistaxis are trauma, infection, tumours and high blood pressure.
Foreign objects inserted accidentally can cause airway obstruction, which you should treat as an emergency.
You will start by learning about respiratory tract infections.

Upper Respiratory Tract Infections

The upper respiratory tract often falls victim to viral infections. The most common viral infections are pharyngitis, tracheitis, tonsilitis, laryngotracheobronchitis and influenza. These infections are common in children in whom they cause serious illnesses. Even the common cold is a viral infection. Viral infections cause inflammation resulting in congestion and watery exudate formation. In adults these conditions do not cause very serious illnesses unless the individual's immunity is compromised.
The management of infections involves use of antibiotics, control of fever, and relief of discomfort
The nose is part of the respiratory system. Nasal polyps can affect it. These are small masses that protrude into the cavity. Their cause is not clear but chronic inflammation is thought to be a risk factor.
Allergic rhinitis is commonly associated with allergens such as pollen, animal fur and dust. Patients have frequent sneezing, running nose and nasal blockage.
Acute sinusitis is an inflammation of the sinuses. Microorganisms that spread from the adjacent nose and pharynx commonly bring about the inflammation. There follows congestion, blocking the drainage from the structures. This results in dull pain over the affected sinus, fever and sometimes purulent discharge, if there is communication with the nasal passages. Sinusitis can become chronic if not well managed.

Acute pharyngitis accompanies common colds. The infection causes inflammation resulting in congestion. The infection can spread to the nose and sinuses. Laryngitis and tracheitis are the other infections that affect the upper respiratory tract mostly due to trauma, foreign bodies or infection. The trachea may be accessed via an endo-tracheal tube. This is inserted to open an airway for emergency resuscitation or to deliver anaesthetic gases.
Tonsillitis is another common inflammation. It affects the tonsils.
It can be acute or chronic. Streptococcus pyogenes and some viruses commonly cause the inflammation of the tonsils.
Other micro-organisms that can affect the tonsils are Staphylococci and Haemophilus influenza.
Tumours are rare in the upper respiratory tract.

Care of Adults with Upper Respiratory Tract Disorders

Epistaxis

This is nose bleeding. The most common causes of nose bleeding include trauma especially picking of nose, infection, tumours and high blood pressure. Bleeding is caused by the rupture of tiny blood vessels in the mucus membrane. It may also occur as a sign of rheumatic fever.

Management

For a patient with epistaxis, which manifests quite often in our communities, simple first aid means may be effective in stopping the bleeding. It is important to keep the patient quiet. Place them in a sitting position, leaning forwards or reclining with head and shoulders elevated. You can apply pressure by pinching the lower portion of the nose for 10-15 minutes. Apply ice, if it is available, to try and stop the bleeding. Partially insert small gauze and call for more help. If first aid is not effective, management involves application of vaso-constrictive agents

or cauterisation. If after packing the patients require oxygen, then it should be given. Mouth care and antibiotics will decrease the possibility of toxic shock syndrome.

Rhinitis

Rhinitis is the inflammation of the mucus membrane of the nose. It could be as a result of infection or allergic reaction. When the cause is allergy, it is referred to as allergic rhinitis. Rhinitis can be caused by infections that could be bacterial or viral, the most common being viral. Rhinitis causes inflammation of the nasal mucosa, leading it to become congested, swollen and oedematous. This leads to an increase in nasal discharge and in cases of bacterial infection this could be a thick nasal discharge. This is then referred to as acute rhinitis. Recovery may follow after a few days.
Repeated attacks lead to deposition of abnormally large connective tissue in the nasal mucus membrane leading to thickening and hypertrophy. This causes formation of spurs and polyps on the nasal septum. There could be excessive exudation leading to atrophic rhinitis. Patients present with frequent sneezing, running nose, pulurent discharge and nasal blockage.

Pharyngitis
This is the inflammation of the pharynx which commonly accompanies the common cold. It is caused by several viruses and bacteria. The throat becomes inflamed leading to the mucus membrane becoming fiery red. The lymphoid tissue including the tonsils become swollen with exudation.
Uncomplicated pharyngitis resolves in 3-5 days, while complicated pharyngitis may cause otitis media, sinusitis, mastoiditis, rheumatic fever, nephritis and adenitis.

Management
For uncomplicated pharyngitis, a lot of fluids are recommended with saline, antimicrobial, antifungal gargles. Intravenous fluids are recommended if one is not able to take them orally. Liquid diet is given due to discomfort in swallowing. Bacterial infections are treated with antibiotics. Staphylococcal and streptococcal infections are treated with penicillins.

Laryngitis
This is the inflammation of the larynx. It may be caused by use of irritants, abuse in use of voice or infection. Bacteria infections are usually secondary to viral infection.
Causes include exposure to low temperatures, malnutrition, low immunity and dietary deficiencies.
Laryngitis presents with hoarseness or complete loss of voice (aphonia), severe cough and general malaise.

Management of Laryngitis
- Irritants like tobacco smoking must be avoided.
- Steam inhalation or aerosol therapy is important to sooth the mucus membrane and facilitate drainage of mucus secretions.
- Anti bacterial therapy is done where bacterial infections have been suspected.
- Rest of the voice promotes healing. This is done in a well humidified environment.
- Plenty of fluids must be given to replace lost fluids and to thin the secretions.
- Steroids could be beneficial in reducing inflammation.

Sinusitis

This refers to the blockage of the nasal sinus by either inflammation or hypertrophy of the mucosa. It may affect one or more of the four sinuses.
The main causes include obstruction by nasal polyps, deflected nasal septum, spurs or hypertrophid turbinates due to inflammation. The blocked nasal ostia (exit) results in the accumulation of secretions which provide media for growth of micro-organisms. This results in a secondary infection.
Acute sinusitis results from upper respiratory infections, allergic rhinitis, swimming or dental manipulation which cause inflammation resulting in increased secretions and blockage of their drainage. Chronic sinusitis is usually associated with chronic infection of sinuses and nasal polyps

Clinical Features
- There is usually pain over the affected sinuses due to inflammatory process and accumulation of pus and absorption of air.
- Purulent nasal drainage due to hyper secretion.

- Nasal obstruction due to inflammation or altered anatomy.
- The turbinate will be oedematous, enlarged with tenderness over the affected area.
- Recurrent headache which changes with position.

Investigations include:

- A CT scan will show sinus filled with fluid or hypertrophied mucosa.
- A nasal endoscopy to examine or drain the sinus to get the secretions for culture
  and sensitivity.
- An X-ray of sinus will show fluid in the sinus.

Management

If the patient has pain related to decreased sinus drainage, inflammation or infection:

- Encourage patient to take the prescribed medication. Requires antibiotics for example amoxil to decrease risk of recurrent infection.
- Expectorants may be used to drain secretions. A steroid like the hydrocortisone to relieve inflammation especially in allergic sinusitis.
- Use analgesics and decongestants to relieve pain.
- Instruct the patient to use plenty of fluids to dilute the secretion hence allow good drainage.
- Nurse patient elevated to facilitate drainage and encourage frequent nose blowing.
- Nasal irrigation, nasal drops may be used to relieve obstruction or decongest the nostrils.
- Teach patient to avoid situations which aggravate sinusitis like swimming and diving.
- Take vital signs and report any increased temperature.
- If allergies, follow instructions of environmental control by identifying the allergen and avoiding stimulation of allergy.
- Assess patient for features of infection and give appropriate medication.

<u>Peritonsilar Abscess</u>

Peritonsillor abscess develops above the tonsil following tonsillar infection or pharyngitis.

The tonsils grossly enlarge to sometimes threaten the patency of the airway. The patient will have difficulty in swallowing (dysphagia) and pain (odinophagia). The patient presents with thickened voice, chills, fever and swelling of the soft palate.

Management

Peritonsilar abscess occurs as a complication of tonsilitis and acute pharyngitis. The tonsils may enlarge to threaten airway passage. High fever, leukocytosis and chills will occur and the patient needs IV antibiotics, incision and drainage for the abscess. Tonsillectomy may be performed after the infection has subsided. When a patient has a mass in the upper airway, patency may be lost. In such a patient, endotracheal intubation may have to be done

Airway Obstruction

This is the blockage of the air passage through the airways, that is, the nose, pharynx, larynx into the trachea and the lungs. It may be either partial or complete obstruction.

The causes include: Laryngeal oedema, aspirated food or foreign body, laryngeal tracheal stenosis, neurological depression, tumour.

Clinical features include: Stridor, uses of assessory muscle in breathing, substernal and intercostal muscles retraction, wheeze, restlessness, tachycardia, cyanosis.

Management

This is an emergency and interventions are aimed at establishing and maintaining a patent airway, the Heimlich manoeuvre, cricothyroidectomy, endotracheal intubation or tracheostomy are commonly used

Intubation

Make sure the patient is well oxygenated, explain the procedure and assemble and check the equipment. Then remove any dentures, and administer pre-medication. After intubation, the responsibilities include:

- Assessing for correct tube placement

- Inflating the cuff
- Assessing oxygenation and acid-base balance
- Suctioning to remove secretions and preventing accidental disconnection from ventilator or blockage
- Prevention of the over-inflation of the cuff

Tracheotomy

Tracheotomy is an incision into the trachea for the purpose of establishing an airway. Tracheostomy is the surgical creation of an opening into the trachea through the neck. It is used:

- To bypass airway obstruction
- To facilitate removal of secretions
- To facilitate weaning from a ventilator
- To permit long-term mechanical ventilation and improve patient comfort

Care of the patient with tracheostomy involves avoiding dislodgment, assessing the respiratory function and evaluating the risk of swallowing, and speech problems. The patient on long-term tracheostomy should be taught about its care. The suctioning of the airway for a patient with endotracheal tube or tracheostomy should be done in such a way as to avoid cuff deflation while maintaining good respiratory function. Principles of asepsis must be strictly adhered to.

Cancer of the Head and Neck

Cancer of the head and neck can greatly affect respiration. The choice of treatment in cancer of the head and neck is dependent on such factors as extent of the disease, cosmetics, and urgency of treatment. However, surgery and radiation are commonly used. Whatever the mode of management, the patient requires health education on radiation, duration of treatment, change of voice, speech and emotional adjustments.

Nutritional management and improvement of respiratory function are the most important aspects to concentrate on, in addition to the teaching just mentioned. The post-operative care is done by undertaking the following actions:

- Putting the patient in semi-fowlers position
- Clearance of the secretions
- Care of pressure areas and dressings, checking on drainage tubes and use of a humidifier

Wound management should always be part of the post-operative care. Later, stoma care, voice rehabilitation and home care are taught to the patient for long-term home management.

Disorders of the Lower Respiratory Tract

Acute and Chronic Bronchitis

Acute and chronic bronchitis are common conditions of the respiratory tract. This is an inflammation of the bronchi. Acute bronchitis is caused by bacteria and may follow a common cold. Streptococcus, staphylococcus aureus and H. influenza are commonly associated with acute bronchitis. Chronic heavy smoking and air pollution contribute to chronic bronchitis. The inflammation of the bronchi brings about thickening and an increase in mucous secretions, oedema, decrease in ciliated cells and narrowing of the bronchi.

Acute bronchitis is commonly a bacterial infection, which responds well to broad-spectrum antibiotics. Patient education goes hand in hand with the antibiotics, especially on the importance of completing the dose and recognition of symptoms of complications such as chronic obstructive pulmonary disease.

Bronchial Asthma

It is an intermittent, reversible, obstructive airway disease that is characterised by increased responsiveness of the trachea and bronchi to stimuli resulting in the narrowing of the airway.

Types

1. Extrinsic asthma - Patients usually have a history of earlier allergic conditions like eczema or allergic rhinitis. They usually have known allergies like pollens, animals and food. Children with this type of asthma recover with age especially in adolescence.
2. Intrinsic - This is not related to any allergen. The attacks become more severe and frequent with time and can progress into chronic bronchitis or emphysema. Factors associated with intrinsic asthma include environmental pollutants, cold weather, exercise, respiratory tract infection or drugs especially the non steroidal like aspirin.

3. Mixed - This is the most common and has both the characteristics of the intrinsic and extrinsic type.

Pathophysiology

Exposure of the person to a stimulant causes the initiation of an immunological response which leads to production of antibodies against the allergen and antigen.

Re-exposure results into the antigen binding into the antibodies resulting into the production of cell mediators which include histamine, and prostaglandins. These mediators cause the muscles of the airway to go into spasms, mucus membrane swelling and hyper production of mucus secretion. This leads to broncho constriction with increased secretion causing further obstruction of the airway.

Breathing in becomes easier with more effort required in expiration due to narrowing of the bronchus and increased secretion. The secretion produces a sound as air squeezes out of the constricted bronchus. This sound is called a wheeze.

Clinical Features

- Cough is present due to production of excessive mucus secretion
- Slow laboured breathing with excessive use of accessory muscles
- Obstructed airway creates dyspnoea
- Profuse sweating, weak pulse and cold extremities is experienced due to fluid loss and dehydration
- Occasionally nausea, vomiting and diarrhoea
- Air hunger and chest tightness

Management of Asthma

When the patient has ineffective breathing due to bronchospasms, mucosal oedema and increased secretions:

- Provide a comfortable sitting up position to facilitate breathing and use of accessory muscles.
- Give low humidified oxygen to increase oxygen saturation and correct hypoxia.
- Monitor the vital signs and respiratory activity of the patient to identify any change of condition and acute dyspnoea.
- Monitor blood gases with pulse oximetry or blood gases analysis to monitor oxygen saturation.
- Auscultate patient's chest, premedicate with broncho dilator, advise deep breathing, coughing and chest physiotherapy to open airway and to allow good sputum removal.
- Teach patient deep breathing to increase PaO2 and reduce the respiratory rate.
- Administer broncho dilator to reduce bronchospasms.

Management of Asthma

When the patient has ineffective airway clearance related to broncho spasms, ineffective cough and increased mucus production:

- Ensure absence of possible allergen to reduce the severity of attack.
- Assess patient’s ability to expectorate secretions noting the character, quantity and odour of the secretions to rule out any infection.
- Carry out culture and sensitivity tests and treat with appropriate antibiotics.

When the patient becomes anxious due to difficulty in breathing:

- Give simple, concise explanations to situations and procedures to alleviate anxiety.
- Provide reassurance by staying with the patient and allowing full participation.

When there is risk of infection due to impaired airway clearance:

- Assess for infection, do culture and sensitivity tests and give the appropriate antibiotics

When the patient has a knowledge deficit on the management of asthma:

- Teach patient and relatives about the important aspects of management.
- Enlighten patient on what asthma is, good asthma control management and medication and their safe use.

Diagnosis

- History of hypersensitivity to known allergen or stimulant
- Clinical manifestation
- Pulmonary function test, BGAs
- Chest x-ray

Status Asthmaticus
Status asthmaticus is severe bronchial asthma that is unresponsive to conventional therapy and lasts for more than 24 hours.

Causes incluide:
- Infection that is not resolved
- Anxiety
- Dehydration
- Increased beta block
- Non specific irritant
- Use of aspirin
- Pathophysiology

There is narrowing of bronchus, with bronchospasms and swelling. Increased mucus production limits air movement and patient ends up with hypoxaemia. Patient presents with respiratory alkalosis initially and as condition persists progresses to acidosis.

Clinical Features
Severe form of the acute asthmatic. However, with severe asthma, wheeze may be minimised.

Management
- Patient is admitted, preferably in a pulmonary ICU.
- Intravenous fluids are given to replace lost fluids.
- Nebulisation can be attempted if not initially used to cause broncho dilation.
- Low humidified oxygen is used where dyspnoea is marked. With poor ventilation, treat with endotrachial intubation and mechanical ventilation.
- Intravenous drip of aminophylline is commenced with corticosteroid used to restore bronchial reactivity.
- Mucolytis may also be used to help in the removal of secretions.
- Antibiotics are used for treatment of underlying respiratory infection or prophylactically.
- Carry out constant monitoring of the vital signs to identify deviations from normal and also to evaluate the effectiveness of the therapy.

Bronchiectasis
When small bronchi are permanently dilated it is called this bronchiectasis. This is associated with bacterial infection. There is persistent cough to remove mucous retained in the dilated areas, which increases the pressure, worsening the dilation. Pus may form or bleeding may occur. This condition can lead to hypoxia and it can also contribute to right sided heart failure.
Bronchiectasis is normally treated with bronchodilators, mucolytic agents, expectorants and antibiotics. Good hydration, to liquefy secretions, must be maintained. Postural drainage and avoidance of air irritants are also important.

Lung Cancer
Lung cancer is mainly treated by surgery and radiation therapy. Make sure that the patient has effective breathing patterns, adequate airway clearance, adequate oxygenation, minimal pain (or none at all), and adherance to treatment regimen. If one has undergone surgery, postural drainage, airway clearance and an effective breathing pattern are the goals of care.

Emphysema
Pulmonary emphysema is an irreversible distention of the bronchioles, alveolar ducts and alveoli. This results in increased capacity of the lungs. In this condition, the alveoli may merge, hence decreasing the surface area. The factors thought to predispose to emphysema are smoking, acute inflammation, chronic cough and congenital defects that result in deficiency of proteolytic enzyme in the lungs.
Emphysema may also result from rupture of the lung through stab wounds and accidents. Emphysema can be divided into alveolar or interstitial emphysema.

Emphysema is managed by:
- Treatment of respiratory tract infection if present
- Bronchodilators such as anticholinergics, beta-2-adrenergic blockers and corticosteroids
- Chest physiotherapy to improve the removal of secretions
- Positive end expiratory respiration if the patient is on assisted ventilation, this prevents
  alveolar collapse
- Breathing exercises and retraining
- Hydration with at least three litres of fluid per day
- Advice on cessation of smoking
- Rest as appropriate
- Progressive plan of exercises and pulmonary rehabilitation

Empyema
This is the collection of pus in the pleural cavity. It is usually associated with underlying pulmonary infection.

Causes include:
- Ruptured lung abscess
- Thoracic surgery
- Penetrating wounds of the chest

Management
The goal of management is to drain the pus and allow and full expansion of the chest cavity.
- Antibiotics are used to check infection and prevent further pus formation
- Analgesics and antipyretics to reduce temperature and pain caused by inflammatory process
- The patient will be put on humidified oxygen to improve oxygen saturation. This is accompanied with positioning and breathing exercises
- Needle aspiration can be done in thin exudates under good monitoring of the vital signs
- Open drainage by decortication or pus removal may be done
- Heimlich valves can also be used
- Under water seal drainage may be done to allow for proper drainage of the pus and
  prevent atelectasis

Care of Patient on Underwater Seal Drainage

Insertion of chest tube through a thoracotomy incision with the aim of draining fluid or air from the chest cavity and passing it into or through a water bath to prevent back flow of air or fluids into chest cavity.

Indications
- Pnemothorax
- Haemothorax
- Hydrothorax

Procedure
The procedure of setting an underwater seal drainage is done in the ward or at the emergency room. The thoracotomy tube is passed through a system of bottles with fluids to prevent back flow or entry of air into the chest and to provide for suction pressure. The fluid contained must be sterile to prevent ascending infection.

Patient care
- X-ray of the chest is done to confirm the position of the tube.
- Keep patient in a comfortable position where patient is able to breath effectively to improve oxygenation and prevent hypoxia.
- Keep tubings straight to avoid coiling which might end up with obstruction to flow.
- Ensure tight tubings to prevent leakage and back flow and air entry in pleural space.
- Check vital signs to evaluate patients condition.

Patient Care
- X-Observe the bubbles/dripping of fluids into the underwater seal fluid to ascertain patency
- Change the fluid in the sterile bottle using aseptic technique to limit infection
- Mark the amount of fluid in the seal bottle to have an accurately drained amount
- Remember never to put the drainage bottle above the patient level
- Milking the tubings increases the amount of negative pressure and can therefore be done periodically
- While changing the patient's position, tube cramping is done to prevent back flow

Chest Tube Removal
- Give the patient pain medication before removal of the tube
- Ensure chest x-rays are done to check lung expansion
- Drainage should have stopped
- Removal is done by cutting the suture and sealing the area with petroleum jelly dressing gauze. It is removed during deep expiration
- Observe patient for any respiratory distress and signs of infection
- The dressing should be completely removed when healing is complete

Atelectasis

Atelectasis refers to the collapse of an alveoli, lobule or lung unit. This could be due to defective expansion of the lungs at birth as a result of obstruction, poorly developed lungs and poor stimulation in the respiratory centre. It may also be acquired as a result of severe lung infection, particularly where there is poor clearance of secretions. Bronchial carcinoma and bronchiectasis are also common causes. The patient may present with dyspnoea, cyanosis, prostration and chest pain. There is cyanosis and anxiety with dyspnoea.

The affected side or part of chest has little movement with the opposite side experiencing excessive chest movement.

Management

- Endoscopic procedures may be performed.
- Carry out a radiograph e.g chest x-ray.
- Angiograph - study of pulmonary vessels. The goal of management is to increase ventilation and remove the obstruction.
- Encourage the patient to cough and do suction where indicated. Chest physiotherapy will also assist in facilitating secretion drainage.
- Oxygen therapy will be done to increase oxygen concentration during inhalation.

Pneumonia

Pneumonia is an acute respiratory illness, which is either segmental or affecting more than one lobe. It can be community acquired, hospital acquired or occurring due to immunosuppression. It can also occur as a result of aspiration of contents. The factors that contribute to this process include damage to the epithelia lining by chronic disease, chronic bronchitis and aspiration of contents from the stomach when drunk or unconscious. In our setup, the common infectious agents include: streptococcus pneumoniae, klebsiella pneumoniae, haemophilus influenzae and staphylococcus aureus. In patients with an impaired immune system, the agent pneumocystis carinii commonly causes pneumonia in the immunocompromised.

Patients with pneumonia clinically present with breathlessness, cough, fever, chest pain, tachypnoea and reduced chest movements. Subjectively, the patient with pneumonia may complain of dyspnoea, and fatigue. On x-ray the film may show pulmonary infiltration. The cough accompanying pneumonia may have several characteristics. It could be purulent, or yellow and blood stained, or red and gelatinous.

The goals of nursing care for a patient with pneumonia are: the patient to have clear breath sounds, normal breathing pattern, normal chest x-ray and no complications related to pneumonia. Although many patients in our set up are treated on an outpatient basis, some may be admitted into hospital and will require interventions ranging from measures to ensure comfort, good nutrition, fluids and electrolytes and patient education on infection prevention and control.

Before the actual management, it is recommended that vital signs and breathing patterns are assessed. It is recommended that sputum is collected for culture and sensitivity testing. Determine the colour, consistency and amount of sputum the patient is producing.

When the patient has ineffective breathing due to pneumonia and pain:

- Monitor respiratory function of a new patient's respiratory response to treatment, this should include blood gas analysis, pulse oximetry, respiratory rate and rhythm.
- Position patient in an upright position to ease breathing and facilitate use of accessory respiratory muscles.
- Give oxygen by mask or nasal cannular depending on the patients need.

When the patient has splenic pain:

- Administer analgesia and provide information that can relieve pain
- Observe the pharmacological effects of the drugs
- Patient is at risk of infection complications
- Administer antibiotics and observe their effects to therapy
- Monitor for any signs of hypoxemia

Where there is an ineffective airway clearance due to thick secretions:

- Administer broncho dilators, mucolytics and exercises to facilitate secretions removal
- Maintain input of IV fluids to replace lost fluids and dilute the secretions (reduce the viscosity)

When the patient is at the risk of altered health maintenance:

- Educate the patient on health, self care, and safe use of drugs to prevent recurrent infection
- Educate the patient on safe health practices and discourage unsafe practices like smoking
- Teach the patient about food and nutrition that will help maintain a healthy body

To maintain body temperature:

- To relieve fever to promote comfort you can use antipyretics
- Provide fluid replacement for fever and dehydration

If an activity intolerance exists due to dyspnoea on exertion:

- Administer oxygen and increase oxygen intake dependent on patients needs
- Plan for patient to prevent any unnecessary interruptions in order to decrease lung activity and promote ventilation
- Note signs to evaluate the condition and identify deviation from the normal
- Rehabilitation

Complications

- Lung Collapse
- Emphysema
- Empyema
- Hypoxemia

Manifestations of Tuberculosis

Bacteria cause tuberculosis. This is the mycobacterium tuberculosis, also referred to as acid-fast bacilli. These bacteria are spread either by droplet infection or dust contaminated by sputum. Tuberculosis is divided into primary TB and secondary TB.

Primary TB is infection to the lungs as a result of mycobacterium tuberculosis. When microbes colonise the lung, macrophages surround the microbes, triggering the body's defence mechanisms. These macrophages spread to other areas and primary complexes are formed at the Hillary lymph nodes. Caseous material forms in several areas including the lungs. Caseous material is basically necrotic (dead) tissue. The disease may then be referred to as pulmonary tuberculosis.

The clinical features of pulmonary TB are persistent cough for more than four weeks, unexplained weight loss, chest pain, night sweats, poor appetite and haemoptysis.

It is called extra pulmonary tuberculosis if it affects areas outside the respiratory system. When the disease is extra pulmonary, the manifestations may include enlarged lymph nodes, pain and swelling in the joints, meningitis and paralysis if the spine is involved. This is a condition that is very common in Kenya.

Secondary TB is infection that is due to the caseous material in other organs such as the spinal cord, bone and brain.

Management of Tuberculosis

TB is treated with standard pharmacologic agents. While nursing a patient with tuberculosis, the overall nursing goals are that the patient will:

- Comply with the therapeutic regimen
- Have no recurrence of the disease
- Have normal pulmonary function
- Take appropriate measures to prevent the spread of the disease

Pleural Disease

The pleura can be inflamed after injury or as a result of introduction of microbes from other processes. Accumulation of air within the pleural cavity results in pneumothorax. Tension pneumothorax is due to stab injury that allows air to enter, but not leave, the pleural space. Pleural pain, dyspnoea, chest asymmetry and hypoxia are common manifestations of pleural involvement.

Pleural Effusion

Pleural effusion refers to accumulation of fluid in the pleural cavity. The fluid may be blood, serous exudates or pus. It can be a complication of diseases such as pulmonary tuberculosis or lung cancer. It can also follow increased pressure due to heart failure, and increased permeability due to inflammation and impaired drainage. The manifestations are almost the same as pneumothorax. However, the percussion note on examination is different (dull).

The note elicited when percussing air filled cavities sounds like a drum.

Generally, a detailed history and physical assessment must be undertaken to come up with nursing diagnoses. Other than the medication, teaching on how to avoid spreading the disease, continued follow-up and compliance with the drug regimen and good nutrition must be given. The management of tuberculosis will

be mentioned again under communicable diseases.
The involvement of the chest and pleura can be very distressing.
It is important to institute measures to ensure that respiratory function is not compromised.

Management of Pleural Disease and Chest Trauma

The emergency management of chest injuries involves:

- Establishing and maintaining an airway
- Administering high flow oxygen
- Establishing IV access
- Monitoring vital signs, level of consciousness and urinary output
- Assessing for tension pneumothorax
- Dressing a sucking chest wound with nonporous material
- Putting the patient in semi-Fowler's position or laying them on the injured side if breathing is easier
- A pneumothorax can be aspirated if there is minimal air or fluid in the pleural space
- Chest tubes and under water seal drainage are the most definitive treatment modalities

The nursing care for a patient on underwater seal drainage includes the following actions:

- Avoid kinks in the tubing
- Keep all connections tight
- Keep the water seal and suction chambers at appropriate levels by adding sterile water as needed
- Mark the drainage levels appropriately
- Follow principles of asepsis when emptying the fluid and when changing the bottle
- Observe for air bubbles in the water seal chamber and fluctuations in the chest tubes
- Air should be bubbling from the chest tube. Check for intermittent bubbling in the water seal
- Monitor the patient's status and avoid elevating the drainage system to the level of the patient's chest or above
- Encourage the patient to cough

Pulmonary Embolism

Pulmonary embolism develops when venous thrombus or embolus from peripheral circulation lodge in the pulmonary artery or one of its branches. The commonest causes are:

- Venous stasis as a result of immobility
- A flushed blood clot from an IV line

The clinical findings are: dyspnoea, restlessness, anxiety, sharp pleuritic pain, and increased pulse, respirations and temperature.
The management involves anti-coagulants and thrombolytic drugs.

Pulmonary Embolism

The patient should be placed in a good comfortable position preferably High Fowler's position. Monitor them closely and administer oxygen. Keep the patient calm and monitor for the development of hypoxia. The patient with pulmonary embolism should be given IV fluids with caution if pulmonary oedema has developed.

SECTION 2: CIRCULATORY SYSTEM

In this section, you will study the circulatory system. It comprises of the blood, cardio vascular and the lymphatic systems. All the three systems are involved in transporting substances from one point to the other, thus they are also classified under systems dealing with communication in the body.
It is advised that you read and understand anatomy and physiology of these systems before you continue further.

Refer to Rose and Wilson 9th Edition pages 59-129.

Objectives

By the end of this section you will be able to:

- Describe the composition and function of blood
- Describe the structures and functions of the cardio-vascular system
- Describe the structure and functions of lymph vessels and lymphatic tissue
- Describe the disorders of the circulatory system.

- Explain the management of an adult suffering from circulatory disorder

Composition and Function of Blood

In section one of this unit you learned that blood is one type of connective tissue. Blood carries oxygen and carbon dioxide, nutrients and wastes, hormones, protective substances such as antibodies and blood clotting factors.
Blood consists of plasma and different blood cells. Plasma is a fluid that is almost 90% water. It contains plasma proteins, salts, nutrients, organic wastes, enzymes and antibodies dissolved in it. Three groups of cells are found in the blood.

These are:

- White blood cells (Leucocytes)
- Red blood cells (Erythrocytes)
- Platelets (Thrombocytes)

White Blood Cells
White blood cells are the largest of all the blood cells. They contain nuclei, and some have granules in their cytoplasm. There are three main types, each have different functions. These are granulocytes, monocytes and lymphocytes. The granulocytes are involved in the phagocytosis of bacteria and foreign particles. Phagocytosis is the process of engulfing an unwanted organism and digesting it. The granulocytes include neutrophils, eosinophils and basophils. They are also referred to as polymorphonuclear leucocytes.

Lymphocytes are of two types and they form the basis of the immune response.

1. Thymus dependent (T) lymphocytes
2. Non-thymus dependent (B) lymphocytes

The lymphocytes are involved in keeping memory of the various antigens encountered over time.

Red Blood Cells
Red blood cells (erythrocytes) are produced through a process called erythropoiesis. This process is regulated by oxygen requirements and is controlled by a hormone called erythropoietin, which is produced by the kidneys. When patients have chronic renal failure, they suffer from anaemia due to decreased erythropoiesis.

The function of the red blood cells is to transport gases and regulate the acid base balance. The major component of the red blood cell is haemoglobin. This is the red pigment that gives blood its colour. This has the characteristic of combining with oxygen to transport it to various points in the body.

When a red blood cell has lived for about 120 days it is destroyed by spleen macrophages through a process known as haemolysis. This destruction produces bilirubin, which is mixed with bile. You will learn more about the process of bilirubin formation when you look at the liver and gall bladder.

Platelets
These have the major function of initiating blood clotting. They also act as plugs in capillaries to close any opening.

Blood Clotting
Normal blood clotting relies upon the complex interaction between the vessel wall, the platelets and various coagulation factors.
The process of blood clotting takes place after the activation of prothrombin to thrombin in the presence of other clotting factors. The thrombin acts on the protein fibrinogen to form fibrin that is part of the clot.
The activation of prothrombin occurs after a long chain of events that involve the activation of various clotting factors in the blood. There are twelve blood-clotting factors involved in this process. When any of these factors are missing, clotting is affected and individuals may bleed to death.

Blood Groups
These are associated with genetically determined antigens on the red blood cell membrane and naturally occuring antibodies in serum. Two systems are commonly used in blood grouping. One is the ABO system and the other is the Rhesus system. By the ABO system, people are of blood group AB, A, B, or O depending on whether they have A and B, A, B, or no antigens on their red blood cells.
Blood group A has 'A' antigens and has natural antibodies against the other types, that is B and AB. The person with blood group B has "B" antigens and has natural antibodies against A and AB.

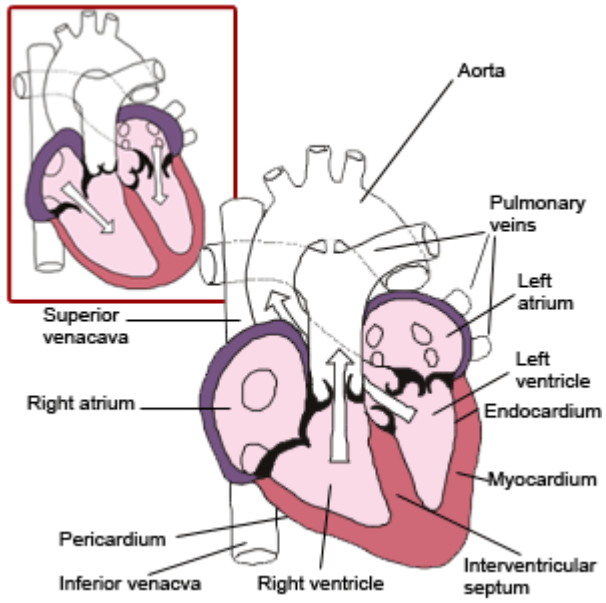
The Rhesus system depends on whether an individual has the Rhesus antigen, in which case they are Rhesus positive, or not. If they don't

have it, then they are Rhesus negative and will form antibodies against the Rhesus antigen and lyse (destroy) the Rhesus positive blood.

The person with Blood group O Rhesus negative has no antigens and has antibodies against A, B, and AB. This person can therefore donate blood to anybody but can only receive blood from group O negative.
The person who is type AB Rhesus negative can receive blood from any donor both Rhesus positive and negative. However, AB Rhesus negative can only give blood to itself.

The internal circulation consists of the blood system (the heart, vessels and blood) and the lymph system, which is made up of lymph nodes, lymph vessels and lymph.

Structure and Function of the Heart



The heart is a cone shaped hollow muscular organ about the size of a person's fist. It is located within the thoracic cavity between the lungs. Its apex is pointed down and towards the left at the fifth inter-costal space.
The walls of the heart consist of three layers. The first is the endocardium, which is a single layer of epithelium and underlying connective tissue. This is the innermost layer and it is continuous with the inner lining of arteries and veins. The middle layer is the myocardium, which comprises specialised cardiac muscle fibres. The third and outer layer of the heart is the pericardium which is made up of two sacs: an outer fibrous sac and an inner sac, a serous membrane, whose parietal layer lines the fibrous sac and the visceral layer or epicardium which is adherent to the heart muscle. The space between the parietal and visceral layers is only a potential space.
The heart is divided into a right and left side by a wall called the atrioventricular septum. This wall is composed of myocardium lined by endocardium.
Each side is further divided by a valve into an upper chamber (the atrium) and a lower chamber (the ventricle). The right atrioventricular valve has three flaps and is called the tricuspid valve. The left has two flaps and is called the mitral valve. These valves open and close according to pressure changes and allow blood to pass from one chamber to another.
The heart acts as a pump and because of its two sides, it can be considered as two pumps in one.

Blood flows into the heart from the superior and inferior vena cavae. The blood is emptied into the right atrium, passes through the right valves into the right ventricle where it is pumped into the pulmonary artery.
The pulmonary artery has the pulmonary valve to ensure blood does not flow backwards. This pulmonary valve has three flaps that make the semilunar valve(s). After leaving the heart, the artery divides into two to supply the right and left lungs. This ensures that the blood becomes oxygenated before it returns to the heart via the pulmonary veins into the left atrium.

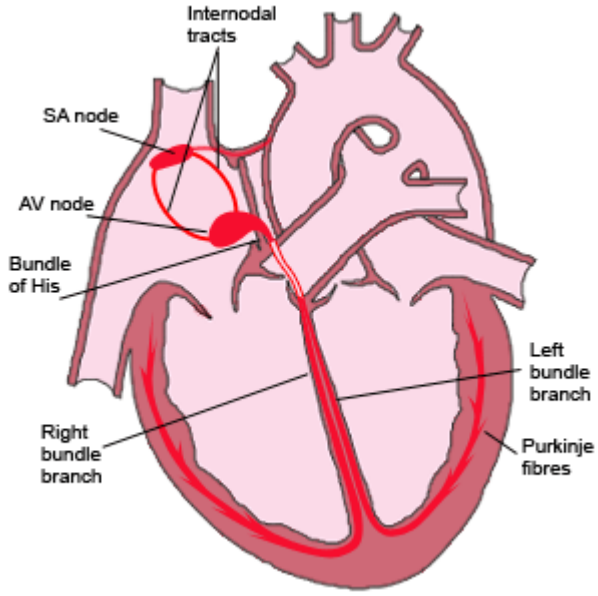
The blood then passes through the left atrioventricular valve, the mitral valve, into the left ventricle to be pumped into the aorta and into the rest of the body. The aorta has a valve as well to ensure blood does not flow back to the left ventricle when it relaxes.
The heart itself is supplied with blood by the coronary arteries, which branch off from the aorta. They form a network of capillaries traversing the heart. Venous blood is collected into small veins that join to form the coronary sinus which empty into the right atrium.
The blood supply to the heart is called the coronary circulation. When this is disrupted, the heart may lack oxygen and nutrients. The most common factor that leads to interrupted blood flow to the heart is narrowing of vessels due to the deposition of cholesterol (atherosclerosis).

This can lead to such conditions as myocardial infarction.

The Conducting System of the Heart

The heart muscle is intrinsically excitable and, therefore, can contract on its own. There are specialised cells in the myocardium, which start an impulse. These specialised areas include the sinoatrial node (SA node) in the wall of the right atrium. This is the 'pace maker' of the heart. The other one is the atrioventricular node (the AV node) located on the wall of the septum near the right atrioventricular valves. This is stimulated by impulses from the SA node. It can also initiate its own impulses but at a slower rate than the SA node.

The last one is the Bundle of His, located in the wall of the septum. It passes downwards into the ventricular septum, and at the apex of the heart divides into the right and left Purkinje fibres. The Purkinje fibres pass impulses to the apex of the heart where the wave of contraction begins.



The heart functions as a pump and consists of a series of events, comprising contraction and relaxation.

The contraction and relaxation is called the cardiac cycle. When the heart contracts and relaxes, blood passes through the valves into the
various chambers.

The opening and closing of the valves produces heart sounds that are audible on auscultation.

Cardiac output is the amount of blood pumped by
each ventricle in one minute. Cardiac output is equal to the heart rate multiplied by the stroke volume, the amount of blood pumped by a ventricle with each beat. Sounds that are audible on auscultation are described as the 'lub' and 'dub'.

Lub is usually loud and more audible. This is caused by the closure of atrio-ventiricular values caused by increased ventricular pressure during systole. Dub is due to the closure of semilunar valves which is caused by relaxation of ventricles during the ventricular diastole.

The blood is then circulated around the body at a certain pressure maintained by peripheral resistance, elasticity of artery walls and the force of contraction

Pulse

Pulse refers to the palpable wave of distension and relaxation in arterial walls following left ventricular contraction. The pulse or the wave of distention is due to blood pressure. The pulse rate is the number of heartbeats per unit time. The pulse rhythm is the regularity with which the heart beats.

The pulse is measured at various points on the human body. During measurement, the rate, rhythm and force/strength of contraction must be determined. The various points of palpation include antecubital, popliteal, femoral, carotid, and radial arteries.

The average pulse rate in an adult is 60-100 per minute.This is determined by the state of the arteries supplying the periphery and the ability of the heart to generate enough force to circulate blood to the periphery.

When measuring the pulse rate of a patient, remember to note the rhythm and strength as well!

The heart pumps blood to all parts of the body and is carried through blood vessels. These vessels vary in structure, size and function. They comprise of the arteries and veins.

Arteries

These are blood vessels that carry blood away from the heart. Large arteries have more elastic tissue allowing them to possess the elasticity property.

They sub-divide into small blood vessels called the arterioles. Anastomoses may also be formed linking one artery with another.

Veins
These carry blood back into the heart. Their walls are thinner and are continuous with the arteries thus forming a closed circuit through where blood circulates. Between the arteries and the veins are capillaries which facilitate the interchange of substances between the tissue and the circulatory system. Some veins in the lower extremities have valves which prevent back flow of blood.

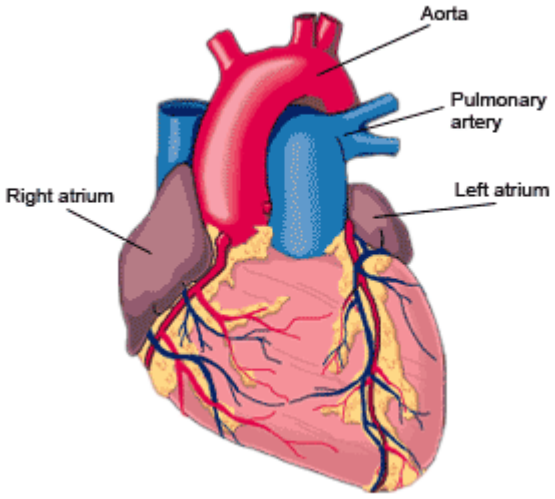
Blood Pressure
The blood pressure refers to the transmitted force of contraction that moves blood through the various vessels. The pressure is measured during contraction (systole) and during relaxation (diastole) of the ventricles. The pressure that you have been measuring is the arterial blood pressure. It measures the force of transmission in the arteries. There is also venous pressure that can be measured centrally through a catheter. This is called central venous pressure (CVP). The central venous pressure measures the pressure in the heart chambers.
The arterial blood pressure can be affected by factors such as total peripheral resistance and cardiac output. The renin-angiotensin-aldosterone system produces angiotensin that can act directly on peripheral vessels to increase the resistance and, therefore, affect blood pressure. Many diseases of the kidneys, liver and heart can lead to an increase in blood pressure. Endocrine diseases such as hyperthyroidism, Cushing's syndrome and Addison's diseases can affect blood pressure.
There may be variations in the blood pressure in the same individual depending on the emotional status, position during blood pressure measurement and the point of measurement. This means that the patient must be calm and in one position before taking arterial blood pressure. For instance, the arterial pressure while sitting may vary from that taken while one is lying on the left side.

Structure and Function of the Blood Circulation

Blood pumped from the heart (the left ventricle) is carried by the aorta, which has three distinct parts:

- The ascending aorta
- The arch of the aorta
- The descending aorta

Various arteries branch off from these three parts of the aorta to supply all parts of the body. These arteries subdivide further until the capillary network is formed. The capillaries start re-grouping until they form veins that return blood to the right atrium through the superior and inferior vena cavae.



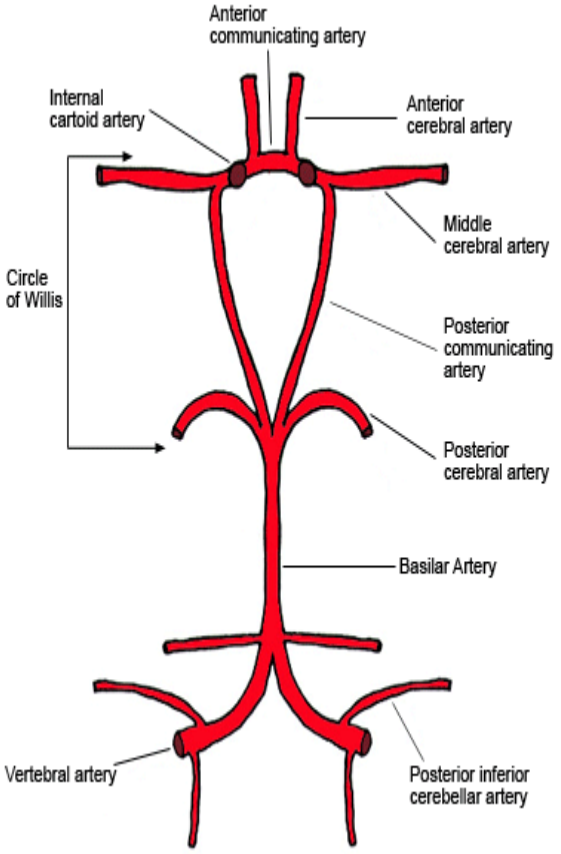
The pulmonary circulation refers to that part of circulation taking blood from the heart to and from the lungs.
Branches of aorta supply the neck and the head. The major arteries supplying the head and the neck are common carotid arteries and the vertebral arteries. The common carotid arteries subdivide into the internal and external carotid arteries.
The external carotid arteries supply the superficial structure of the head and neck while the internal carotid artery supplies the internal structures.

The Circle of Willis

This refers to the network of arteries that supply the brain. It comprises of:

- two anterior cerebral arteries
- two internal carotid arteries
- one anterior communicating artery
- two posterior communicating arteries
- two posterior cerebral arteries
- one basilar artery

Two vertebral arteries arise from subclavian and pass through the foramen magnum into the skull. They join shortly after forming one basilar artery.



The basilar artery branches into the right and left posterior cerebral arteries. These two arteries are joined to internal carotid arteries which enter the cranial cavity from the mid part of cranial wall by the left and right posterior communicating arteries.
Within the anterior, two anterior cerebral arteries arise from internal carotid arteries and are joined by the anterior communicating artery.
This arrangement completes a circle in the cranium commonly called the circulus arteriosus of arteries or the Circle of Willis.

The blood circulation from the abdominal organs forms the portal circulation. The portal circulation is involved in taking blood from the intestines where nutrients have been absorbed to the liver where the nutrients will be stored or broken down.

Lymphatic System

The lymphatic system consists of lymphatic capillaries and ducts, which carry fluid from the interstitial spaces to the blood and the lymph nodes, which trap particles. Lymph is important because it transports proteins and fat from the gastrointestinal tract. It also transports certain hormones back to the blood. Excess interstitial fluid returns to the blood through the same process to avoid development of oedema.

Lymphatic Fluid

Lymph fluid is pale yellow and diffuses through lymphatic capillary walls. It circulates through its own vessels.
When the fluid is too much, and there is blockage of the vessels, lymphoedema can develop.

Lymph Nodes

Lymph nodes are part of the lymphatic system. They are small and round or bean shaped and vary in size.
Their function is filtration of bacteria and foreign particles.
They are situated at strategic places in the body for
this purpose.

Spleen

The spleen is formed by reticular and lymphatic tissue and lies in the left hypochondriac region of the abdominal cavity.
It is enclosed in a fibro-elastic tissue that forms trabeculae.
It has the splenic pulp made of lymphocytes and microphages.
The function of the spleen includes:

- Maintenance of body immunity
- Phagocytosis
- Storage of blood
- Erythropoiesis

Thymus

The thymus is situated in the mediastinum and it

participates in the defence mechanisms of the body.

Disorders of the Heart

The heart is a very complex and important organ in our body.
You will now look at various disorders that may affect the normal functioning of the heart.

Disorders of the Pericardium

The pericardium is the outer covering of the heart and many processes can affect it. Infectious agents like bacteria, fungi and viruses can bring about inflammation of the pericardium. Inflammation can also result from immune disorders, metabolic disorders such as myxoedema, tissue injury, physical and chemical agents, for example drug reactions and radiation. All these factors bring about pericarditis, which can be chronic or acute.

Pericarditis

This is the inflammation of the pericardium of the heart. This is the pericardial sac that is made up of the parietal and the visceral plueral. Possible causes of pericarditis include viruses, bacteria, tuberculosis, fungi, syphilis, parasites, injury, auto immune disorders, rheumatic fever, radiation or neoplasm.

Pathophysiology

Pericardial tissue damage triggers inflammatory response causing vasodilatation, hyperaemia and oedema. Capillary permeability increases allowing proteins to escape into pericardial space.
Exudates which contains blood cells may form and if due to infection may be pulurent. This may increase the pericardial fluid substantially causing pericardial effusion. Pericarditis may heal with fibrosis or scarring which may restrict heart function.

Clinical Features

Patients with pericarditis present with chest pain, a friction rub and various symptoms that are related to the chest pain. These include anxiety, restlessness and palpitations.
This is the inflammation of the pericardium of the heart. This is the pericardial sac that is made up of the parietal and the visceral plueral. Possible causes of pericarditis include viruses, bacteria, tuberculosis, fungi, syphilis, parasites, injury, auto immune disorders, rheumatic fever, radiation or neoplasm.

Pathophysiology

Pericardial tissue damage triggers inflammatory response causing vasodilatation, hyperaemia and oedema. Capillary permeability increases allowing proteins to escape into pericardial space.
Exudates which contains blood cells may form and if due to infection may be pulurent. This may increase the pericardial fluid substantially causing pericardial effusion. Pericarditis may heal with fibrosis or scarring which may restrict heart function.

Clinical Features

Patients with pericarditis present with chest pain, a friction rub and various symptoms that are related to the chest pain. These include anxiety, restlessness and palpitations.

Management

- Assessment on quality and nature of pain and anxiety is important to rule out myocardial infarction
- Careful nursing observation including vital signs must be done to identify any deviation from normal
- Pain relief measures - allow bed rest, anti-inflammatory medication
- Antibiotics must be given for infections
- Anxiety reducing measures
- Pericardicentesis can be done under strict observation

Complications

- Pericardial effusion
- Tamponade and shock

Pericardial Effusion

Pericardial effusion is the presence of fluid in the pericardial cavity. The fluid can accumulate slowly or fast, and the amount can be small or large. This is what will determine the symptoms that patients will present with. Pericarditis on its own can result in effusion. The symptoms of pericardial effusion may therefore mimic those of pericarditis, in addition to high blood pressure and impaired cardiac return.

Cardiac Tamponade

Cardiac tamponade, which refers to compression, is one of the consequences following pericardial effusion. Pericardial effusion can lead to increased pressure in the heart and interfere with venous return. Cardiac tamponade is a very serious and life threatening disorder that needs urgent action.

Cause

Pericardial effusion, trauma, cardiac rapture or haemorrhage can cause cardiac tamponade.

Pathophysiology

There is increase in intra cardinal pressures that decreases the ventricular filling time and cardiac output.

During inspiration, the right ventricle receives more venous return thus causing the ventricular septum to bulge towards the left ventricle. This reduces the left ventricular pressure - and leads to low pulse pressure during inspiration. This is called pulsus paradoxicus.

Clinical Features

These include pulses parodoxicus, reduced cardiac output, dyspnoea, tachypnea, tachycardia, distended neck veins, mumbled heart sounds and dilated atrium.

Studies

- Electrocardiography
- Echocardiography
- X-ray shows cardiac enlargement
- CT scan identify the pericardial effusion
- Haemodynamic monitoring - elevated pulmonary pressures

Management

- Pericardiocentesis may be done to remove fluid from the pericardial sac
- Drug treatment includes anti-inflammatory drugs to reduce inflammation and promote comfort
- Surgery can be done in restrictive pericarditis
- Antibiotics may be used if associated with infection
- Maintain a calm environment and position of comfort
- Monitor patient vital signs
- Assess for pain and relieve as necessary

Management of Inflammatory Heart Disease

Adults with such conditions as endocarditis, infective endocarditis, myocarditis and pericarditis are likely to come under your care at sometime

Endocarditis

Endocarditis is the inflammation of the innermost layer of the heart. It may be infective or non-infective. Infective endocarditis is due to bacteria, viruses, yeast and fungal infection, while non-infective endocarditis may be due to rheumatic fever. Rheumatic fever might be caused by autoimmunity. Endocarditis presents with fever, heart murmurs, anorexia, malaise and lethargy.

Infective Endocarditis

Infective endocarditis will be managed by giving appropriate antibiotic therapy, antipyretics, rest and surgical valve repair if the valves are damaged. Rest periods can give the heart opportunity to use the little oxygen available well. Antipyretic medication is intended to control the fever.

For the patient with infective endocarditis, blood culture, X-ray and other specialised investigations may identify the problem. Then appropriate antibiotics can be given for the infection.

Myocarditis

Most patients with myocarditis recover spontaneously. However, they may be treated in the same manner as those with pericarditis.

Generally, the patient with inflammatory heart disease must be assessed well through clinical, radiological and laboratory techniques. Chest x-ray, blood culture and cardiac catheterisation may be used.

People, especially young children, undergoing dental surgery should be given prophylactic treatment to avoid the possibility of development of infective heart disease

Pericarditis

Pericarditis is treated after identification of the underlying cause with aspirin, bed rest, non-steroidal anti-inflammatory drugs, and corticosteroids. Steroids are intended to decrease the inflammation, while aspirin has thrombolytic activity.

If blood clotting occurs in the coronary circulation, there may be a decrease in the

supply of oxygen to the heart muscle, leading to myocardial infarction.

Coronary Heart Disease

This results from impaired blood flow to the heart muscles. Impairment of coronary heart flow may lead to myocardial infarction, angina and conduction disorders. It can also result in heart failure and death. Myocardial ischaemia occurs due to deficient blood flow to the myocardium. Ischaemia is deficient oxygen supply to a particular tissue. In the heart, this can manifest with a condition referred to as angina pectoris, which is chest pain or pressure sensation that the patient will describe as constricting and suffocating. Sometimes there can be ischaemia without angina. With continued lack of oxygen and nutrients, myocardial infarction can occur. An infarction is dead tissue.

The manifestations of myocardial ischeamia are: pain, weakness, dysrhythmias and signs of inflammation. Nausea, vomiting and epigastric discomfort are common. Tachycardia, restlessness and anxiety occur with the patient's skin becoming cold and moist. Myocardial infarction can cause shock, pericarditis, heart failure and ultimately, death.

The adult patient with coronary heart disease should be involved in identifying modifiable and non-modifiable risk factors and then managing those that are modifiable. These will decrease the risk of myocardial infarction. The modifiable factors include:

- Hypertension - The patient should have regular check ups and take prescribed medications. They should reduce salt intake, stop smoking and reduce their weight.
- Smoking - Patients should stop smoking.
- Obesity - Patients should change feeding patterns and habits, reduce caloric intake, exercise regularly, avoid fad and crash diets and avoid large, heavy meals. Fad diets are the fast foods that seem to be very fashionable but are not balanced.
- Diabetes mellitus - Patients with diabetes mellitus should control their diet, reduce their weight and monitor their blood glucose closely.
- Elevated serum lipids - Individuals should reduce animal (saturated) fat, engage in regular exercise and increase complex carbohydrates.
- Physical inactivity - Advise patients to develop and maintain a routine for physical activity.
- Stressful lifestyle - Increase patient awareness of behaviour that is detrimental to health such as long hours in stressful situations without breaks or leave.

In addition, the specific management of the disease includes drugs and supportive therapy. Patients can receive drugs, which increase lipoprotein removal, for example. cholesterol, and drugs that restrict lipoprotein production, for example, nicotinic acid.

Coronary artery disease can manifest as angina pectoris. This is treated with nitroglycerin if the patient has acute attacks. The tablets will be given sublingual when the patient is working hard and is likely to experience exertion. They are taken in three doses repeated one after every five minutes. Chronic angina prophylaxis involves antithrombotic therapy, nitroglycerin treatment, long acting nitrates, adrenergic blocking drugs and calcium channel blockers. Nitrates increase oxygen supply to the heart muscle. The overall goals of nursing care in coronary heart disease involve pain relief, reduced anxiety and modification of risk factors.

Myocardial Infarction

This refers to destruction of myocardial tissue on the regions where blood supply has been deprived because of reduced coronary blood flow.

Causes

The causes may include reduced coronary flow due to shock, haemorrhage or coronary occlusion.

Pathophysiology

Coronary artery may be occluded by an atheroma or emboli, resulting in reduced blood supply to the distal areas of heart. This result into an imbalance between oxygen supply and oxygen demand by the myocardial cells.

This results into ischemia, injury and lastly complete death of the myocardium cells called infarction.

Clinical Features

- Characteristic chest pain, usually described as sudden, sternal or may be

abdominal, radiates to shoulders or down arms. The pain is persistent and may be relieved by either rest or nitroglycerine. Referred to as anginal pain.
- The pulse may become rapid, irregular and feeble.
- Sweating may be present.
- Patient becomes very anxious due to release of catecholamine.
- Nausea and vomiting may result from reflex stimulation of the vomiting centre.
- Fever may be present which may be a manifestation of the inflammatory process of the dying cells.
- Blood pressure may be reduced with reduced urinary output as a result of reduced cardiac output.
- Ventricular aneurysm may be revealed under further examination.

Management

Investigations include:

- 12 lead ECG will reveal areas of infarction.
- Cardiac enzymes - there are enzymes released by dead cells. Some are specific to the cardiac cells and forms basis of diagnosis of cardiac infarction.
- Echocardiogram to assess the function of the valves.

Myocardial infarction requires IV fluid therapy, continued electrocardiogram (ECG) monitoring, narcotic analgesics and oxygen. Vital signs should be monitored every one to two hours while the patient is put on strict bed rest. Thrombolytic therapy, anticoagulants and nitroglycerin are given while at the same time recording intake and output. An infusion of lidocaine may be given to prevent ventricular fibrillation.

When nursing the patient with myocardial infarction always make sure that:

- The patient experiences pain relief
- The patient has no progression of myocardial infarction
- The patient receives immediate treatment and modifies high-risk behaviours.

Many of the patients that you will meet will be emergencies and, will therefore, need quick action to prevent death. The oxygen and nitroglycerin will come in handy. Patient teaching is important during rehabilitation. They must know how to adjust their lifestyles to cope with their problem.

Complications

- Cardiac arrhythmias - this may range from simple tachycardia to complex ventricular rhythms especially when the conducting system has been involved. ECG changes will be involved.
- Congestive heart failure occurs when pumping powers of the heart diminishes.
- Cardiogenic shock will follow in adequate oxygen transport to the tissues.
- Papillary muscle dysfunction - where infarcted area affects the areas controlling the valves.
- Ventricular aneurysms appear in the destroyed muscle tissue.
- Pericarditis may occur.
- Dresslers syndrome caused by antigen-antibody reactions to the necrotic myocardium.
- Pulmonary embolism may occur where a thrombus is involved.

Cardiac Arrhythmias

Cardiac arrhythmias are the result of a disordered contraction of the heart muscle. Fibrillation is the contraction of heart muscle in a disordered sequence

Atrial Fibrillation

The atria has uncoordinated and disorganised atrial stimulation due to presence of numerous ectopic foci stimulating the atria at a very fast rate. Atrial contraction is limited to quivers with no effective atrial contraction.

Ventricular rhythm will depend on the response of the atrio-ventricular node. Most impulses may be blocked allowing ventricles to have a slower rate.

Ventricular Fibrillation

The ventricle has rapid, uncoordinated and disorganised impulse stimulation due to presence of many ectopic foci pacing the heart resulting into ineffective ventricular contraction. Blood flow to various organs is impaired because there is no stroke volume and death results if no emergency measures are taken.

Emergency cardio-pulmonary resuscitation is the only option with ventricular defibrillation being the management of choice.

Atrio Ventricular Block

Heart block occurs when there is delay of an impulse between the atria and ventricles. This is due to a delay of stimulation of the AV node. This results in bradycardia or heart rate of less than 35 beats per minute. Improper use of certain drugs, myocardial ischaemia and myocardial infarction cause heart block.

Care of the Patient with Dysrythmia

The patient with dysrythmia needs to be investigated and the underlying cause treated. They may receive drugs, bed rest and surgical corrections. The various drugs indicated for cardiomyopathy include digitalis, diuretics and angiotensin converting enzyme (ACE) inhibitors. The digitalis increases the force of contraction of the heart muscle. The diuretics will decrease the venous return, hence decrease the cardiac output. This lessens the work that the heart has to perform.

Emergency Management of Dysrhythmias

- Establishing and maintaining a patient's airway
- Administration of oxygen via nasal canular
- Establishing an IV line with a large gauge needle
- ECG monitoring
- Being prepared to initiate cardiopulmonary resuscitation (CPR) and defibrillation should the need arise
- Monitoring vital signs
- Reassuring the patient

Some of the drugs that are used in the treatment of dysrhythmias are atropine, digoxin, quinidine, procainamide, verapamil and beta-blockers. Some of the drugs increase the force of heart contraction, while others open up the peripheral circulation to relieve the heart of too much work. It is important that you get acquainted with the use of cardiac electrodes and the technique for CPR and defibrillation. You can learn this from your more experienced colleagues at work.

Hypertension

Hypertension is another common condition in your practice.

Hypertension can lead to rupture of small blood vessels, hence eye, renal and heart complications, ascitis, liver failure and so on. It can also lead to coronary heart disease, heart failure, kidney failure, and stroke.

The causes of hypertension are not very clear, but there are some predisposing factors. These include heart disease, liver and kidney disease and eclampsia in pregnancy. In many individuals, hypertension has a genetic predisposition.

A stressful lifestyle can also contribute to hypertension.

Hypertension is confirmed when there is an increase of over 20mm Hg diastolic pressure on more than two occasions. That means that the individual is measured on different days and the increase is persistent.

The management involves the use of drugs and modification of one's lifestyle.

The drugs commonly used are diuretics, blood vessel dilators, centrally acting drugs, and beta-blockers. The more familiar names are aldomet (methyldopa), inderal (propranolol), lasix (frusemide), and captopril.

The objective is to decrease the intravascular volume, decrease the force of contraction and decrease peripheral resistance. This is intended to decrease the amount of work being performed by the heart.

The preventive message given to the patient with hypertension is:

- Regular checkups
- Compliance with drugs
- Modification of lifestyle

Rheumatic Heart Disease

Rheumatic heart disease is one of the heart disorders that have serious consequences. It is caused by rheumatic fever which is an autoimmune disease following a throat infection by streptococcus pyogenes, that is, ß-haemolytic group A-streptococci.

The disease may cause heart valve damage leading to heart failure and death. The antibodies that result from rheumatic heart fever can also affect the myocardium, the endocardium or/and the pericardium.

The manifestations of rheumatic fever are fever, abdominal pain, sore throat, headache, polyarthritis, nausea and vomiting. Patients who have a sore throat should be vigorously treated.

Adults with rheumatic fever need bed rest. The rest is intended to avoid overworking the heart.

Benzathine penicillin is used prophylactically, while aspirin decreases the likelihood of clotting and corticosteroids are used to decrease inflammation.
The important aspects are to ensure there is no residual heart disease. Patients with vulvular heart disease can be treated either non-surgically or surgically. They receive prophylactic antibiotics, digitalis, diuretics, sodium restriction and anticoagulants. They may also benefit from anti-dysrhythmic drugs and ß-adrenergic agents.
These drugs and the purposes for which they are given have been mentioned previously. Surgery may be undertaken at specialised institutions.

Heart Failure
Heart failure is the inability of the heart to pump enough blood to meet the metabolic requirements of the body. Some of the causes of heart failure are:

- Damage of heart muscles
- Rupture of heart valves
- Pulmonary embolism
- Cardiac arrhythmias
- Severe hypertension

Heart failure can either be right-sided or left-sided failure

Right-sided Heart Failure

Right-sided heart failure occurs when the right ventricle is unable to pump blood adequately. This results into congestion in the right side of the heart, the viscera and peripheral tissues.
Increased blood flow in the periphery, leads to congestion in the blood vessels resulting into pitting oedema. Congestion in the hepatic circulation also leads to venous engorgement resulting into hepatomegally, ascitis and respiratory distress due to pressure on diaphragm.
Cardiac output improves at night due to improved rest and venous return. This increases diuresis usually referred to as nocturial diuresis.
The patient with right-sided heart failure will manifest with fatigue, oedema, distension of jugular veins, ascitis, cyanosis, anorexia, nausea, and vomiting.

Left-sided Heart Failure
This results from left ventricular failure. The left ventricle is not able to adequately pump blood out of the heart resulting in congestion in the pulmonary circulation.
Fluid accumulates in the lungs resulting into pulmonary oedema which manifests in dyspnoea at rest. Dyspnoea may be at night due to increased congestion in pulmonary circulation. This is caused by increased venous return which results into much more alveolar congestion.
Low cardiac output results into fatigability with decreased removal of catabolic waste.

Left-sided heart failure manifests with pulmonary oedema, hence shortness of breath, cyanosis and dyspnoea. It is important that you remember this well, so that you understand the rationale for management of patients with heart failure.

Congestive heart failure refers to accumulation of fluids in the body (especially the lungs) due to impaired cardiac function.

Care of the Adult with Congestive Heart Failure
It was mentioned earlier that congestive heart failure might be right-sided or left-sided. Therapy is directed towards improving left ventricular function by decreasing the after-load. There is also the need to increase cardiac output, improve gas exchange and reduce anxiety.

Treatments for Congestive Heart Failure
Underlying Cause
Investigations have to be done extensively to determine the cause of the failure.

History and Physical Examination
A history should be taken and a physical examination done. Cardiac monitoring, 12 lead ECG, echocardiogram nuclear imaging studies, and cardiac catheterisation may be done for specific diagnosis and management.

Improve Oxygenation
This may be achieved by administration of oxygen to increase the percentage of oxygen inspired per breath. If patient has severe heart failure with pulmonary oedema, endotracheal intubation might be necessary. Administration of morphine may also reduce oxygen demand by reducing anxiety. It also improves blood circulation by reducing venous return.

Promotion of Rest

Rest improves heart function by reducing venous return due to reduced work load. It reduces blood pressure and increases blood reserve in the veins. It also rests the respiratory system thus resulting into improved respiration and oxygen exchange.

Position the Patient
Position the patient in a sitting up position to reduce pulmonary congestion. This reduces venus return thus improving cardiac contraction.

Digitalis Therapy
Digitalis increases the force of contraction of the myocardium. It is helpful in patients suffering from atrial flutter, atrial fibrillation or fast ventricular rates. Digitalis therapy promotes diuresis thus reducing venous return. It also causes mild venus dilation which helps to increase venous pooling and reduce ventricular congestion.

Vasodilators
Vasodilators are used to reduce arterial congestion hence lower central venous pressure.

Dopamine
Dopamine may be used. When in low doses of below 10 micrograms/min improves renal circulation thus reducing incidence of renal failure.

Anti-arrhythmic Drugs
Anti-arrhythmic drugs may be used to improve cardiac function.

Cardiac Arrest
Incase of cardiac arrest, cardio-pulmonary resuscitation must be initiated within the next four minutes.

Treatments for Congestive Heart Failure
In addition the patient should have their:

- Weighed checked daily
- Sodium diet restricted
- Oedema monitored
- Urea and electrolyte levels tested to ensure balance and prevent weight gain
- Input and output chart strictly maintained to evaluate renal function
- Vital signs monitored to evaluate their condition and response to therapy
- Right-sided heart monitored for failure

Also give the patient general information on the disease and help them to attain self care status.

In the acute phase the patient should be:

- Maintained in the High-Fowlers position
- Given oxygen, morphine, diuretics, nitroglycerine, and ionotropic drugs (These are drugs that increase the rate of contraction of the heart muscle)

Heart Surgery

Heart surgery is increasingly becoming common in our centres. These operations involve open-heart surgery for the reconstruction and repair of the heart valves. In developed countries innovations are making it possible for patients to undergo surgery without the chest being opened. This is done by passing fibre-optic instruments and catheters.
For cardiac surgery, the patient is usually placed under cardio pulmonary bypass. This is a form of extra corporeal circulation of blood to outside environment. This provides means of circulating and oxygenating blood without passing through the heart or the lung.
Heamodilution, hypothermia and heparinisation are done to prevent complications that may result from extra corporeal circulation.
Types of operations requiring open-heart surgery:

- Mitral valve commissurotomy - opening of fussed parts of the valve leaflet
- Valve replacement, for example, aortic, mitral
- Removal of cardiac tumours
- Pericardectomy
- Left ventricular aneurism
- Surgical intervention in coronary artery disease
- Heart transplant

Pre-operative Care

- Aimed at ensuring optimum heart function before surgery. Investigations are done to confirm the diagnosis and the operation to be done.
- Patients and relatives have the fear of the unknown outcome. They are allowed enough time to express their fears. Reassurance is given to calm the patient and reduce their anxiety.
- Patient and relatives are shown the expected pre-operative and post-

operative care.
In Kenya visits are made to ICU to familiarise the family with the environment.

Post-operative Care

- Ensure proper rest to promote calm and healing
- Monitor for any haemodynamic changes due to compromised mycardial function as a result of surgery
- Monitor central venous pressure, maintain at 5-12cm of water
- Assess peripheral pulses and warmth to ensure good peripheral perfusion
- Ascultate for breath sound and heart sound to identify impaired gases exchange
- Monitor blood pressure to identify hypotension early and ensure cerebral perfusion to prevent infarction
- Monitor electrolytes at normal levels (K+ 3.5-5.0) (Na+ 135-145) milliEquivalents/litre (mEq/lt)
- Monitor ECG, echocardiogram
- Observe for blood loss, cardiac tamponade and hypotension
- Ensure adequate gaseous exchange by giving oxygen, monitoring blood gases to
  prevent hypoxia.
- Give strong analgesics, sedatives and anxiolytics to calm the patient and promote comfort.
- Maintain adequate renal perfusion by monitoring urine output at ½ -1ml/hr/body kg wt.
- Monitor the patient for infection. Give antibiotics to prevent infection and maintain principles of asepsis during invasive procedures.
- Teach the patient self-care. Give health education on post-surgery care and drugs to be used. Identify patient's worries and give psychological care.
- Assist the patient in the rehabilitation process.
- Dress the surgical wound, any signs of infection need to be identified and culture and sensitivity treatment done.
- Tubes and gadgets of monitoring on the patient must be cared for well to prevent dislodgement and wrong reading.

Complications include:

- Cardiac tamponade
- Heart failure
- Myocardial infarction
- Dysrrhythmias
- Cardiac arrest
- Infection

Shock

Shock occurs when there is inadequate blood flow to vital organs and/or inability to utilise oxygen by the tissues. It is characterised by hypotension.

Classification

- **Hypovolaemic Shock** - this results from volume loss of blood. This may happen in diarrhoea and vomiting, bleeding and plasma loss in burns.
- **Cardiogenic Shock** - this results from the inability of the heart to contract and supply the tissues with oxygenated blood, for example, infarctions, cardiac tamponade, pulmonary embolism, general anaesthesia or advanced hypovolaemia.
- **Neurogenic Shock** - this results from dilated blood vessels as a result of drugs, for example, anaesthesia.
- **Distributive Shock** - this is when blood does not reach the tissues.
- **Septic Shock** - this is when blood arteries become dilated as a result of endotoxins from gram-negative micro-organisms.

Pathophysiology

Low arterial pressures stimulate the release of catecholamines which causes vasoconstriction and increase heart activity. Renin-angiotensin mechanism is also stimulated. This is where the kidney cells produce renin which acts on angiotensinogen to give angiotensin I. Angiotensin I passes through the lungs and it is activated by angiotensin conventing enzyme into angiotensin II which cause generalised vasoconstriction. It also stimulates release of aldosterone compensatory mechanisms triggered by shock. Patients will manifest with a cold clammy skin, thready pulse, and low blood pressure among others.

Shock is managed by concentrating on the cause. The vital organs must receive adequate perfusion by positioning the patient on the left

lateral position, keeping them warm and giving IV fluids. The patient may require transfusion and haemostasis to stop bleeding. After the initial resuscitation, investigations can then start to focus on the real cause of the shock.

Vascular Disorders

Vascular Disorders

Most disorders of the blood vessels commonly affect men after middle age and women after menopause, atheroma being one of those.

Atheroma

Atheroma is the accumulation of cholesterol compounds in the inner wall of the blood vessels. Predisposing factors are genetic, sex (males are commonly affected), environmental, smoking, obesity, certain lifestyles, alcohol and certain diets. The atheroma can lead to thrombosis or blood clots and the formation of aneurysms. Aneurysms are formed due to a weakened wall of an artery. The arteries affected can be narrowed or occluded. This may lead to tissue ischaemia and infarction. Diets that are high in saturated fats and also high in cholesterol can cause atheromas.

Arteriosclerosis

Degeneration of arteries is associated with loss of elasticity and hardening of the vessel. When it affects the intima of the blood vessel, it is called arteriosclerosis.
Vessels lose their elasticity and their lumen becomes smaller.
A smaller lumen does not deliver blood to the target tissues efficiently. Arteriosclerosis can lead to stroke, myocardial infarction and cardiac arrest.

Embolism

Embolism is an obstruction of the blood flow by an embolus in the blood. The emboli may be fragments of blood clots, tumours, pus, fat or air bubbles. Emboli can affect the heart, lung, liver or brain and result in ischaemia and infarction. Thrombi and emboli are common causes of cerebro-vascular accidents. You studied the pulmonary embolism earlier in the unit and you learnt how it comes about. The consequences of embolism are the same as those of atheromas.

Arterial Embolism

This is an emboli that is found in the arteries. It may develop from the chambers of the heart due to atrial fibrillation, myocardial infarction, endocarditis, cardiac failure or as a result of transport from the venous circulation into the heart. It can also develop from arteriosclerosis.
When the thrombus is carried into the peripheral circulation, it results in blockage of blood circulation to the vessel. It tends to lodge in arterial dification and athelosclerotic narrowing.
Clinical features include severe pain aggravated by movement, gradual loss of sensory and motor function and reduced or lost pulse which is usually accompanied by sharp line of colour and temperature demarcation.
Embolectomy is the management of choice. This must be done early in 6-10 hrs to prevent permanent necrosis.
Intravenous anticoagulants like heparin may also be given to prevent propagation of the clot and reduce muscle neclosis. Thrombolytic therapy with streptokinase or urokinase is effective in dissoving of the clot.
In the post-operative period the patient is encouraged to perform simple exercises to promote blood flow. Pain is managed with strong analgesics.

Varicose Veins and Haemorrhoids

Predisposing factors of varicosities are heredity, advanced age, obesity and high blood pressure. As one grows older, the veins lose their elasticity. The affected veins protrude and become tortuous. High blood pressure impedes venous return. Haemorrhoids, on the other hand, are due to increased pressure and structural weaknesses in the veins of the anus and rectum. Protrusion and difficulty in defecation are the initial manifestations, followed by bleeding and infection

Raynauds Disease

This is severe vasoconstriction resulting from vasospasms caused by environment stimuli. It involves small arteries and affects one or two digits unilaterally.
The main stimulant includes cold climate, pain and ulceration of finger tips.
Patients presents with terrible pain which is associated with removal of ischemic materials when the vasoconstriction reduces.
Management involves avoidance of stimulant, though sympathectomy may improve the patient's condition

Aneurysms

These are out pouching or dilation of the arterial wall of a blood vessel. This condition commonly affects the aorta. They are associated with hypertension, atherosclerosis and smoking.

Classification

- **True aneurysm:** is when walls of the artery form aneurisms with at least one layer intact. A true aneurysm may be fusiform which is of circumferential and uniform shape or a saccular aneurysm which is pouch-like with a narrow neck bulging to one side.
- **False aneurysm:** is also called pseudoaneurysm and has disruption of all the layers of the vessel resulting into bleeding. This may result from trauma, infection, disruption of arterial suture line, removal of canulas and catheters.

Pathophysiology

The walls of the blood vessels weaken and dilate with tabulate blood flow. Thrombi are deposited in the aortic wall resulting into danger of embolising.
In atherosclerosis, plaque deposited on the intima causes degenerative changes on the middle layer, thus leading to loss of elasticity, weakening and dilation of the vessel. The vessel may rupture.
A Ruptured aneurysm causes massive bleeding because of its turbulence. It also causes cerebral vascular accident when the rupture is in the brain. However the most common site for an aneurysm is the aorta.

Clinical features of Aortic Aneurysm

- Deep diffuse chest pain for ascending aorta
- Hoarseness due to laryngeal nerve pressure for arch of aorta aneurysms
- Dysphagia due to pressure an oesophagus
- In case they press on the vena cava, they cause decreased venous-return resulting into oedema
- Abdominal pain
- Blue toe syndrome due to formation of emboli

Management

Investigations:

- Physical examination
- Chest X-ray
- CT Scan
- Aotography
- Echocardiogram

The goal of management is to prevent rapture of the aneurysm. Detailed evaluation is done also to identify any existing problem or obstruction to blood flow that may be co-existing. The management of choice is surgical interventions. Surgical technique depends on location, size and pathophysiological effects.

Post-operative Care

The post-operative care is aimed at maintaining adequate tissue perfusion, intact motor neurological function and prevent complications related to surgery.
Where the patient may have altered peripheral tissue perfusion:

- Maintain adequate systemic blood pressure to prevent hypotension thrombosis and to maintain adequate blood flow to the graft. This helps to prevent rupture of the sutureline
- Ensure normal central venus pressure to maintain hydration
- Maintain patient on intravenous fluids
- Assess the peripheral for warmth to identify impaired flow resulting from the graft

Monitor the patient for any signs of hypovolemia related to bleeding, diuresis or fluid redistribution:

- Monitor the input and output and do adequate replacement
- Check hematocrite and hemaglobin levels and transfuse as needed
- Monitor vital signs and intervene when abnormal

Where there is risk of infection due to presence of vascular graft or invasive lines:

- Ensure asceptic technique in invasive procedures
- Check temperature to identify signs of infection
- Give adequate nutrition to promote healing
- Give broad spectrum antibiotics
- Do white blood cells count regularly to rule out infection
- Ensure that the changing of the catheter changing and dressing is done aseptically

Where the patient may have altered renal perfusion related to operation procedure:

- Monitor urine output and maintain at ½ - 1ml/kg/min
- Check urea and electrolyte levels

Monitor neurological status related to poor cerebral perfusion due to surgical procedure during and after surgery.

If the patient has anxiety and requires the nurse's intervention:

- Explain the whole procedure to the patient and allow them to verbalise their worries

When caring for the surgical incisions:

- Check for bleeding post-operation
- Check for signs of infection
- Change dressing as necessary

Complications include:

- Cardiac tamponade
- Renal failure
- Cerebral insufficiency
- Bleeding
- Ruptured graft

Care of the Adult with Vascular Diseases

Occlusive disease can be treated with non-surgical and surgical means. The non-surgical treatment involves use of mild analgesics, walking daily as tolerated, foot care, avoidance of trauma and avoidance of tobacco. First, the individuals must avoid foods that can predispose to arterial depositions.

Nutritional care involves adjusting caloric intake to achieve optimum weight, decreasing dietary cholesterol, reducing saturated dietary fat and restricting sodium to 2g/day.

Care of Patients with Deep Vein Thrombosis (DVT)

Deep vein thrombosis is treated with both conservative and surgical measures. The conservative measures are:

- Continuous IV heparin
- Bed rest
- Elevation of the legs above the heart
- Oral anticoagulants
- Elastic stockings
- Measurement and charting of the size of both thighs

Any time you are caring for a patient with deep vein thrombosis, ensure that there is relief of pain, decreased oedema, no skin ulceration or any evidence of pulmonary embolism.

Disorders of the Blood and the Lymphatic Tissue

Any of the cellular components of the blood can be affected by disease. The cellular components were mentioned before, they are erythrocytes, platelets and leukocytes.

Leucopoenia

Leucopoenia is a decrease in the number of white blood cells.

It may affect any of the specific types of white blood cells. Granulocytopenia is a decrease in circulating granulocytes.

In many cases, it is a result of drugs, irradiation, bone marrow disease or severe infections. Patients become susceptible to infections when the number of circulating white blood cells is low.

Lymphoproliferative Diseases

Lymphoproliferative disorders are those that affect the white blood cells and lymphoid tissue. They include leukaemia, lymphomas and multiple myeloma.

Leukaemia

Leukaemia is a malignant neoplasm of the white blood cells. The types of leukaemia according to the predominant cell type are:

- Myelocytic leukaemia
- Lymphocytic leukaemia

They can also be classified according to whether they are acute or chronic. There is Acute Lymphocytic Leukaemia (ALL) and Chronic Lymphocytic Leukaemia (CLL) among others.

Acute Lymphocytic Leukaemia is common in children, while Acute Myelocytic Leukaemia is common in patients aged between 13 and 39 years.

Chronic Myelocytic Leukaemia (CML) and Chronic Lymphocytic Leukaemia (CLL) are common in the elder generation. The causes of leukaemia are not known. However, associated factors are irradiation, genetic predisposition, exposure to certain chemicals and viral infections.

The clinical manifestations include:

- Bone marrow suppression

- Bone pain and tenderness
- Headache
- Nausea
- Vomiting
- Abdominal discomfort
- Anaemia
- Frequent infections

Once a diagnosis of leukaemia has been made, therapeutic management includes chemotherapeutic drugs and sometimes radiation. The patient should be evaluated and support given to avoid complications such as haemorrhage and infection.

In more advanced treatment centres, bone marrow transplant is undertaken.

Nurses should know the various drug combinations used for treatment of leukaemia and the cycles of treatment, the doses and side effects.

The specific nursing actions necessary are:

- Discussing the importance of follow up with the client and family
- Providing emotional support
- Providing specific care related to chemotherapy, transfusion, and diagnostic tests
- Providing a safe, injury free environment
- Using appropriate infection control techniques
- Ensuring the patient does not develop fatigue
- Providing nutritional support

Lymphoma

A lymphoma is a malignancy of lymphatic tissue. They are divided into Hodgkin's disease and non-Hodgkin's lymphomas.

Hodgkin's disease

This is characterised by abnormal proliferation of multinucleated cells in the lymph node known as Reed-Sternberg cells. It's of two types, Hodkins paragramutoma which is milder and Hodkins Sarcoma which is more severe.

Hodgkin's disease is characterised by enlargement of lymph nodes, which is not painful. Lymph nodes become enlarged and the spleen increases in size. Patients also suffer high-grade swinging fever, night sweats, weight loss, fatigue and anaemia.

The liver, lungs, digestive tract and central nervous system also get involved. Due to the proliferation of abnormal cells, the immunologic response is defective. Hodgkin's disease is staged according to lymphoid involvement. In the assessment, the objective data that may be obtained is:

- Enlarged lymph nodes
- Progressive anaemia
- Elevated temperature
- Enlarged liver and spleen
- Pressure symptoms due to enlarged nodes

Hodgkin's disease is managed depending on the stage of the disease. Radiation, a combination of radiation and chemotherapy, or chemotherapy are the choice methods. The drug combination for Hodgkin's disease is:

- MOPP - Nitrogen Mustard and vincristine (Oncovin) on day 1 and day 8, Procarbazine and prednisone on day 1 and day 14
- ABVD - Doxorubicin (Adriamycin) and Bleomycin on day 1 and day 15, Vinblastine and Darcabazine on day 1 and day 15

Skin therapy, psychological and social aspects are included in each case. The nursing actions are:

- Providing emotional support
- Protecting the patient from infection
- Monitoring the patient's temperature
- Observing for symptoms of anaemia and managing accordingly
- Encouraging good nutrition

Non-Hodgkin's Lymphomas

One type of Non-Hodgkin's Lymphoma is Burkitt's lymphoma, which is common in Kenya. It may affect the jaw or abdomen. Patients present with fever, frequent infections, enlarged asymmetrical jaw, abdominal mass and anaemia. Medical and nursing management is similar to that of Hodgkin's disease.

Multiple Myeloma

Multiple Myeloma is a disorder of the plasma cell (B lymphocytes). There is abnormal proliferation of plasma cells. The first symptoms to appear are bone pain, weight loss, pathological fractures and weakness. This may progress to heart failure, neurological problems and renal failure.

Multiple myeloma can be easily treated if diagnosed early, by addressing both the disease and

its symptoms.

Ambulation and hydration are used to treat hypercalcemia accompanying multiple myeloma,

hyperuricemia and dehydration. Weight bearing helps the bones reabsorb some calcium. Pain control and chemotherapy are all part of the management. Some drugs such as allopurinol
may be used to counteract the hyperuricaemia (that may cause gout) due to chemotherapy.

Disorders of the Red Blood Cells and Coagulation

The red blood cells are involved in oxygen transport and fine pH adjustment. After about 120 days, the red blood cells become old and are destroyed, resulting in the formation of bilirubin.

Anaemia

Anaemia is a condition in which there is a low number of circulating red blood cells and, therefore, abnormally low haemoglobin, which is defined according to age, sex and geographical location. Anaemia can result from:

- Excessive loss through bleeding
- Deficient cell production because of nutritional deficiencies and bone marrow failure
- Premature or excessive haemolysis

Sickle Cell Anaemia

It is a disorder that affects the red blood cells which contain a special protein called haemoglobin (Hb for short). The function of haemoglobin is to carry oxygen from the lungs to all parts of the body.

People with Sickle Cell Anaemia have Sickle haemoglobin (HbS) which is different from the normal haemoglobin (HbA). When sickle haemoglobin gives up its oxygen to the tissues, it sticks together to form long rods inside the red blood cells making these cells rigid and sickle-shaped. Normal red blood cells can bend and flex easily.
Because of their shape, sickled red blood cells can't squeeze through small blood vessels as easily as the almost disc-shaped normal cells. This can lead to these small blood vessels getting blocked which then stops the oxygen from getting through to where it is needed. This in turn can lead to severe pain and damage to organs. The most affected parts are joints, however the abdomen and chest can also be affected. Sometimes infarction can occur in tissues lacking oxygen.

It is important for you to be able to differentiate between sickle cell trait, sickle cell disease and sickle cell crisis.

A person with sickle cell trait does not have the disease but carries the gene that causes the disease. Persons with sickle cell trait usually have both HbS and HbA, but the HbA is more thus preventing the person from having symptoms of sickle cell disease. If two people with sickle cell trait get married there is a 25% chances of bearing children with sickle cell disease. They therefore require genetic counselling before marriage.
A sickle cell crisis occurs when sickled red blood cells block small blood vessels that carry blood. This causes pain that can begin suddenly and last several hours to several days. The patient might have pain in their back, knees, legs, arms, chest or stomach. The pain can be throbbing, sharp, dull or stabbing. A sickle cell crisis can also cause a severe attack of anaemia.
The mode of management of a patient who has sickle cell disease involves pain control, treatment for anaemia and patient education. These patients must be given genetic counselling.
The therapeutic management of sickle cell disease is mainly supportive with alleviation of symptoms such as chronic leg ulcers, which are treated with bed rest, antibiotics and dressings.
Since nutritional anaemia's are more common in our population, it will be necessary to learn more about them.

Nutritional Deficiency Anaemia

Iron deficiency anaemia is usually caused by dietary lack of iron. Hookworm infestation and deficiencies of other foods can also cause iron deficiency.
Megaloblastic anaemia, on the other hand, is due to vitamin B12 deficiency, pernicious anaemia and folic acid deficiency. Pernicious anaemia is anaemia caused by a lack of intrinsic factor leading to a lack of absorption of vitamin B12. Fish tapeworm infestation can also cause megaloblastic anaemia.
The causes of anaemia generally are:

- Deficiency of materials for synthesis of haemoglobin, through deficient diets, malabsorption, high demands through pregnancy and lactation, drugs that lead to non-absorption, bowel disease that causes poor absorption, and pernicious anaemia

- Blood loss
- Destruction of red blood cells
- Failure to produce red blood cells
- Blood cell cancers

There are several manifestations of anaemia. When assessing a patient, look for:

- Brittle hair
- Signs of fatigue
- Dyspnoea
- Palpitations
- A smooth tongue
- Dysphasia

Other manifestations include decreased sensation, pallor, rapid pulse, faintness and dizziness, high output heart failure and spoon shaped nails (koilonychia). High output failure is congestive failure because of overload, which affects the left side of the heart. In some of the vitamin deficiencies, loss of sensation may be a clinical sign.

When managing anaemic patients, you should try to ensure that they can participate in activities of daily living (ADL's), experience no fatigue and replace essential nutrients. The different causes of anaemia will determine the different nursing interventions. Dietary changes, blood transfusion and pharmacologic agents can be tried.

Aplastic Anaemia

Bone marrow suppression results in aplastic anaemia. Aplastic anaemia is due to irradiation, infections, drugs such as chloraphenical, and toxic chemicals. Cytotoxic therapy can result in aplastic anaemia. Aplasia results in failure to produce blood cells, leading to a reduction in leucocytes, erythrocytes and thrombocytes. The red bone marrow gets replaced with fatty tissue.

Due to involvement of different cells in the bone marrow, patient may present with abnormal cellular levels. There could be marked bleeding due to thrombocytopenia, pallor, weakness, breathlessness on exertion, dyspnoea and fever.

Management involves a bone marrow transplant to provide the patient with intact hemopoietic tissue. Antilympholytic globulin and high dose of methypredinison therapy is given. Careful assessment and supportive therapy is important for
these patients.

Polycythaemia

When the red blood cell mass is abnormally high, the condition is called polycythaemia vera. The haemoglobin level is abnormally high. It may occur with living at high altitude. The blood becomes thick and this can result in hypertension.

Coagulation Disorders

The process of coagulation involves vessel spasm, platelet aggregation, and formation of fibrin clot, clot retraction and fibrinolysis afterwards. This was mentioned when you covered the process of blood clotting. The conditions associated with hypercoagulation are atherosclerosis, diabetes mellitus, smoking, high cholesterol, pregnancy and puerperium. Immobility and malignancies accelerate the activity of the clotting system.

Disseminated Intravascular Coagulation

Coagulation defects, on the other hand, result in easy bleeding. This is initiated by situations where there is massive consumption of coagulation factors leading to easy bleeding. Endothelial damage resulting from many causes, for example, obstetric conditions such as placental abruption, malignancies, severe burns, severe infection and severe malaria, shock, surgery and blood transfusion reaction can lead to disseminated intravascular coagulation (DIC).

This is a life threatening condition that you may have heard about. The therapeutic management of DIC involves relief of the underlying cause, for example, IV antibiotic for suspected septicaemia. Exacerbating factors such as acidosis, dehydration, renal failure and hypoxia should be corrected. Blood transfusion to correct identified deficiencies such as platelets, fibrinogen, and so on, should be given. Here you must remember that observing for any bleeding, minimising skin punctures and providing emotional support are important nursing actions.

Haemophilia

Haemophilia A is a sex linked disorder which is characterised by reduced or absent factor VIII activity, while haemophilia B is a similar disease but is due to the absence of or reduced factor IX. The main characteristic of haemophilia is persistent bleeding into joints and muscles, hence crippling arthritis. Easy bleeding is the hallmark of the disease. The female is the

carrier; but it is her male offspring that may suffer

Management of haemophilia includes emergency measures to prevent bleeding and administration of the missing clotting factors after proper investigation. Use of blood products and transfusion are necessary measures while investigations are undertaken. The main role of the nurse in this situation is health education on healthy living and avoidance of injury by the patient.

When you are caring for patients with haemophilia you must ensure measures are taken to stop the bleeding as soon as possible, administer specific coagulation factor, give rest and manage any life threatening complications.

Most of the long-term measures are related to education. All activities of daily living should be done with utmost care to avoid trauma.

Blood Transfusion Reaction

The reactions that are likely to occur during a blood

transfusion include:

- Acute haemolytic reactions
- Febrile reactions
- Mild allergic reaction
- Circulatory overload
- Sepsis
- Massive transfusion reactions

Blood Transfusion Reaction

If a patient on blood transfusion gets a transfusion reaction, you should:

- Stop the transfusion
- Maintain a patent IV line with saline solution
- Notify the blood bank and a physician immediately
- Re-check identifying tags
- Monitor vital signs and urine output strictly
- Save the blood bag for cross checking with appropriate patient details

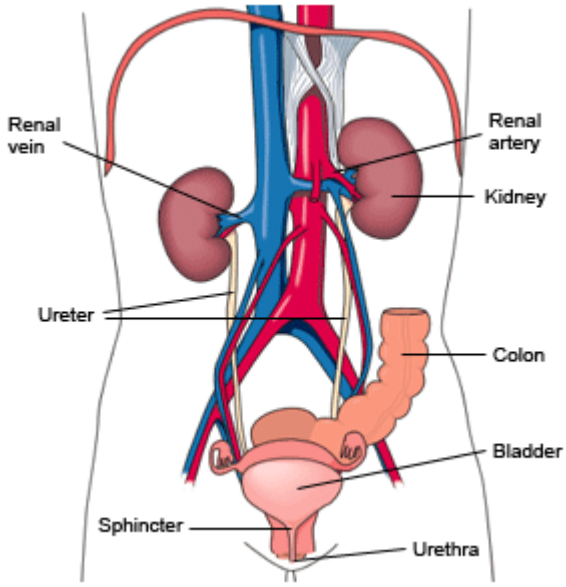
SECTION 3: GENITOURINARY SYSTEM AND THE INTEGUMENTS

Introduction

.

In section four, part one of this unit you covered the digestive system where you looked at the digestion, absorption, assimilation, metabolism and storage of proteins, carbohydrates, fats, vitamins and minerals. The last stage of this cycle is excretion.

In this section you will focus on the genitourinary system and the integuments.



Objectives

By the end of this section you will be able to:

- Describe the structure and function of the urinary system
- List common genitourinary disorders and conditions
- Describe the structure and function of the integuments
- List common skin disorders
- Describe the nursing process in the management of diseases and conditions outlined in this section

The Kidneys

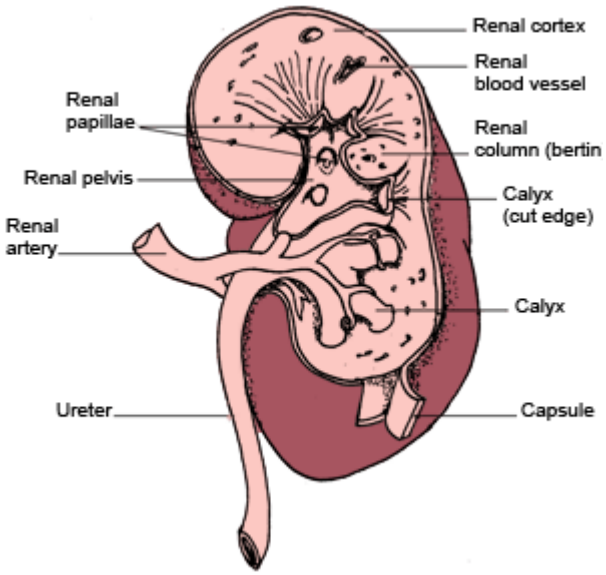
The kidney is an important organ of excretion. If kidneys fail completely, then there is a threat to survival.

Structure

The kidneys are bean shaped organs located behind the peritoneum on either side of the vertebral column, from the 12th thoracic

vertebral to the third lumbar vertebra.

Each kidney is about 11cm long, 7cm wide and 3cm thick and weighs 120-170g.The right kidney is slightly lower than the left probably due to the space occupied by the liver.



Gross Structure of the Kidney

A thin, smooth layer of fibrous membrane, called the capsule, covers the surface of each kidney. The lateral surface of the kidney is convex and the medial surface is concave and forms a vertical cleft called the hilum where the renal blood and lymph vessels and nerves enter and renal vein and ureters exit.

On cutting the kidney longitudinally, various internal structures can be seen. The outer layer is the cortex while the inner part is the medulla. The medulla is made up of many pyramids. The apices of these pyramids are called papillae. It is through these papillae that urine passes to enter minor calyces, which merge to form major calyces. The calyces form the funnel shaped renal pelvis. The lumen of the pelvis decreases to form the ureter.

The major calyces form the funnel shaped renal pelvis.

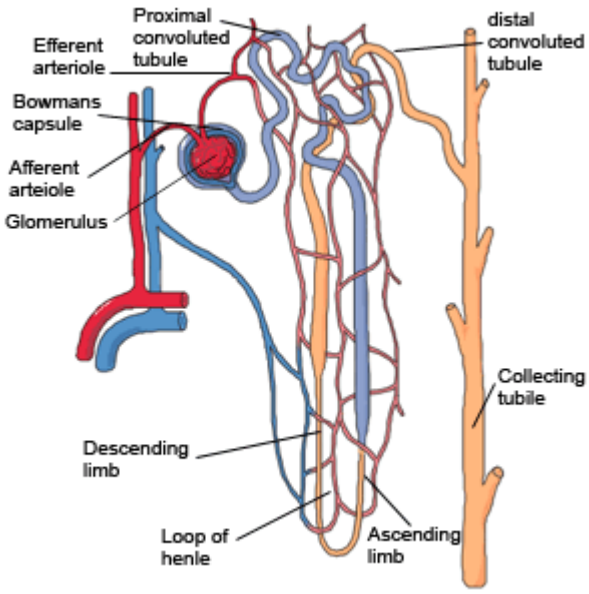
Microscopic Structure of the Kidney

The functional unit of the kidney is the nephron.

Each kidney has more than one million nephrons. A nephron consists of a glomerulus, Bowman's capsule and a tubular system. The tubular system has a proximal convoluted tubule, loop of Henle, and the distal convoluted tubule.

Many distal convoluted tubules drain into a collecting duct. The glomerulus, Bowman's capsule, the proximal and distal tubules are in the cortex while the loop of Henle and the collecting ducts are in the medulla.

Structure of the Nephron



Blood Vessels

After entering the kidney at the hilum, the renal artery divides into smaller arteries and arterioles. In the cortex an arteriole, the afferent arteriole enters each glomerular capsule then subdivides into a cluster of capillaries forming the glomerulus.

The blood vessel leading away from the glomerulus is the efferent arteriole. It breaks up into a second capillary network to supply oxygen and nutritional materials to the remainder of the nephron.

Venous blood drained from the capillary bed leaves the kidney in the renal vein which empties into the inferior vena cava.

The blood pressure in the glomerulus is higher than in other capillaries because the diameter of the afferent arteriole is greater than that of the efferent arteriole.

Structure of the Glomerulus Glomerular Capsule and Tubule walls

The walls of the glomerulus and the glomerular capsule consists of a single layer of flattened

epithelial cells. The glomerular walls are more permeable than those of other capillaries. The remainder of the nephrone and the collecting tube are formed by a single layer of highly specialised cells.

Functions of the Kidney

The primary function of the kidneys is to regulate the volume and composition of the Extracellular Fluid (ECF). The excretory function of the kidneys is secondary to this regulatory function. Other major functions include renin secretion and blood pressure control, erythropoietin production, vitamin D activation and acid base balance.

The Physiology of Urine Formation

The kidneys form urine which passes through the ureters to the bladder for excretion. There are three phases in the formation of urine:

- Simple filtration
- Selective reabsorption
- Secretion

Simple Filtration

Filtration takes place through the semipermiable walls of the glomerulus and glomerular capsule. The hydrostatic pressure of blood within the glomerular capillaries causes a portion of blood to be filtered across the semi-permeable membrane into Bowman's capsule, where the filtered portion of the blood called the glomerular filtrate begins to pass down to the tubule. The filtrate is similar in composition to blood except that it lacks blood cells, platelets and large plasma proteins.

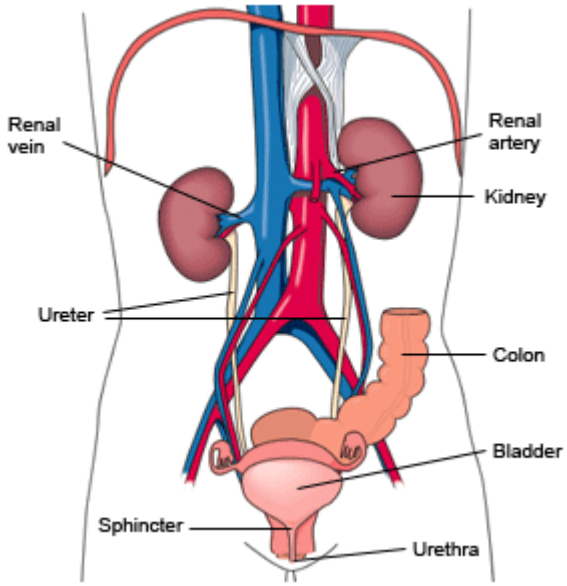
Simple Filtration

The amount of blood filtered by the glomeruli in a given time is termed as the Glomerular Filtrate Rate (GFR) and the normal glomerular filtrate rate is about 125ml per minute. On the average only 1ml per minute is excreted as urine because most glomerular filtrate is reabsorbed by the peritubular capillary before it reaches the end of the collecting duct.

Selective Reabsorption

Selective reabsorption is the process by which the composition and volume of the glomerular filtrate are altered during its passage through the convoluted tubules, the medullary loop and the collecting tubule. The general purpose of this is to reabsorb those filtrate constituents needed by the body to maintain fluid and electrolyte balance and blood alkalinity.

The tubules and collecting ducts carry out the functions by means of reabsorption and secretion.



Reabsorption is the passage of a substance from the lumen of the tubules into the capillaries while tubular secretion is the passage of a substance from the capillaries into the lumen of the tubule. The process involves both active and passive transport.

At the proximal convoluted tubule, about 80% of the electrolytes are reabsorbed, that is all the glucose, amino acids and protein, and hydrogen ions and creatinime are secreted.

- In the loop of Henle, the descending loop reabsorbs water moderately, sodium, urea and other solutes while the ascending loop reabsorbs chloride ions and sodium.
- In the distal tubules, there is reabsorption of water and sodium through the action of antidiuretic hormone and secretion of potassium.
- Acid base balance regulation involves the reabsorption of the bicarbonate (HCO_3^-) and secretion of excess hydrogen ions (H^+).
- The parathyroid hormone, parathormone increases the reabsorption of calcium ions and decreases the reabsorption of phosphate ions.

Secretion
This involves secretion of substances not required and foreign materials for example drugs that may not be cleared from the blood by filtration due to the short time it remains in the glomerulus.

The Composition of Normal Urine

Water	**=**	**96%**
Urea	**=**	**2%**
Uric acid		
Creatinine		
Ammonia		
Sodium		
Potassium		
Chlorides		
Phosphates		
Sulphates		
Oxalates		

Urine is termed as transparent yellow or amber or straw-coloured, with a specific gravity of 1.001-1.035 and is acidic in reaction (PH 4.6 - 8.0). A healthy adult passes 1000 to 1500ml per day which varies with fluid intake.

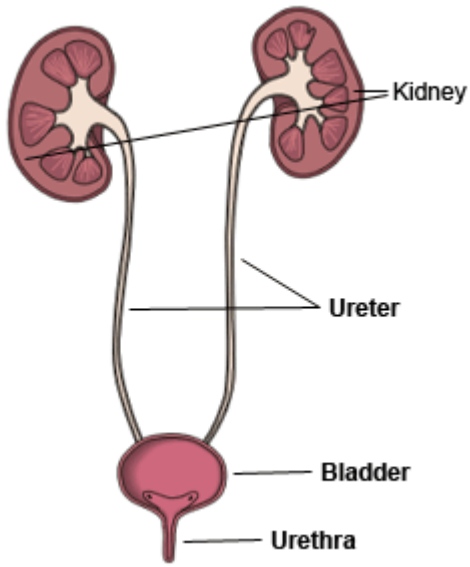
The Ureters

The Structure

The ureters are two tubes which originate from the renal pelvis. They pass behind the peritoneum into the pelvic cavity. They pass through the posterior (rear) part into the urinary bladder. They are, therefore, compressed and their opening closed when bladder pressure rises during micturition. This prevents urinary reflux.
They are made up of an outer fibrous tissue, a middle muscular layer and an inner epithelium.

Functions
The ureters propel the urine from the kidneys into the bladder by peristaltic contraction of the muscular wall.

The waves of contraction originate in a pace maker in the minor calyces and send urine in little spurts into the bladder.



The Urinary Bladder

The Structure
The bladder is roughly pear shaped but becomes more oval as it fills with urine. It has anterior, superior and posterior surfaces. The posterior surface is the base. The bladder opens into the urethra and its lowest point which is the neck.
The peritoneum covers only the superior surface. It is adjacent to the uterus and the rectum. Its wall is made up of three layers of tissue with blood vessels. The middle is a smooth muscle (dartos muscle) and the inner layer is composed of epithelial cells. The three openings in the bladder, that is, from the two ureters and the urethra, form a triangle. At the opening of the urethra, there is a sphincter called the internal sphincter made of a thickening of smooth muscle. The external sphincter is composed of voluntary muscle.
On average 200-250ml of urine in the bladder causes moderate distension and the urge to urinate. When the quantity of urine in the bladder reaches 400-600ml the individual feels uncomfortable. The bladder capacity varies with individuals and usually ranges from 600-1000ml.

Functions

- To serve as a reservoir for urine
- To help the body eliminate waste products

The Urethra

The Structure

The urethra is a small muscular tube or canal that loads from the bladder neck to the external meatus. In the male, it is a common pathway for semen and urine and consists of a prostatic urethra, a membranous urethra and a spongy urethra.

There are two sphincters for the urethra: the internal one, just mentioned in conjunction with the bladder and the external sphincter at the root of the penis. In the female the urethra is approximately 4cm long and opens at the external urethral orifice just infront of the vagina.

Function

It serves as a pathway for urine from the bladder to the outside of the body.

Micturition

Micturition is also termed as urination or voiding. In the average bladder, 250ml of urine causes a moderately distended sensation and the desire to void.

- When the nervous system is fully developed the micturition reflex is stimulated but sensory impulses pass upwards to the brain and there is an awareness of the desire to micturate. By conscious effort, reflex contraction of the bladder wall and relaxation of the internal sphincter can be inhibited for a limited period of time.

Mechanism of Micturition

- This begins when the detrusor muscle contracts and there is reflex relaxation of the internal sphincter and voluntary relaxation of the external sphincter. This forces the urine out of the bladder and through the urethra.
- It can be assisted by increasing the pressure within the pelvic cavity by lowering the diaphragm and contracting the abdominal muscles.
- In over distension of the bladder, there is a tendency for involuntary relaxation of the external sphincter muscle to occur.

Associated Structures of the Urinary System

The associated structures in the female include the uterus and the vagina. You will cover these in module two as part of reproductive health.

In the male, the associated structures are the testes, scrotum, spermatic cords, seminal vesicles, ejaculatory ducts and the prostate gland. The testes are the reproductive organs and are equivalent to the ovaries. The spermatic cords suspend the testes in the scrotum. The seminal vesicles are near the bladder and they are connected by the ejaculatory duct to the urethra. They secrete a fluid that nourishes the spermatozoa.

The prostate gland lies in the pelvic cavity. It has glandular tissue and secretes lubricating fluid through the urethra.

You need to keep this information in mind because it will be mentioned in the module on reproductive health.

Disorders of the Kidney, Bladder and Associated Organs

Urinary Tract Obstruction

Obstructive symptoms of urine flow depend on whether the flow is obstructed unilaterally or bilaterally, partially or completely. When there is obstruction, urine flows back and stays longer in the renal pelvis. The stasis predisposes to bacterial multiplication, hence inflammation of the renal pelvis and the cortex. Prolonged blockage can lead to damage of the kidneys.

The factors that can lead to urinary obstruction include renal stones (calculi), abnormal pregnancy, hypertrophy of the prostate, tumours, neurological disorders such as spinal injury and scars resulting from inflammation. Obstruction can occur at the level of the renal pelvis, the ureter, bladder or urethra.

Urinary Tract Obstruction

Hydronephrosis is the dilation of the renal pelvis due to obstruction to urine flow. Hydroureter is dilation of the ureter due to obstruction.

The manifestations of urinary obstruction are:

- Pain
- Hypertension
- Impaired ability to concentrate urine
- Signs and symptoms of urinary tract infection

These will be covered later.

Renal Calculi

Renal calculi (renal stones) are formed by substances normally excreted in the urine. The stones can be made of calcium, magnesium,

ammonium phosphate, uric acid or cystein compounds. Contributing factors to formation of stones are hypercalcaemia, immobilisation, hyperthyroidism, urinary tract infections, gout, cytotoxic therapy, and a diet that is rich in purines. Pain is the major symptom of the stones. They can also cause other symptoms related to obstruction. People who get severe dehydration are at risk of stone formation if they are predisposed.

Kidney stones are managed by focusing on two approaches. The first approach is directed towards management of acute attacks. This involves treatment of pain, infection and obstruction to urine flow. Large amounts of fluid intake are recommended. The second approach is directed towards evaluation of the aetiology of stone formation. In this case emphasis is laid on hydration, dietary modifications and drugs. The diet restriction is to decrease foods rich in purines (such as sardines, liver, chicken).

Urinary Tract Infections

The infections that are included under urinary tract
are cystitis, pyelonephritis, urethritis, ureteritis and bacteuria.

Bacteriuria

Is the presence of bacteria in urine. Most upper urinary tract
infections ascend from the bladder and urethra. Factors
predisposing to urinary tract infection are urinary tract
obstruction, urine stasis and pregnancy induced changes.

Foreign bodies like catheters and other instruments
predispose to urinary tract infection. Pregnancy and old age
are risk factors to urinary tract infections. This is because
pregnant women and old people have decreased immunity.

Lower abdominal pain, dysuria, fever and general malaise are commonly associated with urinary tract infections.

Cystitis

Is inflammation of the urinary bladder, is common in females
because of their short urethra. It manifests with frequency
of urination, urgency of micturition, supra-pubic pain, dysuria,
and foul smelling urine. Urgency refers to a feeling of wanting
to urinate quickly without delay, while frequency is the
increased number of times one has to urinate.

When a patient presents with cystitis they receive antimicrobial agents and must be encouraged to have high fluid intake. The purpose of this management is to have relief of dysuria, reduce upper urinary tract complications and avoid recurrence of Urinary Tract Infections (UTIs). Urinary catheterisation in the hospital should always be aseptic to decrease the risk of nosocomial UTI's.

Urethritis

Can be specific or non-specific. Gonococci or other organisms cause specific urethritis. If it is non-specific, then no particular micro-organisms are implicated. Non-specific urethritis manifests with discharge, itching, urgency, frequency and dysuria. Nocturia, red swollen urinary meatus and pelvic inflammatory disease may also be present.

Urethritis is treated on the basis of the cause and symptoms of the disease. Antibiotics and antimicrobial agents such as tinidazole, doxycycline, benzathine penicillin, and norfloxacin are drugs that can benefit the patient depending on the sensitivity of the involved micro-organisms. Analgesics are also

given. Urethral sounding, analgesics, antibiotic cover can also be tried and when these measures are unsuccessful, surgery is indicated.

Pyelonephritis

Is the inflammation of the renal pelvis, tubules and interstitial cells of one or both kidneys. Its causes are:

- Reflux of urine due to obstruction or congenital
  structural abnormalities
- Renal infections
- Trauma
- Metabolic disease, which causes destruction of adjacent renal tissue. The commonest metabolic disease implicated is diabetes mellitus
- There is swelling of the renal parenchyma, scarring, kidney atrophy, and if not checked, failure

The clinical picture of the patient with pyelonephritis includes: frequency, dysuria, chills, fever, malaise and dull back pain. If it gets chronic, headache, anorexia, weight loss and the uremic syndrome may occur. Adults who present with pyelonephritis will be treated with antibiotics; antiseptics and high fluid intake as recommended.

Ureteritis

Is an inflammation of the ureters and is commonly associated with pyelonephritis. Once the kidney infection is cured, ureteral inflammation usually subsides. Unfortunately, chronic pyelonephritis causes the ureters to become fibrotic and narrowed by strictures.

Disorders of the Glomerular Function

Disorders of the glomeruli disrupt filtration and affect the capillary membrane, making it easily permeable. This results in proteinuria, haematuria, oliguria, hypertension and azotemia. Azotemia is an increase of the products of protein metabolism such as urea and ammonia.

Nephrotic syndrome is a clinical disorder resulting from increased permeability to protein.

How do patients with nephrotic syndrome present?

Patients with nephrotic syndrome present with generalised oedema and proteinuria, which are the most common manifestations. Idiopathic thickening of the basement membrane that occurs in diabetes mellitus can cause it.

Give bed rest to the patient with nephrotic syndrome and dietary care to include high protein, low sodium and high calorie. Diuretics and other drugs may be used and the patient should be protected from infection.

On the other hand, nephritis manifests with decreased filtration rate, haematuria, oliguria, azotemia and hypertension. There is little proteinuria and oedema. It is a result of inflammation arising from an autoimmune disease or infection.

Among the disorders that can be grouped together as nephritic syndromes is acute glomerulonephritis, which may be due to bacteria and viruses. Streptococci are sometimes involved in acute glomerulonephritis.

Chronic glomerulonephritis and rapidly progressive glomerulonephritis are the other disorders included among the nephritic syndromes.

Acute glomerulonephritis presents with oliguria, proteinuria, haematuria, oedema, and hypertension. The patient with acute glomerulonephritis will be treated with two main objectives in mind.

The first one is to protect poorly functioning kidneys.

- Bed rest
- Restriction of activities until Blood Urea Nitrogen (BUN) and BP are normal
- Restriction of dietary protein if BUN is high and if there is oliguria
- Liberal use of carbohydrates
- Monitoring of vital functions, intake and output
- Daily weighing
- Giving fluids liberally

The second objective is to recognise and treat complications promptly. This is done by:

- Explaining the complications to the patient
- Treating the infection
- Observing closely for symptoms of renal failure
- Evaluating for any other complications

When there is oedema, fluids are given with caution and sodium is restricted.

Chronic glomerulonephritis presents with oliguria, proteinuria, haematuria, oedema,

and hypertension. This disease represents the last stage and may signal the onset of renal failure.

Renal Failure
Renal failure describes the inability of the kidneys to remove metabolic waste products and regulate fluids, electrolytes and the pH. It may be acute or chronic. Renal failure is caused by many factors, which can be divided into pre-renal, intra-renal and post-renal causes.

Acute Renal Failure
Is a clinical syndrome characterised by a rapid decline in renal function with progressive azotemia (an accumulation of nitrogenous waste products such as Blood Urea Nitrogen (BUN) and increasing levels of creatinine). Acute renal failure is associated with a decrease in urinary output to less than 400ml per day.

Causes of Acute Renal Failure
Pre-renal
These consist of factors outside the kidneys that reduce renal blood flow. They are the most common causes of renal failure and accounts for 70% of all the cases, examples include:

- Hypovolaemia which may be from diarrhoea, haemorrhage, vomiting, excessive use of diuretics, burns and glycosuria.
- Drugs that may start or complicate pre-renal azotemia, for example Non-steroidal Anti-inflammatory drugs (NSAID).
- States of decreased cardiac output such as congestive heart failure, acute pulmonary embolus.
- Decreased vascular resistance as in anaesthesia.
- Vasodilatation and sepsis.
- Vascular obstruction, for example aneurysm and bilateral renal artery occlusion.

Intra-renal or Renal

These are conditions that cause direct renal damage to the renal tissue (parenchyma) or changes that result in the malfunction of the nephrons. Intra-renal causes account for approximately 25% of all the cases. Examples include:

- Nephrotoxic substances, for example aminoglycosides, antibiotics, heavy metals
- Acute tubular necrosis (most common renal cause)
- Glomerulonephritis
- Acute pyelonephritis
- Trauma
- Metabolic disorders
- Renal vascular lesions

Post-renal

These involve mechanical obstruction of urinary outflow in the urinary tract from the renal tubules to the urethral meatus. As the flow of urine is blocked, urine backs up into the renal pelvis resulting in renal failure. Post renal causes account for less than 5% of the cases. The most common causes are:

- Benign prostatic hyperplasia
- Renal calculi
- Prostrate cancer
- Tumours
- Urethral or bladder cancer
- Cervical cancer
- Trauma
- Post-surgical or traumatic interruption or retroperitoneal fibrosis

Pathophysiology of Acute Renal Failure
Renal vasoconstriction:

- Hypovolaemia and decreased renal blood flow stimulate renin release which activates the angiotensin-aldosterone system.
- This results in constriction of the peripheral arteries and the renal afferent arterioles.
- With decreased renal blood flow, there is decreased glomerular capillary pressure and glomerular filtrate rate, tubular dysfunction and oliguria.

Pathophysiology of Acute Renal Failure
Cellular Oedema:

- Ischaemia causes anoxia which leads to endothelial cell oedema.
- Cellular oedema raises tissue pressure above capillary flow pressure. Inadequate renal blood flow which results further depresses the GFR.

Decreased glomerular capillary permeability: Ischaemia alters glomerular epithelial cells and decreases glomerular capillary permeability. This in turn reduces GFR, which significantly

reduces blood flow and this finally leads to tubular dysfunction.
Intratubular obstruction:
When the renal tubules are damaged, the necrotic epithelial cells accumulate in the tubules. The accumulated debris also lowers the GFR.

Leakage of glomerular filtrate:
The glomerular filtrate leaks back into plasma through the holes in the damaged tubuless and this decreases intratubular fluid flow.

Clinical Features

- Has a rapid onset which results from retention of fluids metabolic wastes and the inability to regulate electrolytes.
- The patient is acutely ill and may suffer from acidosis, anaemia, fluid and electrolytes imbalances, fluid overload or deficit and gastrointestinal distress.
- Oliguria (urine output of less than 400ml per day) or anuria (urine output of less than 100ml/day).
- Oedema and hypertension when the fluid intake exceeds the urinary output and insensible losses (skin and lungs).
- Signs and symptoms of congestive heart failure and pulmonary oedema in excessive
  fluid overload.
- Symptoms of uremia - nausea, vomiting drowsiness, fatigue, shortness of breath, confusion, convulsions, coma or gastrointestinal bleeding.
- Fever, pleuric pain from pericarditis.

The Phases of Acute Renal Failure

There are three phases:

- Onset
- Oliguric Phase
- Diuretic Phase
- Recovery Phase

Onset

This is the initial phase of injury to the kidney and reversal or prevention of kidney dysfunction is possible.

Oliguric Phase

- Urine is less than 400ml/day.
- Is accompanied by a rise in serum concentration of the elements usually secreted by the kidneys (urea, creatinine, uric acid and intracellular cations potassium and magnesium).
- The patient is acutely ill and the phase lasts approximately 10 - 14 days.
- The longer this phase, the worse the prognosis.

Diuretic Phase

- Patient experiences a gradual increase in daily urinary output which may be greater than 2000ml/day, but about one to three litres per day.
- Despite the urinary output rising, the nephrons are still not fully functional.
- The kidneys have also recovered their ability to excrete wastes but not to concentrate urine.

The Recovery Period

The phase begins when the glomerular filtrate rate rises and the blood urea nitrogen and serum creatirinine levels start to stabilise and then decrease. The phase lasts 3 - 12 months.

Diagnosis

- History taking and physical examination are done to determine the causes.
- Urinalysis will show casts or proteins in intrarenal disorders.
- Decreased or absent urinary output.
- Increase levels of Blood Urea Nitrogen (BUN), serum creatinine, sodium, potassium and chloride.
- Decreased serum calcium, carbon dioxide (bicarbonate) and haemoglobin.
- If the diagnosis cannot be made by history and physical examination, then the following tests may be done.
- Renal ultrasound, renal scan, retrograde pyelogram, Computed Tomography (CT) scan or Magnetic Resonance Imaging (MRI).

Management

Because acute renal failure is reversible the primary goal of treatment is to:

- Admit the patient in a well ventilated room.
- Maintain the patient in as normal state as possible while the kidneys are repairing themselves.
- The predisposing cause is determined and corrected.
- Management is focused on controlling the patient's symptoms and preventing complications.
- The first step in the management is to determine if there is adequate blood supply to the kidneys.
- Replace fluid carefully because fluid overload can easily occur. The amount of fluid administered is based on previous days output (urine, vomitus, diarrhoea) plus an amount to account for the body's insensible loss (500 - 600ml).
- During oliguric phase prevent hyperkalaemia, severe acidosis, severe fluid overload and pulmonary oedema which may become life threatening.

Nutritional Therapy

- Proteins and potassium are restricted to help reduce the accumulation of electrolytes and metabolic wastes.
- Fluid and sodium are restricted during the oliguric phase to decrease fluid overload.

Drug Therapy

Drugs used in acute renal failure include:

- Digoxin to increase stroke volume.
- Antihypertensive to reduce the elevated blood pressure.
- Stool softeners may be given to prevent constipation and excessive straining.
- Dietary supplements, for example multivitamin and iron supplements.

Dialysis, preferably haemodialysis is done to control the build up of electrolytes, metabolic wastes and fluids. The most common indications for dialysis in acute renal fails include:

- Volumes overload resulting in congestive heart failure
- Pulmonary oedema
- Potassium levels greater then 6.0mmoL
- Metabolic acidosis (serum bicarbonate level less than 15mml/L
- BUN level greater than 120gm/dl 43 mMol/L
- Significant change in mental status
- Pericarditis

Chronic Renal Failure

This is the progressive irreversible destruction of the nephrons in both kidneys. The destruction progresses and the nephrons are destroyed and replaced by non-functional scar tissue.

Causes

- Chronic glomerulonephritis
- Acute renal failure
- Polycystic kidney disease
- Obstruction
- Repeated pyelonephritis
- Nephrotoxins

Other systemic diseases that may cause chronic renal failure include:

- Diabetes mellitus
- Hypertension
- Polyarteritis
- Sickle cell disease
- Amyloid disease

Pathophysiology

The specific pathophysislogy depends on the underlying disease process.As the nephrons are destroyed, the total glomerular filtration rate falls and clearance is reduced. BUN and serum creatinine levels rise. There is increased hypertrophy of the remaining nephron as a result of increased workload. Glomerular filtration remains effective until 70% to 80% of renal function is lost.

Clinical Manifestations

As the renal function deteriorates, every body system becomes involved. The clinical manifestations are as a result of retained substances which include urea creatinine, hormones, electrolytes and water, imbalance of fluids and electrolytes.

Manifestations may include:

- Uremia, anaemia, acidosis.
- Fluid and sodium are either abnormally retained or excreted.
- Urinary volume may be increased, normal or decreased.
- Hypertension is common due to increase in total body water and sodium.

Diagnosis

Based on:

- History.
- Symptoms.
- Laboratory studies - serum creatinine and creatinine clearance. A rise in serum creatinine and a fall in creatinine clearance indicates renal failure.

Management

The focus is on conservative management. Every effort is made to detect and treat potentially reversible causes of renal failure, for example cardiac failure, dehydration, pyelonephiritis, nephrotoxins and urinary tract obstruction.

Conservative management is directed toward:

- Preserving existing renal function
- Treating the symptoms
- Preventing complications
- Providing for the patient's comfort

Drug Therapy

A patient with renal insufficiency is cautioned to avoid non-steroidal anti-inflamanatory drugs since they block synthesis of prostaglandin in the kidney that promote vasodilatation and thereby reducing blood supply to the kidney.

- Acute hyperkalaemia is treated by (IV) glucose and IV 10% calcium gluconate.
- Hypertension - treatment consists of:

- Sodium and fluid restriction
- The administration of antihypertensive, for example beta blockers like nicardipine, nifedipine
- Diuretic therapy

Drug Therapy

- Anaemia - treated with iron supplements and folic acid.
- Transfusion is recommended in severe anaemia when the patient is symptomatic.
- Gastrointestinal symptoms, for example nausea is treated with antacids, antiemetics, dietary control of nitrogenous wastes and maintenance of fluid and electrolyte balance.

Nutritional Therapy

- Restrict proteins - administer only 20g of high quality protein to prevent accumulation of nitrogenous waste products.

The restriction depends on the ability of the person to excrete wastes from the body.

- Restriction of sodium and potassium.

Sodium restriction may depend on the degree of oedema and hypertension. Patient is advised to avoid food high in sodium like canned foods.

- Water restriction - mainly to depend on the daily urine output.
- Phosphate intake is reduced to less than 1000mg/day.

Promotion of Patient's Comfort

- The patients are prone to muscle cramping, pruritus, headaches, ocular irritation, insomnia and fatigue.
- The primary treatment involves control of the electrolyte imbalance.
- Treatment of pruritus is aimed at decreasing the phosphorus.
- Local and systemic agents may be administered to decrease the itching.
- Ocular irritation is as a result of calcium deposits and treatment is aimed at decreasing the plasma phosphate levels.
- Insomnia and fatigue are due to uremia and are treated by decreasing metabolic wastes and providing psychological support.

If the above measures are not successful then renal dialysis is performed.

Many patients with chronic renal failure may require dialysis. Dialysis is done either as peritoneal dialysis or haemodialysis.
You will learn more about this in unit five of this module which covers critical care.

Bladder Dysfunction and NeurogenicBladder

Bladder dysfunction essentially results in retention and obstruction to urine flow. The signs and symptoms of this are bladder distension, frequency of micturition, a small and weak stream of urine, a feeling of incomplete emptying and hesitating before micturition. Some of the causes include stones, tumours and scarring due to injury or infection.

When there is involuntary loss of urination control, it is known as urinary incontinence. It may be due to stress, physiologic dysfunction, reflex incontinence or overflow incontinence.
An incompetent bladder sphincter should be managed with the objective of avoiding urinary leakage. A catheter with urine bag could be used. It is important to give emotional support to the patient.

Cancer of the Bladder
Malignant tumors of the bladder are the most common tumors within the urinary system, but when considering the entire genitourinary system, then prostate tumors are more prevalent.
Cancer of the bladder is most common between the ages of 60 and 70 years and it is three times as common in men as in women.
There are three types of bladder cancer:

- Transitional cell carcinoma.
- Squamous cell carcinoma.
- Adenocarcinoma - common in individual with chronic recurrent bladder stones, chronic lower urinary tract infections and in patients who have indwelling catheters
  for long periods.

Transitional cell carcinoma is the most common, accounting for approximately 90% of all bladder cancers. It develops in the epithelial lining of the bladder. The tumours can be identified as being papillary or non-papillary lesions. Papillary lesions are usually superficial and grow outward from the mucosa, while non-papillary tumours are solid growths that tend to extent deep into the bladder wall and are likely to metastasize.

Predisposing Factors

Bladder cancer is related to a number of environmental and occupational health hazards:

- Certain chemicals used by industrial workers in the rubber and cable industries, textile, printing, coal and gas production and sewage works.
- Cigarette smoking.
- Drinking coffee.
- Women treated with radiation for cervical cancer and patients receiving cyclophosphamide (cytoxan).
- Chronic abuse of phenacetin containing analgesics.

Clinical Manifestations

- Painless haematuria (most common symptom) and may be a gross or microscopic finding. This can occur with each voiding or intermittently.
- Irritative voiding symptoms such as dysuria, frequency and urgency.

Diagnosis

This is based on symptoms, history and diagnostic tests which may include:

- Urine specimen is taken for cytology to determine the presence of neoplastic cells.
- Radiological studies - intravenous pyelogram, ultrasound, Computed Tomography (CT) scan or Magnetic Resonance Imaging (MRI).

Management

The type of treatment initiated depends on the form of tumour and the stages of the disease. The following various therapies are used in the management of cancer of bladder:

- Bloodless destruction of the lesion
- Multiple tumours can be eradicated without using anaesthesia
- Minimal risk of operation
- Lack of need for a urinary catheter

Surgical Treatment of Papillary or Superficial Bladder Cancer

- Laser therapy (Laser photocoagulation): This procedure can be repeated a number of times to prevent recurrence. The advantages include:

- Open loop resection:
  This method is used for the control of bleeding for large superficial tumours and for multiple lesions which require segmental resection of the bladder (segmental cystectomy).

Surgical Treatment of Non-papillary or Muscle - Invasive Bladder Cancer

- Segmental or partial cystectomy: Is done if there is a tumour in the bladder that in not accessible to treatment by transurethral resection. The objective is to only remove that

portion of the bladder affected without injuring the ureters, bladder neck or prostate.

- Intravesical immunotherapy: The treatment involves the instillation of bacillus Calmette-Guerin into the bladder.
- Radical cystectomy: Is performed when the bladder cancer is not treatable by conservative measures or when there is recurrence after conservative therapy.

Post-operative Management

- Patient is instructed to drink large amounts of fluids each day
- Monitor intake output chart
- Administer analgesics and stool softeners if necessary
- Health education on patient's condition and follow up care

Radiation therapy

- Radiation therapy is used with cystectomy or as the primary therapy when the cancer is inoperable.
- Sometimes radio therapy is combined with systemic chemotherapy preoperatively or to treat distant metastases.

Disorders of Organs Associated with the Urinary System

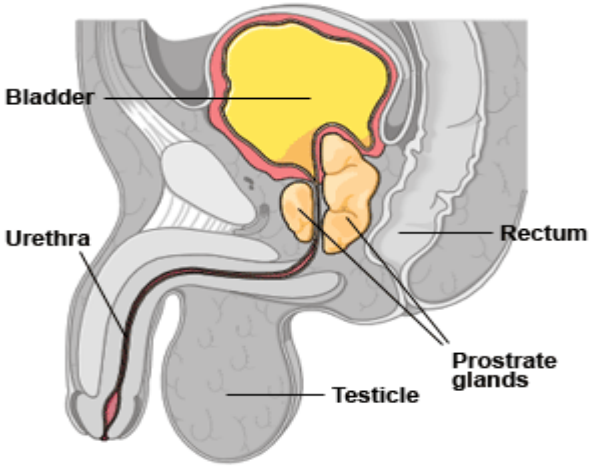
Various disorders also affect the testis, penis and associated structures. Read further on the following conditions; Hydrocele, cryptorchidism and orchitis.

You will now look at a condition that is common in many surgical units. This is benign prostatic hypertrophy and cancer of the prostate.

Benign Prostatic Hypertrophy

Benign prostatic hypertrophy is a non-malignant disorder occurring in men over 40 years of age. As the prostate enlarges, it compresses the urethra causing obstruction. The urinary stream flow becomes weaker. Incontinence, frequency and nocturia are common.

The specific nursing care for patients with benign prostatic hypertrophy involves many actions. You must encourage increased fluid intake of at least 3,000ml per day. Urinary antiseptics and antibiotics are given to prevent urinary tract infections. Nalidixic acid and nitrofurantoin are good drugs in this case. Immediately after prostatectomy or transurethral resection of the prostate, vital observations, monitoring the patency of the urinary catheters, input-output monitoring and change of dressings must be undertaken. As part of the post-operative education, you should instruct the patient to perform perineal exercises to regain bladder control.



Prostatic Cancer

Prostatic cancer is the most common cancer in men. Its incidence increases with age and its symptoms are similar to those of benign prostatic hypertrophy. As it progresses, there is anaemia, with metastases to other organs and hence a more varied clinical picture. Mainly weight loss, easy fatigability, urinary obstruction, nocturia, and frequent urinary tract infections are manifested. The assessment of the patient involves rectal examination, enzyme studies and other investigations involving blood and electrolytes.

Benign prostatic hypertrophy and early cancer of the prostate can be managed surgically. The most common procedure is prostatectomy.

After prostatectomy, irrigation of the bladder, close observation, antibiotics and wound care

must be undertaken. If the cancer cannot be treated surgically, then chemotherapy and radiotherapy may be attempted.
Education on the populations at risk and frequent checkups for men from the age of 40 years must be shared with the community.
For the patient with cancer of the prostate who has undergone prostatectomy, you need to explain to them that female sexual characteristics may develop as a result of estrogen therapy. Provide general nursing care related to chemotherapy such as infection prevention and treatment of anaemia.

Cancer of the Testis
Cancer of the testis occurs commonly in men aged 20 - 35 years.

Predisposing Factors
- Common in males who have had undecended testes (cryptorchidism) or with a family history of testicular cancer.
- Those individuals with a history of mumps, orchitis, inguinal hernia in childhood and trauma.

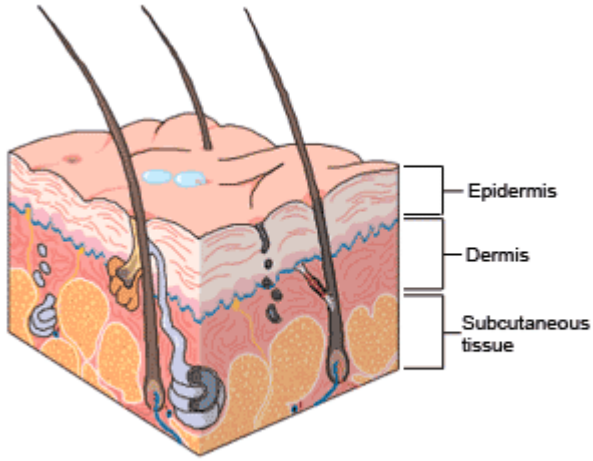
Pathophysiology
- 90 to 95% of all primary testicular cancers arise from the germ cell epithelium of the testis.
- The cancer is classified as either seminomas or non seminomas.
- Seminomas are the most common of all cancer of the testis, they grow slowly and are usually localised in that they may be confined to the testicles or retroperitoneal lymph nodes and have a good prognosis.
- Non seminomas tend to be invasive and metastasize quickly through the lymphatic system or blood.

Clinical Manifestations
- In early stages cancer of the testis is asymptomatic except for the hardened area or lump on the testis.
- A dull ache or heavy feeling develops in the lower abdomen, inguinal or scrotal area.
- If it is associated with infection the patient presents with acute testicular pain necrosis and haemorrhage.
- Symptoms from metastasis may include: Neck mass, respiratory symptoms, gastrointestinal disturbances, central and peripheral nervous system involvement, lower extremity oedema, anorexia and weight loss.

Management
The therapeutic interventions include removal of the testis, lymph node resection in the retroperitoneal area, radiation and chemotherapy. The specific nursing care will be similar to that given to patients receiving chemotherapy. After surgery, close observation, wound care and patient counselling on hormonal therapy will be necessary.

The Skin

The skin is an organ that is involved in excretion, regulation, protection and sensory input in the human body. The integuments include the skin, hair, nails and various glands.
The diseases affecting the other integuments are mainly communicable diseases and you will cover them in unit four of module three.
The skin has three layers.



The Epidermis

The epidermis is the outermost layer. It is thin and is nourished from diffused nutrients and oxygen. It is composed of stratified epithelium, which varies in thickness and is composed of

five layers. Dead cells from the outermost layer slough off and are replaced by others

The Dermis

The dermis is the second layer of the skin. It has blood vessels, nerves, lymphatic vessels, hair follicles, involuntary muscle fibres, glands and collagen fibres. It is the collagen that gives the skin its elasticity. The dermis is divided into two layers. These are the upper papillary layers and the lower reticular layers.

Subcutaneous Tissues

This is mainly composed of adipose tissue. It attaches the skin to underlying structures.

Functions of the Skin
List at least five functions of the skin.
Your list should include the following:

- Protection
- Formation of vitamin D
- Regulation of body temperature
- Excretion
- Sensation

Disorders of the Integuments
Some disorders that can afflict the skin are: eczema, psoriasis, and tumors of the skin.

Skin Lesions
When these are observed they should be described in terms of type, colour, size, shape, configuration and arrangement, distribution and texture.

Type

Proper description terminology should be used for clear accurate communication about skin lesions,
for example the term vesicle provides a clear picture of a lesion that is clear, fluid filled and smaller
than 1cm.

Colour

This varies from pale, brown, red to normal background pigmentation. Colour helps to identify whether
the lesion may be secondary to an inflammatory process, infection, and sun exposure or hereditary.

Size

The metric system is used for measurement, but where a ruler is not available the size of a lesion may be estimated by measuring a portion of ones finger to use a gauge.

Shape and Demarcation

Shape describes the contour of a lesion and this may be round, oral, polygonal (many sided) and asymmetric. Demarcation refers to the sharpness of the edge of a lesion, whether discrete or diffuse.

Texture

The lesion is described as being rough or smooth, dry or moist and on the surface, or deeply penetrating into the tissue.

Configuration

Refers to the arrangement or pattern of lesions in relation to other lesions. Skin lesions can occur discretely or in groupings.

The groupings may be termed as linear, following a line, annular, ring like, confluent, merging together, or serpiginous, serpent like, while disseminated refers to multiple scattered lesion diffusely distributed over the body.

Distribution

This takes into consideration both the arrangement of lesions over an area of skin as well as the pattern. This may be described as discrete (isolated), localised, regional and generalised.

Diagnostic Tests

Most skin disorders are diagnosed by careful physical assessment. Diagnostic tests may be used when further information is required to confirm the diagnosis.

Other tests may include:
Laboratory Tests

- Tzanck prep test:
  The test can be used to further differentiate sign disorders that produce vesicles or blisters. The blister is unroofed with a cotton swab or blade

and the base of the vesicle is seraped to obtain cells for examination.

- Potassium hydroxide (KOH) prep test: The test is done if fungal infection is suspected to assist in the identification of the fungal forms. Dry scale is scraped from the lesion and put on a slide. One or two drops of 20% KOH are placed onto the slide and gently heated.

Culture

Gram stain and culture and sensitivity of weeping or pustular lesions is performed to rule out bacterial sources for infection. Streptococci and staphylococci are the most common organisms that cause skin infections. Wound cultures are obtained by swabbing of the exudates from the lesion surface.

Other Skin Disorders

There are a vast number of dermatological conditions but the common conditions include:

- Acne
- Atopic eczema
- Contact dermatitis and other forms of eczema
- Psoriasis
- Viral warts
- Benign and malignant skin tumors
- Leg ulceration

Eczemas

Eczema is characterised by superficial inflammation of the skin. The terms eczema and dermatitis are often used interchangeably. There are many forms or eczema each of which is triggered by certain non-infective factors.

Contact Dermatitis

There are two types:

- Irritant Contact Dermatitis
- Allergic Contact Dermatitis

Irritant Contact Dermatitis

This is a non-allergic reaction occurring in any person on contact with a sufficient concentration of irritant. It occurs four times more commonly than allergic contract dermatitis.

Causes

- Mechanical irritation from wool or glass fibres.
- Chemical irritants include acids, alkalis, solvents detergents, insecticides and industrial compounds.
- Biologic irritants include urine, faeces and toxins from insects or aquatic plants.
- Persons engaged in wet work such as food handlers, health care workers and child
  care providers.

Allergic Contact Dermatitis

This is a cell mediated type IV delayed hypersensitivity immune reaction from contact with a specific antigen.

Causes

Typical antigens include:

- Poison ivy
- Synthetics
- Industrial chemicals
- Drugs for example: penicillin
- Metals especially nickel in jewellery (most common) and chromate

Once the skin has been sensitised, further contact with a sensitising substance will produce an eczematous reaction.

Mode of Transmission

The sensitising allergen may reach the site by:

- Direct contact
- Indirect
  contact for example; transmission by animals
- From one part of the body to the other by hands
- From clothing
- By the air for example: in smoke

Pathophysiology

The lesions appear sooner in an irritant contact than in allergic type. The rash develops on the exposed areas, particularly the more sensitive areas for example: dorsal more than the palmar surface of the hands.

Diagnosis

Patch testing is performed where the agent is unknown.

Management

- Weeping vesicular lesions are treated with domeboro soaks (aluminum acetate) applied one to two times a day.
- Crusts and scales are not removed but are allowed to drop off naturally as the skin heals.
- Topical corticosteroids are applied twice a day to the affected areas for approximately two weeks.
- When the affected areas are on the face, genital and skin folds weaker steroids are used, for example: hydrocortisone 0.5% to 1%.
- In case of generalised rash or significant face and hand involvement oral corticosteroids may be prescribed.
- Itching is relieved by administering oral antilistaminies and topical antipruritic agents.

Prevention

This can be ensured by:

- Avoiding the irritating or sensitising substance whenever possible.
- Protecting the skin by wearing appropriate clothing where poison ivy is grown or by immediately rinsing the skin for 15 minutes with running water to prevent skin penetration when in contact with poison ivy.
- If in contact, clothes should be removed carefully to prevent skin contact.
- Change of environment if sensitivity develops in living or working environment.
- Use of gloves when handling irritant or allergenic substances.
- Use of mild soap in case of sensitivity to detergents.

Atopic Dermatitis

This is a common inflammatory skin condition linked to a larger group or atopic diseases including asthma and hay fever. It's a chronic condition. Common in children and often develops symptoms by six months of age and becomes less severe between the ages of two and three.

Predisposing Factors

- Sudden changes in temperature and humidity
- Exercise
- Psychologic stress
- Fibres such as wool, fur or nylon
- Detergents
- Perfumes

Clinical Features

- Intense pruritus
- Chronic rubbing and scratching which is followed by skin thickening (lichenification) and alteration in pigmentation (hyperpigmentation or hypopigmentation)
- Rough dry skin
- Infants may develop moist, oozing, crusting lesions on the scalp and face and this may spread to the trunk, arms and legs
- Later the lesions become localised on the neck, wrist, popliteal fossae, and eyelids and behind the ears
- The erythema is dusky
- Excoriations may become infected

Pathophysiology

The protective barrier function of the skin is diminished greatly. Lipid content changes in the epidermis permit water loss from the cells resulting in dry skin. There is a marked tendency toward vasoconstriction of superficial blood vessels. Cold and low humidity are poorly tolerated because of drying effects. Heat and high humidity are poorly tolerated because vasodilatation increases the inflammatory reaction and therefore aggravates the dermatitis and as well causing increased itching and discomfort.

Management

- The aim is to control the symptoms but there is no cure. Topical therapies are sufficient to control atopic eczema and triple therapy is usually recommended for example:
  - Topical steroid twice daily
  - Emollient
  - Bath oil (oilatum) and soap (aqueous cream)

General management: erythema

- Avoid non irritants, for example soaps and animal fur.
- Manipulating the diet, for example taking dairy free diet.

Complications

Bacterial infections e.g. staphylococcus aureus and pseudomonas.

Discoid Eczema (Nummular Eczema)
This is characterised by a well demarcated scaly patch especially on the lower limbs, which can be confused with psoriasis. It is more common in adults.

Cause
Contact with irritants for example; detergents, chemicals.

Clinical Manifestations

Eczema can be confined to the hands and feet and can present with:

- Itchy vesicles of the palm and along the sides of the fingers, occasionally with large blisters called 'pompholyx'
- Discrete coin shaped patches on the trunk and limbs
- The surface in covered in crust or scale

Psoriasis

This is a common chronic inflammatory disease of the skin where the replacement of epidermal cells is faster than normal.
The real causes are not known and the actual pathology is not well understood.

Predisposing Factors

Its associated factors are trauma, genetic, emotional, immunologic, drugs, infections such as streptococci, and excessive exposure to sunlight among others.
Environmental factors that trigger psoriasis include:

- Hormonal changes
- Infections for example; cold, sinusitis or sore throat
- Skin injury from surgery or sunburn
- Alcohol
- Smoking
- Obesity

Clinical Features

- The usual or most common sites of psoriasis are the elbows, knees, scalp, lumbosacral skin but can occur on all skin surfaces.
- Pitting of the nails, yellowish discoloration, onycholysis (separation of the nail from the bed), thickening, grooving and splitting.
- In severe cases may lead to psoriatic arthritis involving the interphalangeal joints of the hands and feet, the sacroiliac, hip and cervical areas.
- Skin lesions and arthritis may occur together.

Diagnosis

Diagnosed by the characteristics lesions.

Management
The aim is to decrease epidermal proliferation and dermal inflammation.

Treatment

- Mild to moderate topical steroids for example calcipotriol (synthetic vitamin D)
- Purified coal tar

All of the above are applied twice a day to the lesions.

Tumours of the Skin

The tumours of the skin may be benign, pre-malignant or malignant. The benign ones include the more common keloids and cutaneous cysts. Malignant ones are basal cell carcinoma, Kaposi's sarcoma which is gaining prominence due to HIV/AIDS, and the melanomas.

General Management of the Adult with Skin Disorders
There are three principles to be followed in the management of skin disorders:

- Treatment should be simple and aimed at preserving or restoring the physiologic state of the skin. Topical therapy is preferred because medication can be delivered in optimal concentrations at the exact site where it is needed.
- If the condition the patient is suffering from makes the skin dry, then aim at making it more moist.

- If the condition the patient is suffering from makes the skin wet, then aim at making it drier.

Skin diseases must be treated appropriately because they may make the patient develop emotional problems. Many skin problems are unlikely to lead to patients getting admitted and the medications are normally locally applied. Antibiotic creams and ointments are given in addition to skin dressings. Understanding drugs and procedure in skin care is all that is required.

Health education is of utmost importance in the management of skin problems. This is because most people associate dermatological diseases with poor skin hygiene. The kind of information that a patient with skin problem needs to have so as to facilitate better care is related to:

- Appropriate hygiene
- Nutritional and metabolic requirements
- Elimination pattern
- Activity - exercise pattern
- Perception of unusual sensations
- Use of birth control hormones

It is also important to know that drugs that may cause photosensitivity to the skin include antidysrhythmic drugs such as quinine, antihistamines, some antimicrobial agents, for example tetracycline and nalidixic acid, some diuretics, and oral hypoglycemic agents for example sulphonamides.

Health message sharing on preventive measures should be done regarding:

- Use of the sun for light skinned people and how drugs cause photosensitivity
- Radiation therapy and its effects on the skin
- Hygiene
- Nutritional management, particularly fatty foods, vitamins and adequate proteins

The general measures in the treatment are:

- Use of phototherapy especially in the treatment of jaundice
- Radiation therapy for cutaneous malignancies
- Antibiotics for bacterial infections
- Corticosteroids, especially topically applied
- Antihistamines for hypersensitivity reactions
- Surgery by use of various techniques such as lasers, curettage
- Wet dressings - for dry conditions of the skin
- Baths using appropriate solutions and general wound care

Care of the Adult with Burns

Burns constitute a significant problem in surgical units. Burn wounds occur when there is contact between tissue and an energy source, such as heat, chemicals, electrical current or radiations.

Thermal Burns

The most common type of burn is thermal injury, which can be caused by flame, flash, scald, or contact with hot objects.

Thermal burns are managed in the following way:

- Remove the patient from the environment
- Establish and maintain the airway
- Administer high flow humidified air
- Establish IV access, IV fluids and monitor vital signs
- Remove clothing and jewellery
- Do further assessment; cool a minor burn by running cool water over the site
- Cover the burns with clean clothing and call for further help

Chemical Burns

These are the results of tissue injury and destruction from necrotising substances. Chemicals can cause respiratory problems and other systemic manifestation, as well as skin or eye injuries. Chemical burns are mostly caused by acids, however alkali burns also occur, and they are more difficult to manage than acid burns.

Always undertake a quick assessment to determine aetiology, then:

- Wear protective attire
- Remove the chemical from contact with the individual's body
- Flush the chemical with saline or water
- Remove clothing including shoes and jewellery
- Do not rub the skin, just pat it with dry towel and cover wounds with a clean, dry dressing or sheet

- Monitor the airway and get more help

Inhalation Injuries

Inhalation of hot air or noxious chemicals can cause damage to the tissue of the respiratory tract. There are three types of smoke and inhalation injuries:

- Carbon dioxide poisoning
- Inhalation injury above the glottis caused by the inhalation of hot air, steam or smoke
- Inhalation injury below the glottis which is usually chemically produced

The emergency management of inhalation (smoke) injuries should concentrate on removing the patient from toxic environment, establishing and monitoring the airway and administration of oxygen. Removal of clothing, vital signs monitoring and placing the patient in high Fowler's position as you wait for more medical help.

Electrical Burns

Injury from the electrical burns results from coagulation necrosis that is caused by intense heat generated from an electrical current. It can also result from direct damage to nerves and vessels causing tissue anoxia and death.
For electrical burns, the emergency measures include:

- Removing the patient from contact with the electrical source
- Assessing for and maintaining a patent airway, breathing and circulation
- Initiating CPR if necessary
- Establishing an airway and administration of 100% oxygen
- Establishing an IV line
- Removing the patient's clothing
- Covering the burn sites, monitoring vital signs and doing further assessment

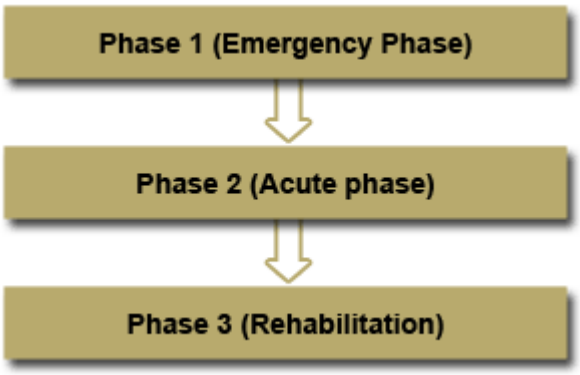
The key factors in burn pathology are the area of the burn, the depth of the burn and any special areas of the body, such as the respiratory tract that are involved.
The burnt area will almost immediately begin to lose fluid which is very similar to plasma in its composition. If sufficient fluid is lost from the burn, hypovolaemic shock will develop. The area of the burn is, therefore, crucial as it determines the volume of fluid lost. Area may be estimated using Wallace's Rule of Nine.
It is more appropriate and precise to describe the depth of burns as either full thickness, partial thickness or superficial. Ensure you read more on the depth of burns

Special Areas Affected By Burns
Oedema of the face and neck can have serious implications for the airway. Inhalation of flames or hot gasses will cause burn oedema in the respiratory tract itself.
The threat of an occluded airway is very real in such cases and an early tracheotomy or intubation, if possible, is indicated.
Once at the emergency department, the other measure instituted is to calculate the fluids volume required.

Have you heard of Parkland's formula?
It is used to calculate the amount of fluid requirements in adults.
Example of fluids to be administered:

Crystalloids such as Ringer's lactate
Give 2ml/Kg/%burn; one half in the first 8 hours post-burns and the other during the next 16 hours.

Glucose in water
Give in amounts to replace losses in the second 24 hours following burns.
The mainstay of burn management is in three phases.



Phase 1 (Emergrncy phase)

- Fluid therapy, IV access, fluids given, and monitoring intake and output

- Wound care - topical antibiotics, debridement, and administration of tetanus toxoid

Phase 2 (Acute phase)

- Fluid therapy - replacement of fluids, use of RBC concentrate
- Wound care
- Early excision and grafting depending on the extent of the wound

Phase 3 (rehabilitation phase)

- Counselling and health education
- Physical therapy
- Correction of contractures and scars through surgery, physical therapy and splinting
- Possible cosmetic and reconstructive surgery

SECTION 4: PALLIATIVE CARE

Introduction

Palliative care is about providing maintenance measures to patients with terminal illnesses and trying to keep them alive and as comfortable as possible. In many cases, patients may suffer illnesses that may not be totally cured, and they have to live with them for a long time.
You are going to learn about the care that is given to such patients.

Objectives

By the end of this section you will be able to:

- Define palliative care
- Name conditions and diseases requiring palliative care
- Describe the principles of palliative care
- Describe the skills used in palliative care
- Describe the stages of death and dying
- Describe the management of terminally ill patients

Principles and Approaches Used in Palliative Care

Palliative care is caring for people (and their families) who are suffering from life limiting illnesses. It aims at achieving the best possible quality of life for them by meeting their physical, psychological and spiritual needs. Palliative care employs a holistic approach, which enables people to die with dignity while supporting those close to them.
The World Health Organisation (WHO) defines palliative care as 'the active total care of patients whose disease is not responsive to curative treatment', control of pain, psychological, social, and spiritual problems is paramount. The goal of palliative care is the achievement of the best quality of life for all patients and their families.
Palliative care is an affordable and appropriate way of taking care of those with terminal illnesses. It is the key to supporting people with incurable illnesses. It has great relevance to your country because of the number of people living with HIV/AIDS and cancer.

Why do you think palliative care should be well embraced in Kenya?
Some of the points you should be thinking about are:

- It improves the quality of life for the sick
- It is suited to home care
- It offers freedom from unnecessary pain and suffering
- It makes use of affordable and effective drugs
- It enables people to prepare for death and to die with dignity
- It also supports families and caretakers
- It empowers communities to respond to the emerging HIV/AIDS crisis and cancer

You will cover home care in unit seven of module three and you will be able to see the relevance of this concept.

Principles of Pallative Care
Palliative care is based on the philosophy of total care. It employs the following principles.

- **Teamwork:** Involving team of medical workers, i.e. physicians, nurses , social workers, pastoral care professionals, physical and occupational therapist, pharmacist whose skills are required.
- **Pain relief:** Ensuring that the client experience death free of avoidable pain and suffering and in accordance with the client's and family's issue.
- **Support:** Ensuring availability of support for the client to enable them

carry out activities they enjoy doing that improve the quality of their life.

Stages of Dying

Kubler-Ross described 5 stages of dying. These are:

Denial
During denial, a person may act as though nothing has happened and may refuse to believe or understand what the impending loss means.

Anger
During denial, a person may act as though nothing has happened and may refuse to believe or understand what the impending loss means.

Bargaining
During bargaining, the individual tries to postpone awareness e.g.'God ,if you give me life I will serve you better' as though the loss can be prevented.

Depression
In the depression stage, a person realises the impact of the loss. They feel very lonely and may withdraw from interpersonal interaction, refusing to talk.

Acceptance
Acceptance stage, loss is accepted and they begin to look to the future.

The stages do not necessarily appear in this order. Each terminally ill patient presents differently because of difference in personalities.

In the delivery of palliative care the nurse does the following:

- Provides relief from pain and other distressing symptoms
- Affirms life and regards dying as a normal process
- Neither hasten nor postpone death.
- Integrates psychological and spiritual aspects of patient care
- Offers support systems to help client and family cope with patients illness and own bereavement
- Enhances the quality of life
- Ensures the patients dignity and self esteem are maintained

As a nurse one of the most important skills in providing palliative care is in establishing a caring relationship with both the client and family in home-based care.

The nurse needs to understand the stages of death and dying and whose knowledge is useful in caring for the patient.

Management of the Terminally Ill Client.
a) Assessment
In caring for this patient, assessment includes the client, family and significant others. Grief assessment is ongoing throughout the period of illness. Questions that may be asked include:

- Tell me how this diagnosis makes you feel?
- How has this change in your life affected you today?
- What are your feelings about your family, illness, etc?

b) Nursing Diagnosis

- Hopelessness related to failing physical condition
- Dysfunctional grieving related to loss, e.g. loss of breast

c) Planning
The focus in planning is to support the client physically, emotionally, developmentally and ensure self esteem and dignity are maintained. Therefore:

- Select communication strategies that assist patient adapt to loss
- Provide skills/knowledge for the family to manage and understand care for the dying patient

The outcomes should include e.g:

- Patient will be able to continue the parental responsibilities of their children
- Patient will express hope in radiotherapy

Interdiscplinary teams help in identifying and meeting the needs of patient and family.
d) Implementation
Although return to full function is not expected, the goal should be to return to optimal health. This is achieved through:
Therapeutic communication
Promoting hope
Facilitating mourning
Pain management

Support is offered in this way for both client and family.
Some of the diseases you should have listed are:

- HIV/AIDS
- Cancer: cancer of the cervix, prostate cancer, cancer of the oesophagus, leukaemia, Hodgkin's disease, cancer of the breast and many others
- Terminal liver disease and kidney disease

These diseases and many more may present with symptoms that may make living with them difficult. In each case you must ensure good delivery
of care.
First, you must build a therapeutic relationship, develop a patient profile, and anticipate symptoms by determining the patient's main problem. This could be pain, bleeding, discharge or other problem. You will need to find out the patient's expectations and their priorities For instance, which things are most important to them right now? You should find out the patient's understanding of the illness and anticipated symptoms. If you do all this, you would have built a fairly good profile.
Second, you need to apply the principles of palliative care.
You are now going to find out how to go about palliative care for specific patients.

Patients Requiring Palliative Care

One of the biggest challenges to health care in Kenya is HIV/AIDS. The disease is a drain on scarce resources. It is treated with a lot of stigma in many communities. It is, therefore, a challenge to give palliative care to people living with HIV/AIDS.

HIV/AIDS

The disease presents with many manifestations related to opportunistic infections. Currently, antiretroviral medications are available to prolong life. The opportunistic infections can be treated well with appropriate antibiotics.
You will cover HIV/AIDS in module two, unit six. Some of the symptoms that you may have to deal with include cachexia and anorexia, anxiety, diarrhoea, cough, delirium and dementia, mouth ulcers, skin problems and sometimes constipation.

Cancer

About 30,000 new cases of cancer are diagnosed each year However, in many developing countries, this is a forgotten disease, such that when one is diagnosed, the disease will be advanced and there will be few resources to fight it.
The main symptoms of cancer include pain, wasting, anaemia, anxiety, depression, skin problems, and infections among others.
In this unit you have already covered several neoplasms affecting various systems and their presentations.

Liver and Kidney Disease

Although technology is making it possible to manage chronic kidney and liver failure, due to a lack of resources and failure of the patients to present early to the health facility for diagnosis, some patients have to be put on measures that can only relieve their symptoms indefinitely.
You have learnt about chronic renal failure and that patients may receive dialysis. The dialysis may have to continue as well as management of other symptoms for a long time. Liver cirrhosis may also lead to liver failure, which requires symptom palliation.

Degenerative Nervous System Diseases

Some diseases of the nervous system may be incurable, hence the management of symptoms. Remember multiple sclerosis, senile dementia and Alzheimer's disease? Senile dementia and other types of dementias may present to you and you have to undertake palliative care.
There are many other diseases; they can't all be covered here but you could come across them on a daily basis. The principles of care will be the same.

Symptom Management

Before you start palliative care for any patient, you must evaluate the nature and severity of the symptoms. The following are some of the questions that you will ask to evaluate the nature and severity
of the symptoms.

- How does the symptom affect the patient's life?
- How does it affect the patient's physical function
  and mobility?

- What makes the symptom better, is it food, drugs, activity or position?
- What makes the symptom worse?
- At what time is the symptom worse?

Once you have evaluated the symptom(s), its relief requires organisation and communication. You must organise and plan the care through teamwork. You must also communicate to the family and treat psychological stress.
What are the principles of pain management that you should follow in palliative care?

Principles of Management
The first principle is relief of the symptom. Some symptoms are only relieved partly, while others can be completely relieved.
For example, if you are treating somebody with cancer of the breast, it may be possible to completely alleviate the pain while, if they have dyspnoea due to involvement, this may be difficult to alleviate In such a case, the goal is to give the patient a feeling of being in charge and not being subdued by the symptom.
Another principle that is employed in palliative care is the maintenance of independence. Some treatments may limit somebody's movement, for example, during dialysis, oxygen therapy and so on. In some cases, the patient may become so dependent on the treatment that they cannot undertake other activities. In this case you must ensure good balance.
The third principle involves a treatment plan. You should consider both drug and non-drug methods. The non-drug methods include explaining and reassuring, avoidance of factors that make the symptom worse, correction of biochemical derangements, treatment of recurrent disease, for example, opportunistic infections and treatment of psychological problems.
Drug therapy, on the other hand, involves drugs given by mouth and injections. Whatever the treatment, keep it simple and individualise it.
As you have practiced nursing for some time and you know many techniques of management of various symptoms, you will apply the same in palliative care. You are now going to learn about techniques of pain management.

Techniques of Pain Management

Analgesic drugs are commonly prescribed for pain management. Adjuvant drugs must be given as well to make the management more effective.
Before the pain can be treated, you must know the location, severity, radiation, type, aggravating factors and alleviating factors of the pain.
Certain principles have been developed by WHO to guide pain management.

The WHO Analgesic Ladder
WHO recommends that drugs for pain management be given:

By mouth
This should be the route of choice because it is convenient and easy. If no longer tolerable, subcutaneous route should be used.

By clock
By clock means that drugs should be given regularly at the same time.
By ladder
This means that you start with one drug that is the weakest, increase the dosage as necessary and only move to the next stronger drug after exhausting the potential of the weaker drug. For example, you cannot move straight to opioid drugs such as morphine before you finish exploiting paracetamol.
The WHO Analgesic Ladder
The following is the WHO analgesic ladder. Please study it well!
Step 1 Non Opioids
These are drugs such as Paracetamol and other non-steroidal anti-inflammatory drugs.
Step 2 Mild Opioids
These are drugs such as Codeine often combined with Paracetamol.
Step 3 Strong Opioids
In this category, there are immediate release drugs such as Oramorph and sustained release drugs such as subcutaneous Diamorphine.
Sustained release medication is refers to drugs that will be released slowly by the body to act on target receptors.
Other techniques of pain relief include: patient controlled analgesia, which may not yet be available in Kenya. In this technique, the patient has equipment which has been prepared to deliver a certain dosage of the drug and the patient is allowed to adjust the flow rate depending on the intensity of pain they are feeling.
You should be prepared to give palliative care in your community

UNIT FOUR: PAEDIATRIC NURSING

In this unit you are going to cover diseases and conditions which commonly affect children up to the age of twelve years.

This unit consists of four sections:

Section 1: Health Promotion and Child Disease Prevention
Section 2: The General Principles of Paediatric Nursing
Section 3: Nutrition and Nutritional Disorders in Children
Section 4: Infectious Childhood Diseases

There is a lot of material you will have to cover in Paediatric Nursing. For your convenience the unit will be split into two parts. You will now look at the objectives for this unit.

Unit Objectives

.

By the end of this unit you will be able to:

- Describe health promotion and child disease prevention
- Explain the general principles of paediatric nursing
- Describe child nutrition and nutritional disorders
- Describe infectious childhood diseases and their management
- Describe and manage common paediatric emergencies

SECTION 1: HEALTH PROMOTION AND CHILD DISEASE PREVENTION

Introduction

Paediatric nursing is concerned with the health of infants, children and adolescents, their growth and development and their opportunity to achieve full potential as adults.

In order to provide quality nursing care you will have to acquire knowledge in child health, growth and development. This will assist you to identify any deviations from the normal and to take appropriate corrective measures. As far as is practically possible, sick children should be nursed in their own home environments, among people they are used to. This is necessary because hospitalisation and separation of children from their parents or guardians can have serious psychological effects hence worsening their health.

Whether the care of children is given in hospital, home or the community, it is paramount that the paediatric nurse and the parents or guardians work in harmony in order to achieve set objectives for the benefit of the child's well being.

Objectives

By the end of this section you will be able to:

- Review the normal growth and development of children
- Define and explain the principles of paediatric nursing
- Identify and know when to implement health promotional measures necessary in the prevention of diseases
- Explain health messages to be shared with the individual, the family and the community in order to prevent common childhood illnesses

Normal Growth and Development of Children

You are already aware that in normal circumstances, given the right environment, childrens growth and development takes place rapidly. You are now going to look at the definition of the concepts 'growth' and 'development'.

Think of your own definitions of the terms 'growth' and 'development'

Growth

Growth implies a change in quantity. Human growth can be defined as a change in body structure. The changes are both in height and size. They are influenced by various factors, which will be covered later.

Development

Development is a physiological process, which occurs in children right from conception until puberty. It involves a qualitative change in this case from a lower to a more advanced stage of complexity. This process is also influenced by a number of factors.

Can you think of the factors that influence growth and development?

- Good nutrition or a well balanced diet is a very significant requirement for proper growth and development. A child requires food rich in proteins, minerals and vitamins for the development of body tissues and bones.
- Hormones are necessary for normal bodily functions, growth and mental development. During the puberty period common hormones involved in these activities include growth hormones, the thyroid hormone and sex hormones.
- Genetic disposition, for example, where the offspring inherits the qualities of parents of being tall or short.
- Environmental influence is important as it determines physical growth and mental development. Children who are deprived of love or subjected to emotional and physical abuse are more likely to suffer from growth failure and mental development. In some cases, if the environment is not conducive, the onset of puberty may be delayed when compared to children of the same age group.

Developmental Phases

The major development phases are the prenatal, infancy, early childhood, middle childhood and later childhood or adolescent phases.
developmental phases and milestones.

Developmental Age Periods

Period	Age
Prenatal period:	Conception to birth
Infancy period:	Birth to 12 or 18 months
Neonatal:	Birth to 28 days
Infancy:	1 month to approximately 12 months
Early childhood period:	1 year to 6 years
Toddler:	1 to 3 years
Preschool:	3 to 6 years
Middle childhood:	6 to 11 years
Later childhood:	11 to 19 years
Pre Pubertal:	10 to 13 years
Adolescence:	13 to 18 years

Rate of Development

During the foetal period the child's growth rate is rather rapid if it is well supplied with the essential requirements through its mother's placenta. At the infantile stage, up to 18 months of age, growth is similarly rapid, provided the child's health is maintained and the essential requirements are given.
During the childhood phase, growth tends to slow down and the process is prolonged. The child's height gradually increases under the influence of hormones. This also plays a part in the psychosocial development of the child. When the child reaches puberty, the sex hormones facilitate the individual's physical, psychological and emotional development.

milestones that children go through and the ages at which this happens

Stages of Growth and Development

Age (in months)	Milestone
2	Attention to objects
3	No head lag when pulled up to sitting position
5	Reaches out for objects
6	Asymmetric tonic neck reflex disappeared, sits steadily
10	Bears weight on legs when standing (unless bottom shuffler), chews lumpy foods
18	Walks independently, has stopped casting or mouthing objects
20	Says single words with meanings
28	Puts two or three words together to make phrases
36	Talks in sentences

Development Assessment

In order to assess whether a child is developing normally or not, it is necessary to have basic knowledge of the main milestone of normal development.
For each milestone there is a wide range of what is considered normal. It is therefore useful to watch out for developmental warning signs which indicate the point beyond the uppermost limit of normal at which a milestone should have been reached.

Developmental Warning Signs	Age
Not smiling at mother	8 weeks
Poor head control	6 months
Unable to sit unsupported	9 months
Not crawling	12 months
Unable to stand with help	12 months
Not babbling	12 months
Unable to stand unaided	15 months
Not walking independently	18 months
Unable to understand simple commands	2 years
Not using two to three words	2.5 years

Factors that Promote Health

The health of a growing child can be sustained to an acceptable standard when various activities are readily available. The nursing mother and her child should have a well balanced diet rich in proteins, vitamins, iron and calcium for proper growth of the child. In addition, the child requires enough rest, sleep, play, love, recognition and a certain amount of independence. You should explain these in details to the mother during your health education sessions.

Health Promotion in Paediatric Nursing

In order to give holistic care to children under your jurisdiction, you should remember that your role goes beyond nursing. You should operate as health educator, patients' advocate and a counsellor both in the hospital and in the community for the well being of the child. You will now study the main areas of health promotion for the well being of children.

Prevention of Illness

Prevention of illness in the health care of infants, children and adolescents is at the core of Paediatrics. The outcome of preventive interventions in children is measurable in terms of decades of the remaining life. Thus, through professional activities nurses should focus on individual patients, especially on:

- Health supervision of healthy infants, children and adolescents
- Practical approaches to some common issues presenting during health supervision
- Health supervision of children suffering from chronic conditions

As a nurse, you should help parents/guardians and their children to strive for a higher level of wellbeing. This, in turn, will lead to the prevention of illness and accidents. In the hospital, special precautions have to be taken for the safety of the child. You should ensure that children are supervised at all times and restrained. This does not, however, mean the children should be kept unnecessarily in bed when their conditions do not warrant it.

The ward environment should be pleasantly set with all equipment in its rightful place. A playroom should be created where possible, and you should allocate staff to participate in playroom activities as a therapeutic measure for the child. Children should also be given an opportunity to sleep undisturbed.

Health Maintenance

This aspect of child health care applies to those who are in good health as well as those with chronic health problems, which do not significantly interfere with the normal bodily functions. In this group of children you will find those mildly mentally retarded, stabilised diabetics, or those with physical deformities. Your role here is basically to be supportive and educative.

You have nursed many children. Think of the health problems you have encountered when nursing children.

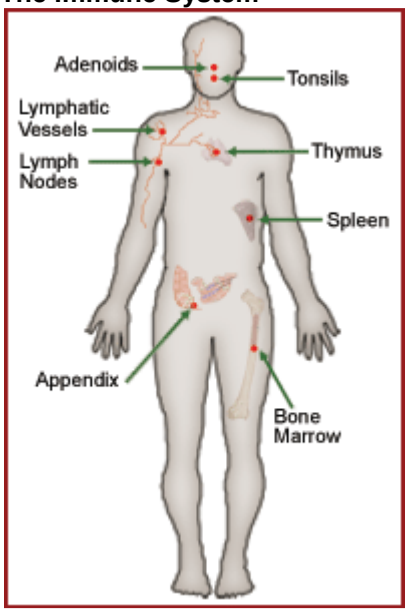
Disease Patterns in Childhood According to Age Group

Foetus	Neonate Birth -1 Month	Pre School Under 5 Yrs 1 Month - 5yrs	Pre School Under 5 Yrs 1 Month - 5yrs
1. Conditions in the mother that affect foetus: • Drugs/Alcohol • Toxaemia • Malnutrition • Infections, e.g. Rubella 2. Genetic Abnormalities 3. Congenital	1. Birth Injuries 2. Low Birth Weight 3. Asphyxia 4. Obstetric Complications 5. Neonatal Tetanus 6. Gastro-Enteritis 7. Opthalmia Neonatorum 8. Septicaemia	1. Resp. Infections 2. Whooping Cough 3. Pneumonia 4. Malaria 5. Diarrhoea 6. Protein Energy Malnutrition (PEM) 7. Measles	1. Anaemia 2. Intestinal Worms 3. Tuberculosis 4. Malnutrition 5. Respiratory infections 6. Malaria 7. Skin Diseases

Immunisation and Vaccination

The immune system is a network of cells and chemical substances that responds in many different ways to the invasion of the body by these micro-organisms and to the entry of poisons (toxins) and other harmful substances. These micro-organisms and foreign substances, usually harmful to the body are called antigens. Any foreign body that stimulates immunity is referred to as an antigen.

The Immune System



The immune system of the body responds to the presence of the antigen in two main ways:

The First Possible Immune Response

The first way is through substances called antibodies which circulate within the body and can act against antigens at sites very far from where they were produced.

Antibodies are produced by special cells called B-lymphocytes within the lymphatic tissues of the body. They are complex chemical substances called immunoglobulin which match the particular antigen they were made for just like a key matches one particular lock only. This forms what is called the humoral immune system.

The Second Possible Immune Response

The second way is through other special cells called T-lympocytes and macrophages that circulate through the body and destroy micro-organisms or other cells that the micro-organisms may have invaded.

The special T-cells are tuned in the same way as the antibodies to a particular infecting germ. They form what is called the cell mediated immune system.

Today it is possible to offer children a substantial measure of protection against diphtheria, whooping cough, tetanus, poliomyelitis, tuberculosis, hepatitis B and influenza. Therefore, teaching the community by display of posters and through personal contact with parents and community members should convince them of the value these protective measures have for their children.

Types of Immunisation
There are two types of immunisation

Active Immunisation
Immunisation can be described as the process of protecting a person from a specific disease. This happens automatically when a person gets an infection and develops their own antibodies. It also happens when a vaccine against a disease is given to someone. This is called active immunisation and it is because the vaccine is serving as an antigen and stimulates the body to produce its own immunity.
These vaccines are prepared from micro-organisms in special laboratories. These may be live bacteria or viruses that have been modified enough to infect the body but only to cause very mild or local effects that may not even be noticeable, although they still resemble the original bacteria or viruses closely enough for the body not to be able to tell the difference. These are called live attenuated vaccines. The property lost is called their virulence and can sometimes be called avirulent strains of the original or wild bacteria or viruses. Other vaccines are made out of killed bacteria and are called killed vaccines and yet others are modified poisons or toxins that bacteria produce and these are called toxoids.

Examples of Toxoid	Examples of Live Attenuated
• Tetanus • Diphtheria	• BCG • Polio • Measles

Passive Immunisation
It is also possible to take ready made antibodies and give them to another person and because the person receiving these antibodies is not making them alone, this is referred to as passive immunisation.
A good example of passive immunisation occurs every time a baby develops in the uterus of the mother as the mother's antibodies pass into the baby's blood and provide them with ready made antibodies against these diseases for a short time after birth.
The main advantage with this is that the individual who has this type of immunisation gets immediate assistance in fighting against an infection and is necessary especially in cases of snake bites or tetanus infection when you need to help the person quickly. As a disadvantage, since they are not their own, there is no antigen stimulating the body to produce more, thus antibodies are gone in few weeks or months and the protection is lost.

Another way of classifying types of immunisation is in two ways:

Natural Immunisation

Natural immunisation means immunisation that occurs naturally in one's life, without vaccines or the assistance of a health worker. An example is when a foetus is developing and gets antibodies from their mother's blood and also when a person gets an infection and produces their own antibodies

Artificially Induced Immunisation
Artificial Immunisation occurs any time that a medical worker immunises a person either by giving them a vaccine (antigen), or by passively immunising them with antibodies.

Current National Immunisation Schedule

Since the year 2002, the immunisation schedule in Kenya has been modified from three specific immunisations given as DPT, that is, diphtheria, pertussis and tetanus to five specific immunisations given in combination as Pentavalent, that is the DPT with hepatitis B and influenza in addition

BCG (Bacillus Calmette-Guerin) Vaccine
This is a live attenuated bacterial vaccine against tuberculosis that is usually freeze-dried. It is named after two French scientists, Dr Calmette and Dr Guerin, who first discovered the vaccine. The vaccine is given to babies soon after birth, preferably before they are discharged from the maternity unit. It should be stored in a regular refrigerator (not in the freezing compartment). In this way it can remain potent for up to two years. Once it has been diluted, the vaccine loses its potency very quickly and must be discarded after three hours.

Note: The BCG vaccine should be protected from exposure to sunlight, otherwise it becomes impotent. Cover both diluted and undiluted vaccine with dark paper.

Administration and Dosage

The vaccination is usually given 0.1ml below the right elbow intradermally. The successful result is noticed as a small red nodule within the first week. This is followed by ulceration and a permanent scar after about six weeks or more.

Note: The dosage of the BCG vaccine will depend on themanufacturer's instructions.

Possible Complications

Complications are uncommon but if they occur, they may include chronic ulceration or enlargement of lymphatic glands. Complications usually occur if the injection is administered subcutaneously instead of intradermally.

Oral Polio Vaccine (OPV)

The oral polio vaccine contains live attenuated virus from all three types of polio. Polio O, (OPV, O) is administered at birth. The first OPV is given six weeks after birth and the second OPV at ten weeks after birth, followed by the third OPV at 14 weeks.

Pentavalent

This is the newly introduced combination of immunisation against diphtheria, pertussis (whooping cough), tetanus, hepatitis B and influenza. The dose is 0.5ml. The first dose is given six weeks after birth, the second dose at ten weeks after birth and the third dose at the age of 14 weeks.

Note: Always remember to inject the pentavalent into the outer aspect of the left thigh. DO NOT inject into the buttock.

Measles Vaccine

This is a live attenuated freeze-dried vaccine given when the child is nine months old. It is administered by intramuscular injection only once in a dose of 0.5ml. An oral vitamin A tablet, 200,000 i.u., is routinely given with the measles vaccine.

Failure of Measles Vaccination

It has been noted that some children still suffer from measles in spite of the fact that they were vaccinated.

The possible causes of this may be:

- Impotent measles vaccine may have been used
- The vaccine may have expired or may have been kept at the wrong temperature
- The child may have been vaccinated while still too young thus having their mother's antibodies still in their blood
- The parents may have misreported some rashes and pyrexia, which appear similar to measles yet it is not

Contraindication for Measles Vaccination

In severe malnutrition, it is recommended that the vaccination be delayed until the child is well nourished. In mild or moderate malnutrition, it should still be administered.

Think of all the investigations you would make before giving any immunisation to a child.

Parents are sometimes concerned that immunising their children may result in adverse effect. You should enquire from parents about:

- The present immunisation status of their children
- Past responses to immunisation
- Past and current illnesses

Other Types of Vaccine

Vaccine	Description
Yellow fever	One injection lasts for 10 years but it is only required for people travelling into or outside the country or in areas where there is an outbreak
Rabies	Given after a bite by an animal which has not been given rabies vaccine or wild animal
Typhoid	Usually used only during an outbreak and food handlers
Cholera	Must be repeated every six months for adequate protection (this is no longer essential)
Plague	Used during epidemics only

Meningococcal meningitis	Two doses at an interval of one month and also upon request
Measles, Mumps Rubella vaccine (MMR)	This is a live vaccine. It protects the recipient against measles, mumps and rubella diseases, as the name suggests. This is relatively new vaccine yet to be used extensively in developed countries
Hepatitis A	Given in two doses six months apart to children above the age of one year
Hepatitis B	Given in two or three doses commencing at birth. It is administered together with hepatitis B antibody immunoglobulin if the mother is highly suspected to be likely to have transmitted the infection across the placenta. In Africa, this is not a high risk, so vaccination can start at six months of age.
Haemophilus influenza B	HIB vaccine given with the triple vaccine to prevent serious hemophilia septicaemia infections

The following vaccines are at various stages of development and may become widely available in the future:

- Rotavirus
- Malaria

The Cold Chain

The main problem in immunisation is reaching every mother and child with a vaccine that is potent. Heat destroys vaccines, some much faster than others, that is, some types of vaccines are destroyed much faster than others because of their sensitivity hence lose their potency. Vaccines should therefore be kept cold from the time they are manufactured to the moment when the mother and child are vaccinated. The vaccine that has lost its potency cannot be restored and should be destroyed. The cold environment in which the vaccines pass from the manufacturer to the vaccinator is called the 'cold chain.'

The cold chain is concerned with the maintenance and monitoring of temperature as the vaccines pass out along a chain of storage places. Different vaccines have different sensitivities to temperature and therefore have to be dealt with slightly differently.

Polio vaccine is the most sensitive to heat, followed by measles, DPT, BCG and tetanus, which is the least sensitive (most heat stable). On the other hand, tetanus and DPT vaccines are destroyed by deep freezing and so should never be frozen.

Vaccines

It is important to know what state of preparation the different vaccines are in and within what temperature limits they must be maintained. Some vaccines need reconstituting just before delivery to the child or other like pentavalent, as an example.

Vaccines are packed in different containers in different number of doses, usually five or ten. All will have a date of manufacture and expiry date. It is important to read the instructions on the vaccines vials as some look different when destroyed, for example, tetanus toxoid will flocculate and settle at the bottom of the ampoule, if frozen hence destroyed.

Various Refrigerators and Cold Boxes

As a health worker, you must make it your business to know how to check and maintain a refrigerator. You need to know what type of refrigerator you have and how to clean it, maintain adequate stocks of fuel and spare parts, monitor the temperatures of both the freezing compartment and the main cold compartment and detect the faults and where repairs are necessary.

You need to separate the vaccines into those that must not be frozen and those that can be frozen, and check that the refrigerator is not being used for anything else as opening and closing the door frequently will shorten the lifespan of not only the vaccines but also the refrigerator. It is also important to know how to pack a cold box properly so that you get the maximum benefit out of storage space and time.

Temperature Monitoring Devices

There are a number of different techniques now available to indicate whether the cold chain has been broken at any time to the point where the vaccine should not be used. Many of these make use of chemicals that change colour or characteristics at different temperatures over time. An example of a common indicator is a cold chain monitor which is placed in each box of vaccines and travels with it down the cold

chain.
A similar type of monitor is used with toxoid and killed vaccines to warn of exposure to freezing temperatures, which will destroy their potency as much as too much heat.

What steps might you require to carry out when ordering the right amount of vaccine?
Ordering the Right Amount of Vaccine

This should not be too much so that the unused vaccine expires and not too little so that the clinics run out of vaccines. To estimate requirements according to WHO-EPI requires the following steps:

- Estimate the size of the population your programme serves
- Calculate the target population – say under three years old and over nine months old in case of measles
- Estimate the expected coverage – say 70%
- Calculate the number of doses given – say three in case of pentavalent
- Estimate the frequency of supply – say once a month
- Add a reserve stock – say 25% of the total

There is nothing worse than to assure mothers that immunisation works and then for them to find that it does not. One of the main reasons for failure of an immunisation programme is a failure in the cold chain.

SECTION 2: GENERAL PRINCIPLES OF PAEDIATRIC NURSING

Introduction

You have seen that the care of children is unique and special. Child care is based on certain principles, which you should adhere to in order to provide quality nursing care to children in any clinical situations.

Objectives

By the end of this unit you will be able to:

- Describe the admission procedure for sick children and how to record their personal histories
- Explain how to perform a complete physical examination
- Describe how to prepare for and carry out the common investigations
- Define and explain the importance of IMCI strategy

Admission Procedure

When working with children, you as a nurse should realise that even if the procedures are routinely normal to you, children and their parents or guardians may be anxious and distressed. With experience and observation, you will detect their concerns.
A concerned attitude calls for a kind approach and understanding on your part. Some parents or guardians may feel guilty or blame themselves, especially if the disease or condition the child is suffering from could have been prevented.
Avoid criticising the child's parent/guardian who is misinformed about the nature of disease, causes and prognosis. Instead you must reassure that person so as to alleviate fears whenever possible.
The parents/guardians should be allowed to accompany their children to the assigned bed within the ward. The parents should receive a pleasant and friendly reception in a clean and a quiet environment. Even if you are too busy, you must protect the trust patients place in nurses. This respect is partly based on calmness and positive attitudes displayed from the very onset of their arrival.
Remember that the first impression counts and is extremely vital.

The older child, if not seriously ill on admission, should be introduced to other children, as this reduces possible anxiety and stress. Similarly, the parents should be introduced to other parents. It is important you use the correct names and pronunciation. You should carry out the procedures carefully and methodically. You should also be ready to answer any questions clearly and fully as ambiguity may cause distress and misunderstanding to parents or guardians.
If older children are not seriously ill and are mobile, they and their parents/guardians should be introduced to the ward or unit, including orientation to available facilities such as call bell, toilets, bathrooms and playroom. Information such as visiting hours for friends, parents, guardians and siblings including the types of

food and drinks that may be brought, should be given.
You should make every effort to find out from the parents/guardians the child's likes, dislikes and what the child's commonly used name is. Such investigations will enable you to adapt accordingly. The same enquiries should apply to family history and spiritual beliefs, which you should address without causing embarrassment. Finally, informed consent for care and operation should be obtained before the parents/guardians leave for home.
Having learnt the paediatric admission procedure, you will now look at the personal history taking procedure.

History Taking

In almost all cases, the history is usually taken from the parents or guardians, especially when the child is young. For older children, additional information as to how they feel may be obtained directly. The most important details to be recorded should include medical history, which is, whether the child has been ill before and the nature of any previous illness. It is also necessary to find out whether the patient has had any surgery before and for what purpose.
You should also take the family, social and economic history because these may be contributing factors to illness. In addition, the mother's obstetric history, including the number of children she has and her marital status should be taken. All these will give you a comprehensive view of the child and their family.
The information obtained must be written clearly and accurately on the available forms because they form permanent records for the period the patient is hospitalised and are useful for future reference. The records become legal documentation, which may assist the health institution in case of problems.
You should, at all times, make an effort to establish rapport with the parents or guardians in order to allay anxiety and gain confidence. You should be extra careful in selecting the words used when interviewing the parents/guardians. Sometimes, your words may be misinterpreted. It is advisable to clarify to parents/guardians why you are asking questions to avoid any offence being taken.
Throughout the period of history taking, you should try to observe non-verbal clues and form your own impression or opinion on the patient and their family members.

While taking the patient's history, you will have the opportunity to apply your communication, interviewing and teaching skills. It also provides a good chance to think about the reasons for asking certain questions. The section on the principles of interpersonal communication is important.

Please refer to module one unit six: Communication and Counselling for more information.

Physical Examination

In order to make a nursing diagnosis and prepare the nursing care plan, you should perform an objective physical examination from head to toe. Exercise patience and make friends with the child before examining them. Be flexible in the order of examination, that is leave upsetting and disturbing procedures until last. In most cases the standard techniques of inspection, palpation, percussion and auscultation is used.

Observation
Should be both visual and clinical. You should personally observe the patient as well as check temperature, pulse and respiration.

Inspection
Involves critical scrutiny to look for signs and symptoms of disease or abnormality.

Palpation
Is the process of examining with a finger over the chest or abdomen

Percussion
Involves placing the left middle fingers over the chest and then tapping with the right finger.

Auscultation

Is listening for sound by use of the ears and stethoscope.

You have already learned about these methods of clinical diagnosis. Please refer to module one unit two: Fundamentals of Nursing for any further information you require.

Position/Place for Examination

When examining a child, it is important to seek the help of the parent or guardian to prevent unnecessary movement and resentment by the child. The young child will have to be undressed by the parent/guardian, while the examination will be performed on their laps. The use of distracters may also win the child's confidence and enhance their cooperation.

You should talk to the child and mother in a low voice and persuasive manner maintaining eye contact at the level to that of the patient. Older children may be given the necessary instruction on what to do and should be allowed to choose the position they wish to adopt during physical examination.
The child's developmental and nutritional status is also assessed during the physical examination.

For further reading, refer to the Nursing Council
Procedure Manual (2nd edition), page 14.

Investigations

Think of all the laboratory and radiological investigations you may have carried out during your clinical practice.

Children, like adults, who are admitted at the hospital or attend clinic, will require detailed investigations in order to arrive at an accurate diagnosis and prescription of the remedial measure. You will be particularly responsible in carrying out these investigations, or assigning them to the relevant personnel in other departments to do so. These personnel may be the doctor, radiographer, laboratory technologist, and of course, you will assess each child individually to determine the type of investigations required.
As a professional operating close to a patient, you must ensure that all investigations are carried out accurately, punctually and aseptically. All forms pertaining to these investigations must be correctly written to avoid mix up in handling specimens. Once forwarded to various departments, you should ensure the results are collected and made ready so that the management of the child is commenced without delay.

Common Investigations

- Body fluids, excretions and secretions, and tissues for culture and sensitivity tests
- Blood for white cell counts and differentials
- Haemoglobin and malarial parasites
- Grouping and cross matching
- Urine for microscopic, albumen, sugar, acetone
- Stool for ova and cysts and occult blood
- Radiological investigations, although for very young babies this may have to be kept
  to a minimum
- Endoscopic investigations may also be carried out but only in a few selected patients according to the problems they are suffering from
- Sputum for microscopic culture and sensitivity
- Where the patient is unable to produce the specimen, insertion of a naso-gastric tube may be considered and stomach content aspirated and sent to laboratory

You should endeavour to ensure that the parents and the patients are physically and psychologically prepared before, during and after the procedures. Similarly you should be able to help and assist to ensure that the child is not subjected to unnecessary pain and discomfort during the process. Above all, the principles of infection control must be observed when handling specimens.

IMCI - Integrated Management of Childhood Illness

The IMCI Concept
This is a strategy, which combines improved management of childhood illnesses with aspects of nutrition, immunisation and several other important influences on child health, including maternal health. The IMCI strategy aims at reducing the infant mortality rate, severity of illness and disability by integrating treatment and prevention of major childhood illness to contribute to an improved growth and development.

The History
The World Health Organisation (WHO), working in collaboration with UNICEF, introduced this new plan for comprehensive and timely management of sick children under the age of

five years. The new initiative was born of the fact that 1.2 million children in developing countries die before celebrating their fifth birthdays, many within the first year of life. It was further noted that seven in ten (that is 58%) of deaths are mainly due to acute respiratory infection, specifically pneumonia.

Other diseases in this category are measles, malaria, malnutrition and diarrhoea. These diseases may occur singly but in most cases they tend to develop in combination. Three out of four episodes of illness in children are caused by one of these diseases.

Millions of parents and guardians present themselves with sick children in hospitals, health centres and dispensaries daily. Some opt to visit traditional healers, community care providers and pharmacists for treatment.

Projections based on global burden of diseases analysis of 1996 shows that five specific diseases, that is, acute respiratory infection, measles, malnutrition, malaria and diarrhoea will continue to be major contributors of childhood mortality right up to the year 2020, unless drastic and significant efforts are made to control them. As a result of these reasons the World Health Organisation, Division of Child Health and Development, in collaboration with ten other WHO programmes and UNICEF developed the IMCI. This should be adopted in the Kenyan context.

The evidence that a large proportion of childhood morbidity and mortality in the developed world is caused by just five conditions is really not enough justification for an integrated approach. However, it is known that most sick children present with clinical features related to more than one of these conditions. The overlap means that a single diagnosis may neither be possible nor appropriate.

Presenting Symptoms with Overlapping Diagnosis

Presenting Complaints	**Possible Cause or Associate Condition**
Cough and/or fast breathing	Pneumonia, severe anaemia, P. falciparum malaria
Lethargy Unconsciousness	Cerebral malaria, meningitis, severe dehydration, severe pneumonia
Measles rash	Pneumonia, diarrhoea, ear infection
Very sick young child with fever	Pneumonia, sepsis, meningitis

Interventions Currently Included in the IMCI Strategy

In this table, some interventions have been standardised. Therefore, for all the conditions you will come across during your clinical practice, you will have to use IMCI.

Promotion of Growth & Prevention of Diseases	**Response to Sickness (Curative care)**
Community/Home based interventions to improve nutrition, Insecticides, impregnated bed nets	Early recognition of sickness in the young, early case management, Compliance with treatment
Vaccination	Case management of ARI, diarrhoea and measles; Complementary feeding and counselling; malaria, malnutrition and other serious infections
Micronutrients supplementation	Complementary feeding & breast feeding, counselling, Iron treatment, antihelminthic treatment

Benefits of IMCI Strategy

In smaller health facilities such as health centres, the IMCI strategy has several advantages.

Do you know what these are?

Promotion of accurate identification of childhood illnesses in the outpatient situation.

- Ensures appropriate combined treatment of all major illnesses and strengthens the counselling of relatives who are looking after the sick children while simultaneously providing preventive services.
- IMCI helps to accelerate the referral system of severely ill children and improves the care of these patients.
- In the home environment, the strategy promotes appropriate care seeking behaviours.

Relationship of IMCI with Existing Technical Programmes

The IMCI strategy helps to promote several interventions and areas of activity such as immunisation, vitamin A supplementation and ongoing supply and management, which are handled by other technical programmes.

The core interventions

The core interventions are the integrated case management of the five most important causes of childhood deaths: Acute respiratory infections (ARI) diarrhoea, measles, malaria, malnutrition and common associated conditions.

<u>The table of interventions currently included in the IMCI</u>

Presenting Symptoms with Overlapping Diagnosis

Presenting Complaints	**Possible Cause or Associate Condition**
Cough and/or fast breathing	Pneumonia, severe anaemia, P. falciparum malaria
Lethargy Unconsciousness	Cerebral malaria, meningitis, severe dehydration, severe pneumonia
Measles rash	Pneumonia, diarrhoea, ear infection
Very sick young child with fever	Pneumonia, sepsis, meningitis

Interventions Currently Included in the IMCI Strategy

In this table, some interventions have been standardised. Therefore, for all the conditions you will come across during your clinical practice, you will have to use IMCI.

Promotion of Growth & Prevention of Diseases	**Response to Sickness (Curative care)**
Community/Home based interventions to improve nutrition, Insecticides, impregnated bed nets	Early recognition of sickness in the young, early case management, Compliance with treatment
Vaccination	Case management of ARI, diarrhoea and measles; Complementary feeding and counselling; malaria, malnutrition and other serious infections
Micronutrients supplementation	Complementary feeding & breast feeding, counselling, Iron treatment, antihelminthic treatment

Implementation of the IMCI strategy involves the following three components:

- Improvements in the case management skills of health staff through the provision of locally adapted guidelines on IMCI and activities to promote their use
- Improvements in the health care system required for effective management of childhood illnesses
- Improvements in family and community practices

The objective of IMCI is not to takeover the responsibilities of the various programmes, but to ensure that the activities are well coordinated and effectively implemented in order to contribute to IMCI.

Remember we have already covered some interventions currently included in IMCI strategy.

SECTION 3: NUTRITION AND NUTRITIONAL DISORDERS IN CHILDREN

Introduction

You are already conversant with the various types of foods used in Kenyan society and their nutritive value as well as how they vary from one ethnic group to another and from one religious group to another. However different they may be, the common denominator is that they provide us with all the nutrients we need for our bodily functions.

You learnt earlier in this unit of the importance of nutrition in growth and development and general health maintenance. You will look at the known food constituents available for human consumption.

You will now look at the objectives for this unit.

Objectives

By the end of this unit you will be able to:

- Describe the groups of foods, their nutritive value and explain their functions in the human body
- Describe various nutritional disorders in children
- Describe the management of children with common nutritional disorders

Food Nutrients and Their Functions

Think of all the major food groups their functions. Write them down on a piece of paper then compare your thoughts with the information that will be covered on the forthcoming pages.

You will now look at each of most common food groups and their functions.

Proteins

These are a group of foods that supply amino acids for the growth and repair of body tissue. Proteins play a very important role in immunity, the blood clotting mechanism, transport of body substances and the regulation and maintenance of osmotic pressure. Therefore, a good amount of protein should be given to patients, especially children. When taken into the body, proteins are broken down to amino acids, which are then absorbed into the blood stream via the villi so as to be utilised by the body.

Sources of Proteins	
Animal Proteins	**Plant Proteins**
Meat, Chicken, Fish, Milk, Eggs, Cheese	Peas, Groundnuts, Beans, Fruits, Lentils, Vegetables

Carbohydrates

These are the main energy source for the body. When eaten and absorbed into the bloodstream in its simplest form, carbohydrate is referred to as glucose. Glucose is very important for the brain and nerve function. Carbohydrates can further be divided into three main categories, that is, sugar, starch and polysaccharides

sources of carbohydrates

Carbohydrates can be obtained from potatoes, rice, ugali, fruits, milk, cereals, starches and vegetables. Some carbohydrates form indigestible polysaccharides and cellulose, which form roughage essential for the stimulation of intestinal peristalsis.

Fats

Although fats have a higher caloric value, they are less efficiently utilised by the brain and nerve tissue. However, fats are the body's largest energy store. Fat is found under the skin and around some body organs, such as the kidneys to give support and protection from injuries. Other functions include formation of cholesterol and steroid hormones. They are also vehicles for the absorption of vitamins A, B, E and K. They are usually broken down to fatty acids and glycerols before being absorbed into the bloodstream via intestinal villi and lacteal vessels. Fats are available in fatty meat, chicken, fish, butter, milk and vegetable oils and so on.

Vitamins

These are organic compounds which are classified as water soluble and fat soluble vitamins. The water soluble vitamins are B and C while fat soluble include A, D, E and K. All the vitamins are obtained through food consumption. Vitamin D can be synthesised

through the action of sunlight and vitamin K, which itself is synthesised by the large intestinal bacteria.
Fat soluble vitamins are found in fish, meat, milk, butter and plant oils. They can easily be stored in the liver and adipose tissue. Over consumption of fat can lead to hyper vitaminosis, though that is a rare occurrence. Deficiency in fat soluble vitamins is rare but if it occurs, it is usually due to trauma or severe illness.

Mineral Salts

The main mineral salts include sodium, potassium, calcium, magnesium, chlorine and sulphur. Only small amounts of each mineral are required to sustain bodily functions. They are essential for enzyme components. Those of significant nutritional value are iron, zinc, and iodine. Iron deficiency leads to anaemia, while iodine deficiency leads to goitre. Zinc is also required for enzyme reaction, especially during growth and wound healing.

Water

This is the major component of the body and the dietary intake must have sufficient quantity in order to meet daily needs. Without adequate amounts of water, the body tissues cannot function properly. Water is the solvent for cellular changes. Water acts as a medium for ions, and transports nutrients and waste products. It is also important for the regulation of body temperature. The amount required varies from one person to another, though in adults an average of two to three litres should be taken daily. In children, the amount will vary according to the age.
Having covered the importance of nutrition, you shall now proceed to the causes, diagnosis and management of various nutritional disorders.

Sources of Nutrition

Nutrient	Source samples
Animal protein	Meat, chicken, fish, milk, eggs, cheese
Plant protein	Peas, groundnuts, beans, fruits, lentils, vegetables
Carbohydrates	Potatoes, rice, ugali, fruits, milk, cereals, and vegetables
Fat	Fats are available in fatty meat, chicken, fish, butter, milk and vegetable oils
Vitamin A (retinol, retinaldehyde, retinoic acid)	Carrots
Vitamin B1 = thiamin	Potato, meat such as beef
Vitamin B2 = riboflavin	Beef liver, dairy produce
Vitamin B6 = pyridoxine, pyridoxal, pyridoxamine	Potatoes, fish
Vitamin B12 = cobalamine	Dairy produce, eggs
Vitamin C = ascorbic acid	Fruit such as orange, lemons, tangerines
Vitamin D = calciferol	Sunlight, tuna fish
Vitamin E = tocopherol, tocotrienol	Spinach, sunflower seeds, walnuts
Vitamin K = phylloquinone	Sprouts, cabbage, cheese
Vitamin C = ascorbic acid	Sodium, potassium, calcium, magnesium, chlorine and sulphur

Nutritional Disorders

You should have learnt a lot about nutrition both in your secondary school and in the basic nursing course. Nutritional disorders are conditions occurring in one's body as a result of bad nutrition or malnutrition.
Malnutrition is more than a medical problem. It is brought about by dysfunctions in economic, demographic, cultural religious and ecological processes. Malnutrition may be due to an excess, deficit or imbalance in the essential components of a balanced diet.

Over Nutrition
This refers to ingestion of more food than is required for the body needs, as may be seen in the case of obesity. This condition is more common in rich western countries (the developed world).

Under Nutrition
This describes a state of poor nourishment as a result of inadequate diet or presence of disease, which interferes with the normal appetite,

absorption and assimilation of ingested food. Inadequate or poor nourishment diet is more prevalent in the third world countries that are still developing and poor. Included in under nutrition are protein energy malnutrition and vitamin deficiencies.

The main causes of under nutrition are:

- Insufficient food resources
- Lack of education about nutritional needs
- Poor socioeconomic conditions
- Chronic illnesses

You should have learnt a lot about nutrition both in your secondary school and in the basic nursing course. Nutritional disorders are conditions occurring in one's body as a result of bad nutrition or malnutrition.
Malnutrition is more than a medical problem. It is brought about by dysfunctions in economic, demographic, cultural religious and ecological processes. Malnutrition may be due to an excess, deficit or imbalance in the essential components of a balanced diet.

Protein Energy Malnutrition (PEM)

This condition is also referred to as protein calorie malnutrition (PCM). It is the most common form of under nutrition in children. Protein Calorie Malnutrition can be classified as primary type, which means the nutritional needs are not met as a result of poor eating habits, or secondary type, which refers to malnutrition occurring as a result of an alteration or defect in ingestion, absorption or metabolism. In such circumstances, the tissue needs are not met even though the dietary intake would be deemed satisfactory under normal conditions, for example in diseases such as measles, tuberculosis, mal-absorption syndromes and so on.

Clinical Forms of Protein Energy Malnutrition

The two clinical forms of protein energy malnutrition are kwashiorkor and marasmus. In kwashiorkor the main deficient nutrient is protein, while in marasmus the deficiency is caloric. There are some children who fall in between the two forms, and who suffer growth failure but exhibit no signs of either disease. Both conditions impair growth and if they are chronic will end up reducing the size of an individual

Kwashiorkor

In this condition there is a lack in protein relative to calories, often associated with a normal growth pattern until six to eight months of age when the weight of the child begins to decrease. The name originated from a local Ghanaian language meaning 'displayed child'. Characteristics include growth retardation, changes in skin tone, mental apathy and other bodily changes.

Causes

- Kwashiorkor may be caused by a sudden change from breast milk to porridge, which is entirely comprised of carbohydrates. This sudden change in feeding habits may be prompted if the mother realises that she is pregnant while still breast feeding.
- Infections, such as malaria, measles and so on, accompanied by fever which tends to use up the scarce protein stored in the body may result in kwashiorkor.
- Anorexia, due to other illnesses, and intestinal worms, which draw on the child's food supply, may also be predisposing factors. The onset is commonest between one to three years but may extend to five years.

The following are some of the clinical features of kwashiorkor:

- Growth failure and some muscle wasting
- Oedema of the face, hands, anus, feet and bulging abdomen
- The hair becomes thin, straight and brownish in colour
- The child has poor appetite and is irritable
- There is mental apathy and lack of interest in the surroundings
- Diarrhoea
- Hepatomegaly and anaemia

When undertaking diagnostic investigations, you should carry out the following procedures:

- First, you should always take the child's personal history from the parents.
- Secondly, physical and laboratory examinations to exclude infections such as malaria which is done by testing blood slide for malarial parasites and intestinal worms which are checked from the stool (ova and cysts).

- Thirdly, blood tests for WBC and haemoglobin estimation should exclude anaemia.

Marasmus

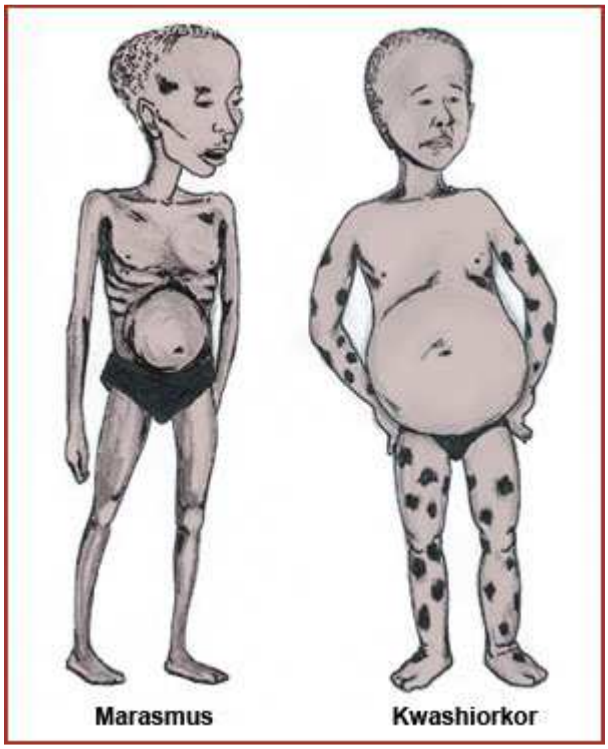
The term marasmus refers to starvation. The disease is caused by lack of food of any kind, which includes proteins, carbohydrates, fats and vitamins. Marasmus occurs at any age, but is more commonly found in infants who do not get enough breast feeding or during the weaning period, when poor bottle feeding practices are followed or supplementary foods are not given.
Clinical features of marasmus include:

- The weight of the affected child normally drops to 60% below the standard expected weight
- Muscular atrophy, especially visible on the arms and legs, with loss of subcutaneous fat and legs and arms are thin
- Wrinkled, thin and flaccid skin
- The face of the child usually looks old and anxious
- The child may have diarrhoea or constipation
- The child has very good appetite when being fed but does not put on weight

Marasmic Kwashiorkor

How would you identify this condition in a child?

Any child with kwashiorkor has some muscle wasting and loss of subcutaneous fat, regardless of the presence of oedema. If this process is severe enough to result in weight loss below 60% of the normal expected weight according to their age, then the child is said to have marasmic kwashiorkor.
There are several factors, which contribute to protein energy malnutrition (PEM). Many people in developing countries know very little about the nutritional values of the food they eat. In addition, some people in the developing countries are traditionalists and the food they consume is often dictated by cultural norms. For example, there may be customs outlining what men, women and children are supposed to eat and what they are forbidden.
Poverty is also an important factor. Most body building foodstuffs suitable for weaning, for example, milk and eggs, are too expensive for a large percentage of the population. This factor often pre-disposes parents to act in a seemingly negligent manner, especially in instances where they are pre-occupied by income generating activities, leaving the child in the care of other people who may not be aware of the child's dietary requirements.
Poor farming practices, and natural disasters, like droughts and floods may also lead to a loss in income and inability to meet the dietary requirements of the child. Finally, political instability often drives people away from their natural environment to camps (as refugees), where they are unable to engage in productive activities and may have no means of supplementing their basic rations.



Management of Children Suffering from PEM

Protein Energy Malnutrition (PEM)

Mild nutritional problems are easy to deal with and pose no major problems to you, as a nurse. The moderate and severe types of protein energy malnutrition (PEM) must be investigated to enable the health care worker to establish the origin or cause of malnutrition in different children.

Investigations

The following investigations should be carried out:

- Take the family and social history to identify the cause of malnourishment e.g. enquire into the type of food used at home, the child's appetite and other relevant points to that effect.
- Conduct a physical examination to find out if the child is suffering from any other health problems. Weigh the child, take the height and head/limb circumferences and record them.
- A blood test for white blood cells, haemoglobin and malarial parasites should also be conducted.
- A stool test should be carried out to exclude the possibility of intestinal worms.

Management of PEM

The immediate requirement for a child suffering from PEM is energy. In the presence of an oedema, the energy requirement is 100 calories/kg body weight/day. In a marasmic child, or when oedema has subsided, then 150-200 calories/kg body weight/day is the recommended caloric intake.

You should assess whether the child is able to consume food orally. If this is not deemed possible, then a naso-gastric tube should be inserted for feeding purposes. If the child is very sick, cold or collapsed, then they should be hospitalised and an IV infusion of glucose should be commenced. Any infection should be managed with appropriate antibiotics. The child should be kept warm and a doctor has to be called urgently.

Severe cases should be tube fed. You should begin with milk products, which may have to be diluted. These should have added sugar and vitamins. As the condition of the patient improves, undiluted milk, sugar, oil and vitamins should be given. Other staple foods should be gradually introduced.

A high calorie feed should be commenced after two to four days, with solids being cautiously and slowly introduced. As the condition of the child gradually improves the feeding tube should be removed and a cup or a cup and spoon should be used to feed the child. The parent/guardian should be involved in the feeding of their child under the supervision of the nursing staff.

Feeds should initially be given at two to three hour intervals and later, as the child's condition improves, the quantity of food should be increased and given after every four hours. The amount and composition of food administered should be worked out by the doctor and nutritionist or dietician. The amount given each time must be documented on the fluid and feeding chart. Urine output must also be strictly monitored.

Vitamin Deficiencies

Vitamin deficiency diseases commonly occur in association with protein energy malnutrition (PEM). Severely malnourished children are, therefore, likely to suffer from deficiencies of various vitamins, which will have to be added into the diet as part of management of malnutrition. With the normal balanced diet supplemented by an additional intake of protective foods such as greens, vegetables and fruits, the deficiencies will be prevented.

Vitamin A Deficiency

Vitamin A plays a number of important roles. It combines with specific proteins to form the retinal pigments called rhodopsin and iodopsin. These are essential for vision in dim light. It is necessary for the development of bones and teeth and essential in the formation and maturation of epithelia of the skin, eyes and other body systems such as digestive, respiratory and reproductive tracts. It also helps to build body resistance against illness, promotes good health, helps growth and development and finally improves eyesight.

Children between the ages of zero to six years are among the risk group of people who are prone to deficiency.

Several foodstuffs are rich in this vitamin. They include breast milk, other milk, dark leafy vegetables, carrots, eggs, meat, fish and fortified foods such as blue band margarine.

Clinical Features Include:

- Reversible dryness of the conjunctiva and the cornea, exophthalmia in the early stages
- Night blindness during early stages

- Keratomalacia, irreversible corneal damage with scarring or rupture of the eyeball, this causes impaired eyesight (blindness)
- Bitot's spots (white 'foamy' areas) often seen near the lateral part of the sclera of the eye

Vitamin A deficiency can be treated by administering 200, 000 i.u. orally. Start a second dose the following day. Administer a third and fourth dose of 200,000 i.u. orally one to four weeks later. In children below the age of 12 months, the vitamin A dosage is halved.

Vitamin B Deficiency

This vitamin is referred to as vitamin B complex because it consists of various factors naturally occurring together. The deficiency of one factor is uncommon.

A deficiency in vitamin B1 (Thiamine or Aneurine) is usually associated with a polished rice diet. It is relatively uncommon on the African continent, but where it does occur the child suffers from beriberi characterised by muscle weakness, which may lead to cardiac failure.

Vitamin B2 (Riboflavin) deficiencies lead to mucous membrane lesions resulting in dry cracked lips, glossitis and stomatitis.

Nicotinic acid deficiency is a problem that mainly affects adults. It is also known as pellagra.

Folic acid (folate) deficiencies are rare in children, though common in pregnancy and other conditions, such as recurrent haemolytic anaemias and malaria where the demand to manufacture RBC is great. A lack of vitamin B12 may be a contributing factor to anaemia.

The treatment of vitamin B deficiencies usually involves vitamin B complex in the form of Multivite, most commonly through oral administration.

Vitamin C Deficiency

Vitamin C (Ascorbic acid) is readily found in green vegetable, fruits and fruit juices. It is useful in increasing iron absorption from the intestine to the blood stream and in the promotion of wound healing. A deficiency in vitamin C leads to scurvy. It occurs in children between six to sixteen months of age. Scurvy is characterised by haemorrhages in the skin, gums and under the periosteum of long bones, which become very painful.

Treatment involves a course of ascorbic acid tablets, which are quite easily available. Vegetables, fruits and fruit juices are also useful to prevent deficiencies.

Vitamin D Deficiency

Vitamin D is essential for the development of strong bones and teeth. A deficiency in this vitamin affects the epithelial structures of the skin, the mucous membrane and eye.

Clinical Forms of Vitamin Deficiencies

These are of two types namely rickets and osteomalacia. The two terms need to be well defined in order to understand the difference between them.

Rickets

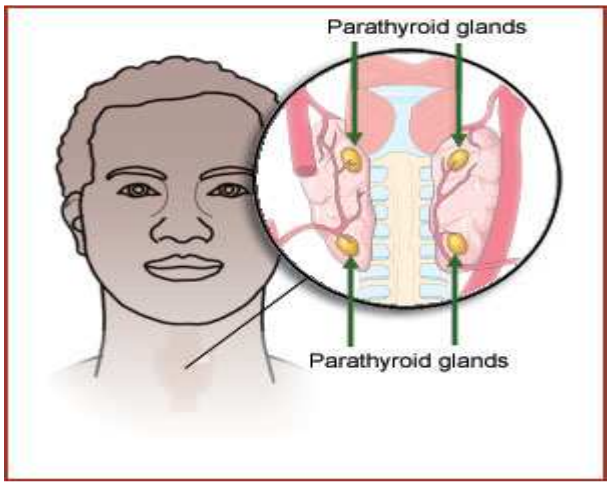
Rickets can be described as a failure in the mineralisation of rapidly growing bone or osteoid tissue. It occurs mostly in infants, toddlers and adolescents and is mainly a result of vitamin deficiencies. Childhood active rickets normally occurs when the diet lacks adequate vitamin D, which is essential for the metabolism of calcium and phosphorus necessary for good growth of bones.

Osteomalacia

Osteomalacia is defined as a failure in the mineralisation of the mature bone. It occurs in adults whose bones are already fully grown.

Predisposing Factors

There are several factors that predispose to rickets. Premature babies are often predisposed because the deposits of calcium and phosphorus at birth are inadequate for the infant's rapid growth. Hereditary factors can also be crucial, for instance, dark skinned people tend to block the ultra-violet light that triggers vitamin D production leading to insufficient quantities of the aforementioned vitamin. Conversely, a failure to expose infants to sunlight may also result in deficiencies.
Soon after birth, the infant receives vitamin D from the mother. If the mother does not breastfeed adequately the baby may soon become deficient of vitamin D. Similarly, if the mother continues to breastfeed but her own intake of this vitamin is inadequate then the baby will still suffer from a deficiency. Cultural or religious beliefs, for example, vegetarianism, may also lead to vitamin D deficiencies if the child is not exposed to adequate milk and milk products or their substitutes.
Malabsorption, is another factor that must be taken into account when trying to determine the cause of the vitamin D deficiency. The infant may have certain diseases, such as celiac disease, which may interfere with, or prevent the absorption of vitamin D and calcium from the gut. Diseases of the parathyroid glands or any of those which interfere with calcium and phosphorus metabolism may also be predisposing factors, although these occur mainly in adults.
.



Pathophysiology

Calcitonin and parathyroid hormones together maintain plasma calcium homeostasis. When the intake of calcium and vitamin D are deficient, demineralisation of bones will occur in order to preserve calcium ion level to 9-11mg/100mls of blood (2.25-2.26mmol/litre).
Secondary effects include the bone changes of rickets and lowered serum phosphorus concentration. The latter is a result of parthormone, which decreases phosphorus reabsorption in the kidneys. This action elevates serum phosphatase.
To read about the treatment of this condition click the links below:

Clinical Features of Rickets
The extent of manifestation of rickets will depend on the age at which it occurs in the child, but it is most noticeable in the first or second year of life.
The following features are normally observed:

- On the head, the anterior fontanel takes longer than usual to close while the cranium appear soft
- Dentition is also delayed and teeth are defective when they grow

- There is apparent forward projection of the sternum on the chest and there is a tendency to respiratory tract infections
- The pelvic bones may become flattened. This may eventually lead to obstetric problems in girls in their reproductive age
- The abdomen may protrude
- Sweating, diarrhoea and vomiting may occasionally be present
- The child is often miserable and sleeps less at night
- Tetany and carpopedal spasm may sometimes be present

Diagnostic investigations

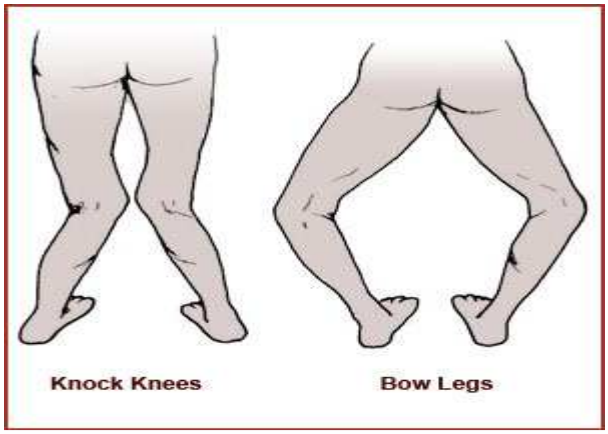
- Begin with a compilation of the personal history to find out the types and food content the child is given.
- Blood for electrolytes is taken paying particular attention to calcium and phosphorus levels.
- An x-ray of wrists should be taken showing widening of distal end of the ulna and radius.
- The bone end density is decreased.
- Do not forget to take a urine specimen for calcium and phosphorus level.

The Management of Rickets and Preventative Care

Rickets can be cured in any stage. Management consists of giving an adequate amount of vitamin D and minerals in the diet. This should include plenty of milk and dairy products, eggs, green vegetables, meat and fish. Vitamin D supplements should be continued daily at the dose of 500-50,000 I.V., either orally or by intramuscular injection. The child should be exposed to sunlight daily. The parents should be advised to avoid the use of thick nappies, as these tend to bow the femur by separating them. The infant should be nursed flat on a hard mattress during the acute stage with restriction of walking or crawling. Where splints are used to correct the bowing, care should be taken to prevent sores. In a few cases surgical intervention may be required. Above all, rehabilitative care is essential.

Preventive Care

One of the simplest preventive measures is to expose babies to sunlight for a few hours a day. This will ensure the infant has a sufficient supply of vitamin D. All babies up to the age of five years should be given a well balanced diet, which includes vitamin D supplements. Health education should be extended to schools so that all members of the community who interact with children on a regular basis can observe and take the necessary action when they notice changes in the children's postures



Iodine Deficiency

In normal circumstances, infants who are breast fed receive a thyroid hormone in the mother's milk which is sufficient to compensate for their own deficiency. They are therefore protected against mental retardation and neurological problems, which are common clinical manifestations of iodine deficiency. This is necessary until they are introduced to a solid diet. During the weaning period the mother's thyroid hormone supply to the infant becomes inadequate. Similarly breast feeding mothers who lack adequate iodine in their dietary intake may end up with infants with hypothyroidism.

Management

Infants should be kept warm and comfortable because they tend to feel cold. You should provide the necessary care to prevent the skin from breaking. The parents should be given health education about the need for the child to maintain life long use of thyroid medication. The infant's vital signs should be monitored and a general physical observation for manifestations such as diarrhoea, vomiting, sweating, weight loss, insomnia and personality changes, which

may emerge with the drug treatment prescribed, should be observed. Oral replacement therapy should be employed.

Obesity

Obesity in children is an important issue because if it is not monitored it may be a problem in adult life. It causes complications of the heart thereby reducing life expectancy. Over nutrition increases growth and the onset of puberty. The child may be teased and develop a poor self image, which affects self confidence, particularly when it comes to establishing relationships with the opposite sex. Obese children often require psychological support to overcome their problems.
You should emphasise the importance of weight reduction in the obese child although you should note that it is very difficult to achieve this in children, because a low energy diet is likely to interfere with the child's activities. The family should be asked to alter their dietary intake to accommodate what the child requires. A reduced calorie intake should be recommended, starting with one or two energy dense foods per day with an emphasis on increasing low calorie food intake. They should be educated about the medical complications of obesity so that they can make informed decision. Involve all the family members in the education programme
Families should be encouraged to reduce inactivity in children by limiting television and computer games, encouraging children to walk instead of being driven to and from schools and to play more actively with friends. Families should try to take a minimum of at least

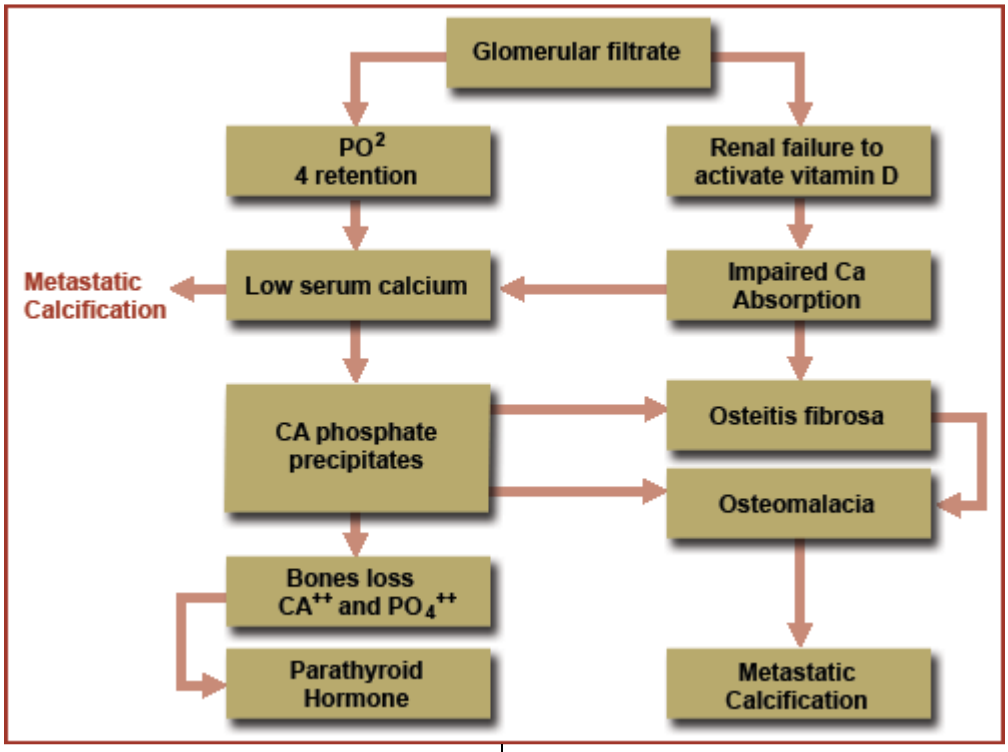
What complications can you think of that are associated with obesity?

- Orthopaedic, that is, tibia vara (bow legs) and slipped femoral epiphysis
- Benign intracranial hypertension, which manifests with headaches and blurred optic disc margins
- Hypoventilation syndrome
- Daytime somnolence
- Sleep apnoea
- Snoring
- Hypercapnoea
- Hypertension
- Heart failure due to hypertension
- Gall bladder disease
- Polycystic ovary disease
- Non-insulin dependent diabetes mellitus
- Psychological consequences, for example, low self esteem as a result of teasing by peer groups

Renal Osteodystrophy

This is a syndrome of the skeletal change found in chronic renal failure. It is usually a result of alterations in the calcium phosphate metabolism. Normally, the calcium phosphate maintains electrolytes in an insoluble state. As the renal glomerular filtrate rate decreases, phosphate stops being excreted by the kidneys. Calcium complexes form and are deposited in various parts of the body. This is referred to as metastatic calcification. Low calcium stimulates a rise in parathyroid hormone secretion, which causes bone re-absorption of calcium. This eventually leads to demineralisation of the bones and elevated alkaline phosphates level. In children the disease resembles rickets and in adults it resembles osteomalacia.

The Mechanism of Renal Osteodystrophy



Clinical Features

- Growth retardation
- Muscle weakness
- Bone pain
- Skeleton deformities
- Slipped epiphyses

The areas of the body most commonly affected are the joints, eyes, muscles, myocardium, lungs and blood vessels. The latter can lead to gangrene of fingers and toes.

Complications

- Osteomalacia, which is a lack of mineralisation of newly formed bone as a result of hypocalcaemia.
- Ostitis fibrosa is a condition caused by re-absorption of calcium from the bone and replacement by fibrous tissue. The primary cause here is increased level of parathyroid hormone (parathormone).
- Metastatic calcification, which results when the soft body tissues become calcified as a result of calcium phosphate deposits to these tissues.

SECTION 4: INFECTIOUS CHILDHOOD DISEASES

Introduction

In this section you shall look at the various common infectious diseases which affect children.

Children are more prone to infections than adults because they have low body resistance. They are also susceptible as a result of their mobility, especially as a toddler, of coming into contact with dirt and other harmful substances.

You will now look at the objectives for this unit.

Objectives

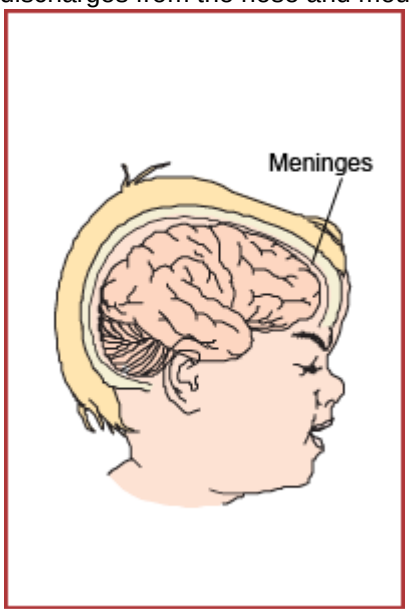
By the end of this unit you will be able to:

- Define and list the common infectious childhood diseases
- Describe the causes and clinical features of the most common infectious childhood diseases
- Describe the nursing care and medical management in relation to infectious childhood diseases
- Identify possible complications that may arise

Meningococcal Meningitis

Meningitis means inflammation of the meninges. The meninges are membranes that cover and protect the brain and spinal cord. The meninges consist of the pia mater, dura mater and the arachnoid. Causative organisms are Neisseria Meningitis (Meningococci). This micro-organism is intracellular gram negative diplococcus. There are six sero strains (groups), namely A, B, C, D, X and Y.
In many parts of the African continent sero group A is the main cause of epidemics. Meningococcal meningitis is the most common of the types of meningitis accounting for 90% of cases. Other types of meningitis may be caused by pneumococci or salmonella staphylococci. However viruses and mycobacterium, tubercle bacilli occasionally cause meningitis.
The incubation period ranges from two to ten days but commonly three to four days.

Meningococcal meningitis is an infectious disease that can be passed from one person to another if meningococci are present in the discharges from the nose and mouth.



Pathophysiology

Normally, the meningococci are found in the nasopharynx without disturbing the host or carrier. The reservoir is mainly human. Illness results from either increased invasiveness of the bacteria or lower body resistance of the host. Some people have deficit or deficiency of some gamma immunoglobulin, which in some cases runs in families. This explains why some epidemics run in the family, while other carriers show no symptoms.
Meningococcal meningitis is most common in children and young adults. When the surrounding blood vessels around the nasopharynx are invaded, the organisms enter the Cerebral Spinal Fluid (CSF) spreading throughout the sub-arachnoid space. This inflammatory process increases the CSF secretion in the ventricles, resulting in the interference with the CSF flow throughout the ventricular aqueducts.
The colour of the CSF changes according to the causative micro-organism. The cranial nerves may be affected as the infection spreads further resulting in neurological symptoms. When the CSF flow is interfered with, hydrocephalus may occur especially in infancy.

Predisposing Factors and Causes

Overcrowding and poor ventilation are the main pre-disposing factors, given that the mode of entry of micro-organisms is through inhalation. This is referred to as an exogenous type of infection. The organisms may also enter into the bloodstream through cracks in the respiratory tract in which it has been normal flora (that is endogenous infection).

Clinical Features

Can you think of the clinical features of meningococcal meningitis?

- Usually the onset is acute and sudden
- Older children may complain of a headache that becomes severe and spreads down the neck
- The patient becomes pyrexial with tachycardia
- Rigors are often present
- Pain in the back and limbs
- The patient's neck and possibly the spinal column become stiff/rigid
- Kernig's sign is positive: patient supine with hip flexed to 90°, pain and inability to fully extend the knee, Kernig's sign is negative if the patient can fully extend knee
- Due to the fever, convulsions may occur
- The child cries with a high-pitched voice
- Anorexia is usually present

- In very young babies, the anterior fontanelle may bulge outwards instead of positive Kernig's sign
- The child is irritable, drowsy and goes into a comatose state
- Photophobia is usually common and in some cases circulatory collapse with petechial haemorrhage may occur (bleeding spots) on the skin
- Cyanosis and vomiting are present

Diagnostic Investigations

Begin by taking the patient's personal history. A physical examination should follow.

A lumbar puncture is performed to analyse the CSF and may show that polymorph cells are increased. CSF is turbid in appearance (cloudy), the pressure is raised, glucose level is lower than normal and/or the amount of proteins is raised.

You should also investigate other suspected infections, for example, measles, malaria, typhoid, broncho-pneumonia.

Nursing Care and Treatment

- The patient is admitted into an isolated cubicle to protect other children
- Barrier nursing is instituted for at least the first 48 hours
- The room should be quiet and darkened
- Shock if present or anticipated, should be effectively managed
- Drug therapy should be commenced at once

Drug Therapy

- Crystalline penicillin 300mg (500,000iu)/kg/day, ten times the normal dose given intravenously or intramuscularly three to four hourly until temperature falls, then six hourly for fourteen days.
- Chloramphenicol (chloromycetin) can also be administered at 100mg/kg/day IM six hourly until apyrexial and general condition improves usually five to seven days then change to oral syrup for a total of fourteen days.
- Phenobarbitone 5mg/kg/day tds is advised for convulsions up to 10mg tds.
- An ampicillin injection may be given in combination with the chloramphenicol and crystapen.

Drug dosages are determined according to each patient's individual needs, taking into consideration the age bracket.

The Main Goals of Intervention

- Identify the micro-organism
- Control the spread of infection
- Initiate therapy immediately
- Maintain a clear airway in a well ventilated room
- Put up an intravenous infusion with the prescribed antibiotics
- Maintain the fluid balance chart
- Identify contacts in the family and elsewhere as they will require treatment also

The origin of the infection should be investigated and measures taken to prevent its spread in the community.

The Secondary Goal - How to Prevent Complications

- Constant and vigilant nursing assessment for increased intracranial pressure
- Monitoring and maintaining fluid intake, if intracranial pressure is present then restrict the fluid intake
- Observing the infusion site for anything abnormal that might occur
- Observing drug side effects and taking appropriate measures
- Using dim light in the environment and controlling noise
- Regularly changing the patient's position to prevent pressure sores and control convulsions
- Observing the vital signs
- Two to four hourly tepid sponging
- Ensure comfort by providing an electric fan if necessary
- Maintaining general body and oral hygiene
- Physiotherapy when condition improves at a later date

Complications

You should observe the patient carefully and report to the physician in charge the onset of one or more of the following complications:

- Meningococcal septicaemia
- Hypostatic pneumonia
- Peripheral circulatory shock
- Adrenal damage
- Central nervous system: Hydrocephalus, cranial nerve palsies, mental retardation, subdural effusions, deafness, blindness, epilepsy

Prognosis

If the condition is identified early and effectively treated, the mortality rate does not exceed 5%. However, if treatment is delayed the mortality rate is 30%, but those who survive usually have permanent brain damage.

Prevention and Control

Cases of meningococcal infection should be isolated and treated. As it is a communicable disease, identified cases should be reported or notified to the District Medical Officer of Health immediately for control measures.
The community should be informed of the importance of early reporting and treatment. The dangers of overcrowding should be stressed. Prophylactic penicillin should be given to household contacts. In suspected epidemic children, who are drowsy or have fits, a referral should be made for screening and further observations. Suspected outbreaks in schools should be investigated and surveillance maintained.

Whooping Cough (Pertussis)

This is an infectious respiratory disease, which is characterised by an inflammation of the mucous membranes of the lungs, pharynx, trachea and bronchi. Thick, stringy mucus is produced which the child tries to expectorate by coughing. The attacks of coughing reach a peak of violence, ending in an inspiratory whoop.
The infection is caused by a type of bacterium called bordetella pertussis (or pertussis bacillus). It is a gram-negative aerobic bacillus which is transmitted either through direct contact with soiled fomites or through airborne droplets spread from the infected person. The incubation period is usually seven to 14 days but the infectivity period is from two days before the onset of cough and continues for up to four or even six weeks.
This is a worldwide disease common among children between the ages of two to three years reaching up to five years. In infants of up to one year, it presents in a very severe form with a very high mortality rate. Both sexes are equally affected.
Can you think of the clinical manifestations of whooping cough?

Clinical Manifestations of Whooping Cough
The following are some of the main clinical features of whooping cough:

- Acute illness, with a slow onset of cough and fever resembling common cold (catarrhal stage), the catarrhal stage takes a period of approximately 14 days
- The cough increases and manifests as spasms of cough while breathing out (expiration) followed by crowing or whooping while breathing in (inspiration)
- In mild cases or in babies, the typical whoop may be missing
- Young babies may be very ill or have attacks of not breathing (apnoea) resulting in cyanosis
- Coughing attacks are always associated with vomiting and strings of sticky mucus usually hang down the sides of the mouth and are more common at night
- The underneath and the sides of the tongue may be sore and ulcerated
- The whoop can last several weeks and may recur every time the child has another acute respiratory infection
- There is a high mortality rate in young babies
- Leucocytosis (up to 100,000cm) and lymphocytosis are usually present and these are quite important in confirming the diagnosis

Nursing Care and Treatment

Nurse the child on complete bed rest to prevent paroxysms of coughing. The room environment should be kept warm and humid. Oxygen therapy is given continuously or when the child is cyanosed. The child's nutritional status is maintained by giving small, frequent feeds and

when the child vomits, an attempt should be made to feed them again.

For a child with whooping cough you should maintain a fluid balance chart and observe the child's vital signs such as the temperature, pulse and respiration. Record any findings every two to four hours until the condition improves.
Give health education to the parents. Continue to maintain the child's personal hygiene.

Medical Management

Medical treatment includes Erythromycin 40mg/kg daily or Septrin 30mg/kg BD for two weeks. This can reduce the duration of infection if administered within the first week of the illness. Mild sedatives to keep the child quiet should be given, for example, chloral hydrate or Phenobarbitone (heavy sedation must be avoided).
Phenegram in a dose of 5mg in the morning and 10mg in the evening may reduce whooping and vomiting and ensure a good nights sleep. Antibiotics may be given to prevent secondary complications.

Can you think of the possible complications of whooping cough and how preventive measures can be put in place?

Complications
Be aware in the course of providing nursing care that one or more of the following complications may occur:

- Pneumonia which should be treated with antibiotics
- Encephalopathy including convulsions which can be alleviated by performing a lumbar puncture to relieve intra-cranial pressure
- Surgical emphysema (gaseous distension) escaping into the mediastinum and into subcutaneous tissues
- Sub conjuctival haemorrhage
- Bronchiectasis and lung collapse
- Otitis media
- Marasmus (malnutrition)
- Epistaxis
- Inguinal hernia and rectal prolapse

Prevention
The primary form of prevention is immunisation. The pentavalent vaccine is given in early childhood (infancy). Three injections are given at four week intervals. Good nutrition, especially breast feeding is also necessary. Children should be kept in well ventilated houses.
Prevent contact between small babies and children who have pertussis whenever possible. Children who have household contacts should receive a course of erythromycin.

Poliomyelitis

Poliomyelitis is an acute infectious viral disease of the anterior horn cells of the spinal cord and sometimes of the lower part of the brain. It occurs sporadically or is epidemiological and usually affects children under five but more commonly children under three. It is characterised by varying degrees of paralysis.
In 1925, there were a few cases of poliomyelitis among the children of the European settlers in Kenya. It was not until 1950 that polio was classified as a public health problem in this country, although it should be noted that there was solid immunity within the indigenous African population. From 1954, epidemics began to break out in three-year intervals until the 1970's. As a result, immunisation notifications and surveillance were stepped up.

WHO 1973, Bulletin 48 pp. 421, 429 and 543 obtainable from Kenya National Archive.

In Kenya just like anywhere in Africa, the poliovirus which is of three types, was very common and infected almost all adults at one stage during their childhood.
To develop immunity against each type of the poliovirus, a person has to have been infected or immunised against that particular type and this is one of the reasons why a child is given three doses of polio vaccine.
Poliomyelitis is a complication of a viral infection which is usually confined to the pharynx and gastro-intestinal tract, but in some cases there are no symptoms at all.
In about 1% of the patients the virus gains entry into the nervous system and settles in the motor cells of the anterior horn of the spinal cord or in the medulla oblangata.
Some factors, which contribute to the invasion of the nervous system include muscular exhaustion, tooth extraction, tonsillectomy,

injections and damaged nerve endings. The invasion finally leads to paralysis.

Pathophysiology

The causative micro-organism is poliovirus. There are three types of viruses. Type one is known as Brunhilde, which is commonly associated with paralytic illness. Type two is called Lansing and Type three is known as Leon. The latter two are less commonly associated with paralysis.
It has an incubation period of three to six days but can extend between three to 21 days. It has an infective period of three to 14 days. The virus spreads mainly through the oral route (gastro-intestinal tract) and then spreads to the lymphatic system. It can also spread through droplets.

The Five F's: Fingers, Flies, Faeces, Fluids and Food. These are the five routes of entry. Can you think of the clinical manifestations of Poliomyelitis?

Clinical Manifestations

The infection manifests itself in several ways such as:

- The patient presents with fever of 39-40 ℃
- General malaise
- Vomiting and headache
- Painful and tender muscles follow this a few days later
- Paralysis of one or more limbs occurs as the muscles become weakened
- The paralysis of the respiratory muscles follows without the child developing any other illness (this is referred to as flaccid paralysis)
- Only the motor system is affected but without sensory loss

There are various types of poliomyelitis.

Paralytic Type

This can be divided into spinal polio, where the virus attacks the anterior horn of the grey matter (newness) and bulbar polio, where the virus attacks the grey matter of the brain stem probably following a tooth extraction during an epidemic.
The patient normally shows signs of having the flu, usually complicated by pneumonia.

Non-Paralytic Type

The patient experiences muscle pain and stiffness. This type of polio can also change to a paralytic type as a result of any kind of stress, by IM injection, walking long distances and cold weather

Diagnostic Investigations

A lumbar puncture should be performed to exclude the possibility of meningitis. Cerebral Spinal Fluid is usually clear in colour. Both lymphocytes and polymorphs may be present in the CSF.

How would you manage poliomyelitis?

Management of Poliomyelitis

This can be divided into supportive and preventive management.

- The patient is strictly confined to bed
- Activities in the first two weeks of the infection risk possible increased paralysis and should be avoided
- The patient is to be nursed in isolation
- Pain is controlled through the administration of analgesics, for example, paracetamol, valium or phenobarbitone
- Regular respiratory suction and postural drainage should be performed
- N.G tube feeding should be high calorie and include substantial amounts of protein
- Change the patient's position every four hours to prevent bedsores
- Surgical procedures should also be avoided
- No injections are to be administered during this acute stage as they may precipitate paralysis

Immobilise the affected limbs during the acute stage of the illness, using splints to prevent flexion deformities and promote rest.

After the acute stage has passed, begin gradual and gentle exercise of the affected limbs.

Ensure proper disposal of faeces and urine to prevent spread of infection. Urinary catheterisation must be passed but principles of asepsis must be observed strictly. Maintain an intravenous infusion and fluid balance chart. Oxygen therapy may be used when necessary. A tracheotomy and use of a mechanical respirator may be used should the patient's condition deteriorate.
After being discharged, the child should return to the clinic at regular intervals to ensure flexion deformities do not occur. A plaster of Paris or back slab should be applied to the limbs if these deformities actually occur. Special shoes and callipers may help severely affected children. Prolonged rehabilitation will be required at a later date when the patient is fully recovered.

Prevention
If polio occurs in an area, the District Medical Officer of Health should be notified in writing immediately. Sabin oral vaccines are given to children to prevent them from getting poliomyelitis whenever there is an outbreak and routinely in MCH clinics. Parents should be encouraged to ensure their children are immunised.

Chickenpox (Varicella)

Pathophysiology
This is a mild viral infection, which is extremely contagious. Fever and a typical skin rash characterise it. The causative organism is Varicella Zoster Virus (VZV). It is spread in several ways. These include airborne droplet infection, direct or indirect contact, dry scabs and nut infections.
Droplets from the respiratory tract can transmit the Varicella Zoster Virus from one person to another. Even the wind is now known to transmit the virus particles from the skin of the infected person over a distance of meters to another person.
Once infected, the disease leaves immunity against chicken pox but the virus remains within the body and may reappear later in adult life as the herpes zoster when the person's immunity is weakened, for example in AIDS, diabetes, leukaemia and old age.

What length of incubation period would recommend for a patient suffering with VZV
Incubation Period

It has an incubation period of ten to twenty one days. The period of communicability is about five days before the rash to six days after the appearance of the vesicles.

Clinical Manifestation

The infection presents itself in the following ways:

- Slight fever and sore throat are the first to appear in older children while younger children are affected by a skin rash
- Maculopapular rash, which becomes vesicular within a few hours, appears on the trunk and spreads to the face, armpits, scalp and sometimes the extremities, (distribution to palms and soles is seldom)
- Vesicles are usually superficial on the skin and in the mouth following the sensory nerve, groups of new pocks of rash will appear over many days
- Pustules may form but usually the vesicles collapse and dry up after three to four days leaving no scars
- Anorexia and headache may be present
- Skin irritation (itching) and Lymphadenopathy are sometimes present

Nursing Care

Confine the child to bed until the pyrexia settles down. Monitor the vital signs at regular intervals. The child requires plenty of fluids and a nourishing diet. The fingernails should be kept short and the child has to be restrained from scratching. General body cleanliness should be maintained. Soothing lotions such as Calamine, should be applied to the skin to soothe itching. Antibiotics are given prophylactically. Occasionally, the child may have to be sedated.

Complications

Complications include secondary infections of skin lesions. Pneumonia or encephalitis may also occur but are rare. Other possible complications may be thrombocytopenia, arthritis and nephritis.

Prevention and Control

As part of active immunisation the live varicella vaccine is used selectively for immune suppressed children. The varicella zoster immune globulin is used for high risk individuals

Measles

This is an acute highly infectious disease. It is caused by the measles virus. Transmission is by droplet or direct contact with secretions from the nose and throat of infected persons. The child is most infectious to others during the prodromal phase, often before the diagnosis is made.

Incubation Period

Measles has an incubation period of seven to 14 days but usually 10 to 12 days is sufficient.

Isolation Period

The isolation period is five days after appearance of the rash.

Clinical Manifestations

Prodromal phase:

- This may last three to seven days
- The first symptoms are runny nose, fever, conjunctivitis and coughing
- There may be a faint rash which disappears quickly in the prodromal period
- Koplik spots appear 24 – 48 hours before the main rash. Koplik spots are small white spots on a red base inside the cheeks, usually opposite the lower molars, but may occur on gums and inside lips as well

Stage of advance:
The maculopapular rash starts behind the ears and on the forehead and spreads downwards. It takes about three days to reach the feet, at which point it starts to fade. Fever is high and lasts for four to five days.

What complications may occur with measles?

Complications

- Otitis media
- Respiratory infection
- Pneumonia - This is usually a viral pneumonitis
- Pulmonary TB
- Kerato - conjunctivitis
- Encephalitis is a serious complication often fatal or with residual brain damage
- Gastroenteritis
- Oral thrush and/or oral herpes

Nursing Care and Medical Management

There is no specific treatment available other than supportive. Supportive treatment includes:

- Antipyretics
- Plenty of oral fluids
- Eye and mouth hygiene
- Vitamin A 200,000 units orally daily for two days
- Check the child frequently for complication
- Uncomplicated cases can be nursed at home but complicated cases, infants and malnourished children should be treated in a hospital with isolation facilities

Prevention

Measles can be prevented through active immunisation with attenuated live virus vaccine. All children should be vaccinated against measles as per the KEPI schedule of immunisation.
The infection can be aborted if vaccine is given within 12 hours of exposure.

Mumps (Infective or Epidemic Parotitis)

This is a viral infectious disease of the parotid glands that can also affect other glands. It can spread by droplets or contact with the salivary secretions of the infected person.

Incubation Period

The incubation period varies from patient to patient but is on average between 14 and 21 days of infectivity after the onset of the parotid glands swelling.

What symptoms may present when a patient contracts the mumps?

Clinical Manifestations

All or some of the following symptoms may be present:

- The salivary glands namely the parotid, sublingual and submaxillary glands may be infected by painful swelling, this may be one side or both sides
- The child develops fever and complains of headache and malaise
- There is dysphagia (painful swallowing)
- The tongue is furred and mouth dry due to diminished saliva
- Moderate lymphocytosis is noted on blood examination
- The tenderness may last two to three days then gradually subside

Nursing Care

- Isolate during period of communicability
- Maintain bed rest in a warm room until swelling subsides
- Give analgesics and antipyretics as required
- Encourage fluids and soft bland foods
- Avoid foods which contain acid and which require chewing because they may
  increase pain
- Apply heat or cold compress to neck whichever is more comfortable
- Observe the child's vital signs of temperature, pulse and respiration and record them every four hours

Prevention

Since the condition is caused by a virus, there is no specific drug treatment. However the active immunity of a live attenuated vaccine is available for those who are not already infected. The mumps virus vaccine is best given before puberty.

What possible complications may arise when a patient has mumps?

Complications

Complications after infections with the mumps virus are rare but you should be on the lookout for the following:

- The child may develop deafness
- Inflammations of genital organs, such as the ovaries called oophoritis in girls and testes - orchitis in boys may occur, in both cases this may result in sterility in adulthood
- Meningoencephalitis (inflammation of the meninges and brain)
- Pancreatitis, which is inflammation of the pancreas

Hepatitis

This is the inflammation of the liver, most commonly caused by various types of viruses, namely A, B, C, D and E. In this subsection, you shall briefly look at Hepatitis A, B and C as they are related to paediatric illnesses.

Hepatitis A Virus (HAV), Infectious Hepatitis

This virus usually occurs in epidemic form. It spreads from person to person by the faecal-oral route and ingestion of contaminated material. The virus is excreted in stools and urine from three weeks before to one week after the onset of clinical symptoms.

Incubation Period

The incubation period is about three weeks.

Can you think of the clinical manifestations of Hepatitis A Virus?

Clinical Manifestations

All or some of the following symptoms may be present:

- Gastro-intestinal upset (loss of appetite, nausea and vomiting)
- Fever, headache, joint pains, tiredness
- Jaundice
- Clay-coloured stools, dark-brown urine
- Enlarged and tender liver

Investigations

- Serum bilirubin (increase of mainly direct bilirubin)
- Liver function tests (abnormal)

The disease is usually milder in children than in adults. Many cases of infectious hepatitis take a sub-clinical course, without jaundice there may be only mild symptoms such as slight fever and loss of appetite for a few days. Very occasionally, the disease is severe and may cause death due to acute liver failure.

How would you manage hepatitis A?

The Management of Hepatitis A

- Most cases get better without treatment
- Bed rest is usually recommended while jaundice is obvious
- Hygienic disposal of stool and urine
- Hand washing after contact with the patient
- Free diet (but fatty foods are likely to be refused)
- Refer patients to hospital if jaundice is very severe, vomiting persists and/or if confusion, coma or bleeding tendency occur
- A vaccine is now available for contacts

Hepatitis B (HBV) - Serum Hepatitis

Although a common infection on a global scale, it is more prevalent in sub-sahara Africa because of the high perinatal transmission rate and close contact between toddlers. It can also be spread through other routes. It is caused by the hepatitis B virus (HBV). The virus consists of a capsule and 'o' core, which contains DNA (deoxyribonucleic acid) and DNA polymerase enzymes. The virus circulates in the bloodstream. It can infect people of any age group.

The incubation period tends to be longer than that of other viruses, which affect the liver but usually in the range of 40 to 180 days. The communicability period is just a few days to one month during which period the individual has become a carrier. In many countries the carrier number is as high as 5-20%.

How many ways can you think of that HBV can be transmitted?

There are several routes of transmission. These include:

- Trans-placental route, from mother to foetus through the placenta (vertical)
- Blood transfusion, if the donor blood was not properly screened
- Contact with other body fluids and secretions
- Haemodialysis, especially children
- Through injections with contaminated needles and broken skin surface

Diagnostic Investigations

Diagnostic investigations include the examination of venous blood specimen in the laboratory when hepatitis B antigen/antibodies are found to be positive. Blood should be examined for bilirubin and alkaline phosphates but tests are not always conclusive. A liver function test may also be carried out but should be avoided in children.

Clinical Features of Hepatitis B

The clinical manifestations occur very slowly. These may begin with mild fever, anorexia, general malaise, nausea and vomiting. As the condition progresses, the patient will complain of abdominal discomfort. Occasionally mild jaundice may be present. Bile in the urine and a low white blood count may be noticed.

Nursing Care

When nursing a child admitted to your ward with this condition, you should allow them to regulate their own activities. The diet should be high protein, high calorie, and high carbohydrate but low fat. Vomiting, which may be persistent ought to be managed by intravenous administration of fluids.

A fluid balance chart is maintained during this period. Precautionary measures, which include wearing gloves, when carrying out intimate procedures should be observed.

There is no specific drug treatment but certain antibiotics may be administered when there is an onset of complications.

Prevention of Hepatitis B

In order to prevent spread of infections, you should make every effort to ensure that your hands are thoroughly washed after handling the patient, as well as all the articles, including linen used by the patient. The toilets should be cleaned
with disinfectants.

Complications

Complications may emerge much later and may include:

- Acute fulminating hepatitis characterised by rapidly rising bilirubin
- Encephalopathy, which is a degenerative process of the brain
- Oedema and ascites will always be present in the advanced stage
- Hepatic com-unconsciousness due to liver failure, chronic active hepatitis with hepatic dysfunction plus cirrhosis of the liver
- In some cases cirrhosis of the liver may undergo malignant changes

Nowadays, active immunisation with a hepatitis B vaccine is available. This is given in three doses. The first is followed by a second four weeks later. The third is administered six weeks thereafter.

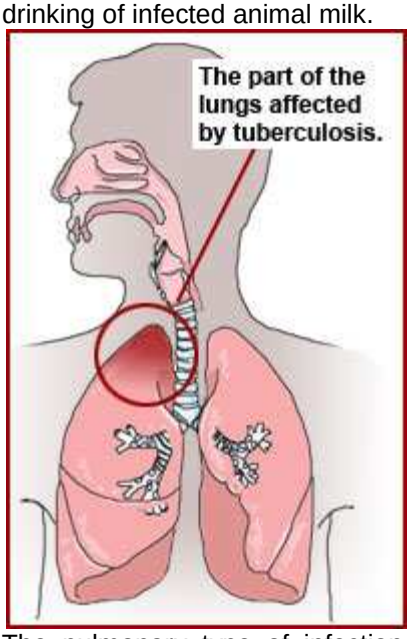
Hepatitis C

This type of virus has Ribonucleic Acid (RNA) in its nucleus. It causes hepatitis in a similar way to hepatitis B, although the risk to health care workers and sexual transmission is less marked. The main difference however, is its high rate of persistent infection, which increases the likelihood of the patient developing chronic hepatitis and cirrhosis of the liver.
It has an incubation period of approximately two to 26 weeks from the initial entry of the virus. It is transmitted in the same way as hepatitis B except that both sexual and vertical transmission are quite uncommon. There is no specific mode of prevention. Nursing care is the same as for hepatitis B.

Tuberculosis

Tuberculosis is an infectious respiratory disease, which affects the lungs and is spread by the droplet method. The infection is due to a rod-shaped micro-organism called tubercle bacillus. In some cases the infection may involve other body systems such as the genito-urinary, skeletal, gastro-intestinal or nervous system. Pathologically, it is characterised by an acute or chronic inflammatory process.
Many factors predispose to the development of tuberculosis. Children under the age of two years are more susceptible than older ones.

Although it is known that the condition is not hereditary, it is thought that tuberculosis is related to overcrowding in poorly ventilated accommodation, malnutrition and many other conditions, which lower the individual's immunity.
Tuberculosis is caused by tubercle bacillus. There are two distinct strains of the tubercle bacillus pathogenic to humans, namely the pulmonary tuberculosis which affects the lungs and the bovine type acquired through the drinking of infected animal milk.



The pulmonary type of infection makes up to 90% of the total number of patients suffering from tuberculosis. The remaining 10% are extra-pulmonary and this condition affects other body organs as you have seen earlier. In developing countries, where there is a lack of facilities for pasteurisation of milk, the extra-pulmonary tuberculosis is just as common as that of the lungs.
Usually for children the most common approach to diagnostic investigations is history-taking, physical examination, including general health status and chest x-ray. A sputum specimen for AFB (acid fast bacilli) may be taken from older children. This is usually done three times. In very young patients, gastric aspirates are examined.

Clinical Features

- General malaise
- Prolonged fever
- Anorexia
- Weight loss and local signs of infection

- Chest x-ray film may show radiological changes
- In some patients, pleural effusion may be present also to include lymphatic nodes enlargement

What steps would you carry out in the nursing management of tuberculosis?

Nursing Management

When the diagnosis is confirmed, the parents should be consulted by the nurse and doctor to see whether admission to the ward is necessary or whether the child can be treated as an outpatient. If admitted, the mother should be encouraged to stay and help with the child's care. Nursing care should aim for infection control, bed rest and high protein diet with oral fluid intake. The patient's personal body hygiene should be maintained at all times.
If primary drug resistance is suspected, quadruple therapy should be given as initial treatment. Usually the child will be prescribed daily anti-tuberculous drugs, which you should administer continuously for a minimum of six months with at least two drugs. The drugs regimen can be selected from the following:

- Rifampicin 10-20mgs/kg
- Isoniazid 10mgs/kg
- Ethambutal 25mgs/ kg
- Pyrazinamide 20-35mgs/kg
- Streptomycin sulphate 30mgs/kg

The dose will be determined according to the child's age and weight. The drugs have to be administered daily in combination to prevent bacterial drug resistance to one particular drug. The drugs are very toxic and so the child should be observed very closel

Nursing Management

When the diagnosis is confirmed, the parents should be consulted by the nurse and doctor to see whether admission to the ward is necessary or whether the child can be treated as an outpatient. If admitted, the mother should be encouraged to stay and help with the child's care. Nursing care should aim for infection control, bed rest and high protein diet with oral fluid intake. The patient's personal body hygiene should be maintained at all times.
If primary drug resistance is suspected, quadruple therapy should be given as initial treatment. Usually the child will be prescribed daily anti-tuberculous drugs, which you should administer continuously for a minimum of six months with at least two drugs. The drugs regimen can be selected from the following:

- Rifampicin 10-20mgs/kg
- Isoniazid 10mgs/kg
- Ethambutal 25mgs/ kg
- Pyrazinamide 20-35mgs/kg
- Streptomycin sulphate 30mgs/kg

The dose will be determined according to the child's age and weight. The drugs have to be administered daily in combination to prevent bacterial drug resistance to one particular drug. The drugs are very toxic and so the child should be observed very closel

Preventive Measures

You should make every effort to prevent the spread of infections, primarily by ensuring that all children have received their BCG vaccination.

You should also give health education to members of the community so that the parents may bring their children to the clinic when infection is suspected and also avoid conditions that
favour the disease

Malaria

Malaria is the most common disease in the equatorial regions (tropical and sub-tropical). In some parts of Kenya, malaria is continuously endemic and young children are more susceptible than adults because of lack of resistance.
The infection is caused by a parasite called plasmodium and is transmitted from the infected person to an uninfected individual by the female anopheles mosquito bite. The male mosquito does not cause infection. The mosquito bites the infected person, draws blood into its stomach and when it bites the uninfected person it transfers the parasite contained in the blood to the victim.
There are four main types of parasites known in medical practice.

Plasmodium Falciparum
Malignant tertian malaria, which is sometimes referred to as Asian form of malaria

Plasmodium Malariae
Is the species which causes quartan malaria where fever usually occurs within 72 hours after an individual is infected.

Plasmodium Ovale
Which is a species, found predominantly in East and Central Africa.

Plasmodium Vivax
The species causing vivax malaria. This may be found in the Horn of Africa
All species of plasmodia have the same life cycle.

Life Cycle Within the Human Body

- Sporozoites present in the mosquito salivary glands, are injected into the human body, they very quickly circulate to the liver and remain in blood circulation for as long as 30 minutes or so.
- During the liver or hepatic stage the sporozoite is taken up by the Kupffer cells of the liver then through the liver cells (hepatocyte). Here it develops into Liver Schizont where thousands of merozoites are released into the general blood circulation. This period takes approximately nine to 14 days.
- In the Erythrocytic (RBC) stage the merozoites released from the liver attack individual Red Blood Cells (RBCs) and there develop inside them from the rings into Schizonts. RBCs are then ruptured by the schizonts releasing merozoites, which then invade the new RBCs. At this stage clinical signs of ill health are manifested.
- Gametocytes develop at an unknown stage or time in the RBC cycle. The sexual forms, which develop are responsible for the survival and transmission of the parasite. These male and female gametocytes circulate for a few weeks and are taken up by the feeding mosquito.

Life Cycle of the Mosquito

- The male and female gametocytes develop into gametes and then fuse in the stomach of the mosquito to form zygote. These then develop into a mobile ookinete which migrates through the wall of the stomach to form an oocyst.
- The oocyst matures and later ruptures to release sporozoites.
- Sporozoites migrate to the salivary glands ready to be injected into the host bloodstream when the mosquito is ready for its next meal.

Some people develop immunity to malaria, which occurs as a result of frequent exposure to malarial infections. The immunity may be partial.

Risk Groups

- Children who are under five years of age who have no or little immunity
- Pregnant women are at risk because the malarial parasites flourish well in their placenta causing abortion or low birth weight and occasionally death of the foetus
- Those children suffering from sickle cell anaemia may go into sickle cell crisis
- Travellers or tourists from countries that do not have malaria because they have no immunity

:Clinical Features

Although in adults the symptoms can easily be more specific, in children they are not specific and the infection can be mistaken for other diseases. The following symptoms are acknowledged in most patients:

- The child complains of fever and being cold at the same time
- The body temperature is high while shivering and sweating may be present
- Nausea, vomiting and headache are common
- The patient complains of painful joints, backache and general malaise
- As the red blood cells are broken down, the child becomes anaemic and dizzy and splenomegaly and hepatomegaly may be present
- The child generally looks sick, mentally disorientated and may display signs of pulmonary and/or cardiovascular symptoms
- In some cases convulsions, drowsiness and even coma may occur

Diagnostic Investigation

As a matter of routine, proper and accurate history taking and physical examinations (to include vital signs observation) should make you consider the possibility of malaria.
You should take blood slides to the laboratory for malarial parasite analysis. Where facilities for laboratory examinations are lacking, consider starting the child on anti-malarial therapy even if there is no fever.

Nursing Management

It is important that any child presenting with fever and other suspicious symptoms should be admitted into a ward for observation and treatment. Keep the child on bed rest in a well ventilated room then cover with a light cotton bed sheet. The patient's vital signs are taken and recorded two to four hourly. Where the temperature does not respond to anti-malarial therapy, the child should be started on a Dextrose 5% solution alternating with Darrow's solution which may be administered intravenously.
In many cases anti-malarial drugs are added into IV infusion. You should attend to the child's personal hygiene, paying special attention to skin and mouth care. A fluid balance chart should be strictly maintained as the child may become dehydrated if not given adequate fluids. As soon as vomiting has ceased, the patient should be given a light, well-balanced diet gradually increasing the amount as their strength returns.

Medical Management

This will vary according to whether the child comes from an endemic area. The use of chloroquine in Kenya has been discouraged because of parasitic resistance to this type of medication. The most favoured drugs now are quinine sulphate, which is administered in a dose of 10mgs/kg every eight hours orally till the blood is free of the parasites. This is followed by a single dose of sulfadoxine combined with pyrimethamine. Doses of these drugs are calculated according to the child's weight. In severe cases quinine is initially added into the infusion fluid every eight hours. When the child's condition improves, it is then given orally, as syrup.

Can you think of the complications that may occur if the child is not treated early and effectively?

Possible Complications

- Severe anaemia due to the destruction of red blood cells
- Dehydration as a result of diarrhoea and/or vomiting
- Convulsions caused by uncontrolled fever
- Cerebral dysfunction, which may cause mental disorientation and comatose
- Renal failure and heart failure
- Hypoglycaemia
- Pulmonary oedema
- Splenomegaly and hepatomegaly

Paediatric Emergencies

There are many problems that can affect young children. These may either be deliberately or accidentally inflicted by self or others. Whatever the case, you have to be conversant with their management.

Where you may be unable to handle them, knowledge of the referral system for management will help.

The parents will similarly need assistance and support when such emergencies occur.

Cardio-Pulmonary Resuscitation (CPR)

If you find a child that has just collapsed, start resuscitation immediately using the 'ABC' approach.

Sequence of Actions

Before starting this procedure ensure both your safety and the child's. If a child is unresponsive, call for help.

What is the 'ABC' approach for resuscitation

A - Airway

- Position the child with head back and hold jaw forward to open the airway. If neck injury is suspected use the jaw thrust method of opening the airway
- Clear the airway of mucus or vomit with gloved fingers or suction machine if available

B - Breathing

- Keeping the airway open, look, listen and feel for breathing, putting your face close to the child's face and looking at the chest of the child
- If a child is not breathing provide positive pressure ventilation with a bag valve mask with 100% oxygen

C - Circulation

- After five ventilations, if no central pulse is felt, start cardiac massage (compression) in infants, use both hands to encircle the chest, thumbs compress the sternum towards backbone about 100 times a minute

Cardio-Pulmonary Resuscitation (CPR)

In older children, use the heel of one hand to press the lower half of the sternum toward the backbone about 100 times a minute with child lying on a firm surface.

- Combine lung inflation and chest compression at a ratio of 1:5
- The force of compression should depress the chest by one third of the anterior posterior diameter
- Continue resuscitation until child shows signs of life or help arrives
- When more staff arrive to help, the most experienced should lead the team, and the less experienced assist
- Try to define the cause and treat as appropriate

Acute Convulsions

A convulsion is a spasmodic contraction of muscles. It is a very common problem among children, mostly seen in clinics and outpatient departments.

Can you think of the factors that might cause this condition?

The Most Common Causes

- Infections such as meningitis
- Brain abscess
- Malaria and other febrile conditions, which lead to infections, unrelated to the central nervous system (about 10% of children in the tropics who are seen in hospitals suffer from febrile convulsions)
- Encephalitis
- Otitis media
- Congenital malformation of the central nervous system, especially hydrocephalus as well as encephalopathy post immunisation or acute infectious diseases
- Metabolic problems such as hypocalcaemia or hypoglycaemia
- Hypomagnesaemia
- Water and electrolyte imbalance
- Toxins which lead to tetanus
- Inherited metabolic disorders such as phenylketonuria
- Space occupying lesions like brain abscess, sub-dural haemorrhage/haematoma and brain tumour
- Post traumatic convulsions which occur several weeks, months or even years following brain injuries
- Systemic infections like renal diseases

Diagnostic Investigations

History taking from the mother will ascertain when the convulsion started, the duration of fits and whether it is generalised or localised. A lumbar puncture should be taken to obtain CSF to find out the causative micro-organisms, if any. Blood chemistry tests should be performed to check the electrolyte levels and blood glucose level.

Take a brain scan to check for any cerebral lesions. Skull x-rays should also be taken to check for any previous head injury, especially with older children. Blood should be tested for malarial parasites and other micro-organisms in case of septicaemia. Electroencephalography may be ordered in some cases, especially in the case of uncontrollable convulsions. Blood and urine examinations should be conducted to determine ammonia level.

Nursing Management

The child is admitted into a cubicle or side ward in a quiet environment and placed on the bed in a semi-prone position to facilitate the drainage of respiratory secretion and vomiting. Ensure that the airway is clear and the patient is breathing properly. The suction machine should be used whenever necessary. When the respiration becomes irregular, blood gases should be measured and monitored from time to time. The child should be given oxygen whenever they are cyanosed. Should the blood gases persistently be unsatisfactory, the doctor may decide to intubate and connect the patient to intermittent positive pressure ventilator. This is a mechanical method of helping the patient to breathe.

Any child with acute convulsions should be regularly observed with the vital signs recorded two hourly initially and gradually phased to four hourly as the condition improves. Due to pyrexia and the resultant sweating, they should be given a nourishing liquid diet and plenty of fluids at regular intervals.

A fluid balance chart should be maintained, paying specific attention to the urinary output. Where the patient is unable to take fluids orally, a naso-gastric tube may be inserted and used for feeding. To this end, mouth care is attended to every four hours. In order to prevent pressure sores, you should make every effort to carry out a two hourly change of position in bed. In general, daily skin care is carried out.

Keep a regular record of convulsions, as a means of determining the nature, frequency and duration of attacks. This is a good way of assessing whether the patient's condition is improving or not.

Burns

Small children are quite likely to get burned or scalded, as they often play close to fires and cooking pots and have not learned through experience or are yet to have the wisdom that one should not play with fire.

If the burn is widespread, it not only may cause a local problem but systemic complications can occur as:

- Large amounts of fluids are lost from the burned surface
- Pain can also contribute to a state of shock
- Anaemia is caused by blood loss and other causes, and secondary infection can occur

Clinical Features and Diagnostic Approach

History Taking

- What caused the burn?
- When did it occur?
- Record the date and time when the incident happened
- Is the child epileptic?
- What treatment has the child been given?

Often you will guess how bad the burn will be when you know what caused it. Flames and electricity usually cause deeper burns than hot tea.

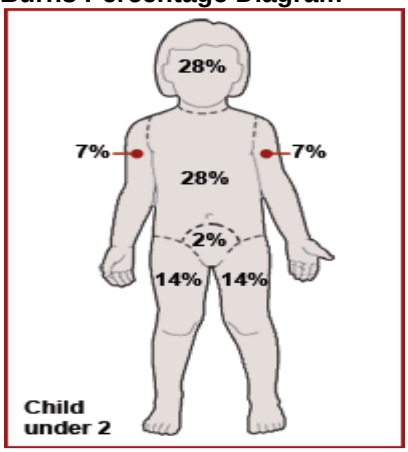
A General Examination

- Are they shocked?
- Check the skin on their nose and fingers. If in shock, they will feel cold and will have a weak, thready pulse

An Examination of the Burn

- How widespread is the burn? This is done using the diagram showing the different body parts and the percentage given to a burn in a specific area.
- How deep is the burn? A blister is usually a sign of a superficial burn. Black, charred skin means a deep burn that will need grafting; so does hard skin that feels like leather. Then you must examine for signs of infection (temperature, obvious pus around the burn area).

Burns Percentage Diagram



Diagnostic Investigations

- The single most important laboratory test is the haemoglobin level (or haematocrit

Management

First Aid in the Home

If anyone gets a scald from a hot liquid or a burn from a hot object in the home the resulting damage can be minimised if the skin is cooled immediately by dipping in clean, cold water. If this is done a few seconds after the accident, it may be possible to prevent a deep burn developing. But after 10 minutes or more, it is too late.
The only thing that can be done is to cover the area with a clean cloth and take the child to the nearest health centre.
Do not encourage putting on local medicine, gentian violet, sugar, fat, sodium bicarbonate or anything else. Remember also that if burnt clothes are still in place, they are the best temporary sterile dressing and should not be removed until formal burn dressing is done.

Pain Relief

All patients in pain need pain relief quickly. Give IM pethidine 1mg/kg p.r.n. or morphine 0.25mg/kg p.r.n 6-hourly. Paracetamol may be sufficient in mild burns.

Restoration of Fluid Loss

All patients need extra fluid because fluid is lost from the burnt area. Just as in diarrhoeal disease, you may have to give an extra amount on top of the daily fluid requirements. The fluid may be given by mouth or by intravenous drip.
You can calculate the total fluid requirements as follows:
For children below 10kg, calculate using 150ml/kg body weight with a maximum of 1,000ml less than one year. Breast milk is preferred and if this is known to be sufficient you do not have to calculate at all.

Example calculations

If a child is 8kg then the fluid requirement is calculated as:
Quantity is = 150ml/kg
If 1kg = 150mls
8kg = (150 x 8) = 1200mls.
This quantity (1200mls) will therefore, be given if the child is more than one year but if less than one year of age, we give the maximum which is 1000mls.

If a child is above 10kg, calculate as follows: - For a child between 11 and 20kg: 1,000ml + (50ml/kg for every kg above 10kg)
For example: If the child weighs 15kg, amount of fluid given is:
1000ml + (50ml/kg for every kg above 10kg - here, 5 from 15-10kg)
= 1000 + (50 ml x 5)
= 1000+250
= 1250 mls as the fluid given to the child weighing 15kg

For a child above 20kg: 1,500ml plus 20 ml/kg for every kg above 20kg
For example: If the child weighs 25kg, amount of fluid given is:

1500ml + (20ml/kg for every kg above 20kg - here, 5 from 25-20kg)
= 1500 + (20 ml x 5)
= 1500+100
= 1600mls as the fluid given to the child weighing 15kg
The above are administered orally.

20ml/kg has to be added for every 10% of body surface or part burned.

To complete the total required, you add this to the already calculated value as the table fluid replacement shows.

Fluid Replacement Table

% of body surface burned	Extra fluids to be given (ml/kg)	Type of fluid and how given
10 or less	20	Can be given as homemade electrolyte solution by mouth
20	40	IV saline or preferably Ringer's Lactate
30	60	Ideally every other bottle should be plasma
40	80	
50	100	

For example, using the above example of the last calculation done:
If a child weighing 25kg with a 20% burn, the child has to receive fluid replacement totalling to:
Resuscitation amount = 1600mls as calculated above
For 20% burns = 40ml/kg
1kg = 40ml
so, 25kg = (25 X 40)
= 1000mls.

Therefore the total fluid requirements = 1600mls + 1000mls = 2600mls of fluid
The method used for this is oral for the 1600mls then as shown in the table, intravenous for the 1000mls.
To administer the amount of fluid given in relation to the % of the burn, the table offers the guide.

Local Treatment

While the pethidine or morphine is working, gently wash the burned area with warm soapy water, remove any dirt or dead skin and gently dry. For burns of the body, limbs, genitals, face and neck, you want the air to get to the area to dry it out, so use no dressings or medicines. This is called exposure treatment. A bed cradle keeps the bedclothes off the area.
For burns of the hands and feet, closed treatment is better. This means that after washing, you put on white petroleum jelly (Vaseline) or Vaseline gauze if you have it, then bandage the limb in a functional position and elevate it on pillows or in a sling. Each finger should be bandaged separately. The burns are soaked in warm, soapy water every day.

Treatment of Burns

Antibacterial Treatment

Although sterile techniques are essential, you cannot prevent the burn from becoming infected, even if broad-spectrum antibiotics are given.
You can, however, prevent streptococcal infection which may result in erysipelas, glomerulonephritis or rheumatic fever by giving penicillin (PPF 400,000 units daily). Tetanus prophylaxis is indicated. If not vaccinated, give ATS 1,500 units after testing and start tetanus immunisation.
If vaccinated more than two years ago, boost with tetanus toxoid 0.5ml stat IM.

Treatment of Anaemia

Keep a check once weekly on the haemoglobin. Give a blood transfusion if it falls below 7g/dl in the first week. Give a course of ferrous sulphate for less severe anaemia.

Transfer to Hospital

Transfer all severe burns to centres with experienced staff and special facilities.

Severe Burns

- Extensive burns (more than 25% of body area)
- Deep burns or burns that have not healed in 14-17 days
- Flame burns to the face and eyelids
- Contractures following untreated burns

Poisoning

Poisoning

There are different types of poisoning. Ingested poisoning includes the ingestion of alcohol, organophosphates, kerosene and common drugs, for example, aspirin. Inhaled poisoning may include the inhalation of carbon monoxide, ethanol and organophosphates.

Identification of poisoning includes taking a detailed history which includes:

- Examining the drugs available at home or noting drug containers/bottles found nearby
- Recording the place where ingestion or inhalation took place
- Analysing any vomitus or urine saved

Poisons create different effects on the body, which range from symptomatic changes to clinical changes then metabolic changes. These effects include:

- Vomiting and haematemesis
- Convulsions or involuntary movement
- Oculogyric spasms
- Hallucinations and agitation
- Pupils either dilated or constricted
- Renal failure
- Respiratory failure
- Cardiac failure
- Hypoglycaemia
- Metabolic acidosis
- Stupor/coma

Management

This will depend on the type of poison taken by the child, the time span since it was taken and the route of intake. Some poisons have antidotes and some do not. The place where the patient is being cared for will also be of great importance because of the availability of the equipment supplies and qualified personnel.

Some of the general actions, which can be taken in the management of poisons, include the removal of poisons from the body if these are known. This involves provoking vomiting (emesis) with the fingers for non-corrosive and non-inhalant ingested poisons. Ipecacuanha syrup may be used instead of the above. This is given as a dose of 15mls stat orally, followed by 200mls of water. Wait for 15-20 minutes for the patient to vomit. If there is no vomiting, repeat with a dose of 15mls orally and wait for 20 minutes. If the patient still has not vomited, perform

gastric lavage.

The blood should be tested for the poisonous substance taken by the child if known and an intravenous infusion using Darrow's solution of 50% Dextrose may be given to correct hypoglycaemia. Oxygen therapy can be administered where necessary. The child should be given oral alkaline fluids to neutralise the acid and vice versa. Urinary catheterisation is indicated in order to monitor urinary output when renal failure is suspected.

The patient's general condition should be assessed to include level of consciousness and inspection of the mouth and lips for any burns in case of corrosive poisoning. Neurological investigations should also be undertaken.

You will look at kerosene poisoning and insecticide poisoning specifically

Kerosene (Paraffin) Poisoning

Young children often drink kerosene by accident. It is kept in the houses as fuel for lamps or primus stoves and is often kept in an old juice, soda or beer bottle. A child will usually not drink more than a mouthful because of the unpleasant taste.

Clinical Features

The main danger lies in aspiration into the lungs, causing bronchopneumonia. For this reason, vomiting is dangerous and should never be induced. The kerosene also can cause acute pulmonary oedema. Another immediate effect may be coma due to narcotic effect of kerosene.

Management

- Do not induce vomiting and do not wash out the stomach
- Give 5ml of milk of magnesia as a laxative instead
- Pneumonia is such a common complication that it pays to start pneumonia treatment immediately

Insecticide Poisoning (Parathion, Malathion)

Contact with these poisons causes:

- Tremors of the muscles
- Sweating
- Copious secretion of the saliva
- Pinpoint pupils

In the later stages it causes:

- Convulsions
- Coma and/or paralysis

The pinpoint pupils can help you make this diagnosis and guide you in the treatment. The treatment consists of first washing the child with soap and water, if there has been skin exposure, then giving them very large doses of atropine intramuscularly - in children under five, 0.5mg and in older children 1mg atropine sulphate IM every 15-30 minutes, until the pupils become wide.

Note that these dangerously high doses of atropine are indicated only in a serious case of confirmed insecticide poisoning. Referral may then be done if appears necessary.

Preventive Measures

Children at the age of five years and below should always be protected from injuries or accidental poisoning wherever they may be. After the age of five years they are educated to distinguish between what is right and wrong and dangerous.

Adults, especially parents, should not experiment the use of certain substances in the presence of children because children are bound to try and imitate them. You should find out from the parents how the accidental poisoning occurred in order to give the correct and effective health education on the topic.

All petroleum products should be kept safely locked and in their correct containers. All drugs in the home should be securely locked away out of children's reach. Parents should always be given health education on preventive measures, the dangers of poisoning and first aid measures to be taken in case of poisoning for their children.

Child Abuse/Neglect

Health care workers especially doctors, nurses and social workers must be on the lookout at all times during their clinical practice for signs of child abuse or neglect. Although these problems are known to exist in the world, incidence has increased in terms of numbers and frequency. Additionally, societies have become more open and it is now easier to expose cases of child abuse than ever before. The media have been increasingly vocal in pointing out incidents of child abuse.

The health care worker must be constantly vigilant to be able to detect, investigate and report to the rightful authorities so that remedial activities can be taken before further injuries are inflicted to the helpless children. It may be argued by some that certain activities affecting children are merely cultural practices carried out in some African traditional societies to maintain their way of life.

The problem is that the children's consent has never been sought.

Basic Children's Rights

The United Nations has come up with a list of basic children's rights, which should be observed and protected, by all world member countries. They are summarised as follows:

- The right to live
- The right to acquire a name and nationality
- The right to enjoy parental care
- The right to proper food and health care
- The right to education
- The right to be protected from all kinds of harm
- The right to moral upbringing
- The right to a culture

Types of Child Abuse and Neglect

There are different types of child abuse and neglect, including physical abuse, neglect and abandonment, sexual abuse, emotional and psychological abuse. Nutritional abuse can well be incorporated within one of the first four. These abuses may occur singly or in combination. The different types of abuse will now be covered in more detail.

Physical Abuse (battered baby syndrome or battered child syndrome)

This is the most common form of child abuse, which is easily recognised by health care workers and lay persons alike. The child displays non-accidental injuries on their body. The majority of victims in this group are infants or pre-school children.

About 60-70% are below three years old in Europe and America, while in Africa the age goes up to five years. The child's behaviour is abnormal, demanding too much attention, behaving aggressively or withdrawn. The child may have a chronic illness or be physically disabled. Some of these children may belong to single mothers who had unwanted or unplanned pregnancies and are unable to cope with the strains
of motherhood.

Various types of injuries may be observed. These include burns, cigarette burns, cuts, bruises, lacerations, fractures and bites. Some of these injuries may be in the healing stage while others may be fresh. This is an indication of repeatedly inflicted injuries. Injuries are predominantly seen in the genital areas,

buttocks, back, limbs, face. Ruptured internal abdominal organs and fractured skull may also be identified.
Physical abusers may include individuals suffering from stress, alcoholics, mentally ill individuals, those who were themselves battered in childhood or drug addicts.

How might you manage a child that has suffered physical abuse?
Once child abuse is detected or suspected, the child should be removed to a safer environment and involve the health care worker and children's departments. The child needs to be hospitalised in order to undergo a thorough physical and mental assessment to detect other previous injuries that may have been sustained. This detection is necessary in case of legal action being taken against the person who inflicted the injuries on the child.
When a child is admitted to hospital, an x-ray, physical examination, medical or surgical treatment should be carried out as appropriate.
The parents or guardians will require counselling especially if they are the ones causing injury to the child. The child's nutritional status should be improved before being transferred to a children's home or a foster home. These transfers are usually undertaken with the approval of the court of law, the Children's Department and Probation Office.
It is recommended that the offenders or abusers undergo corrective measures instead of a punitive corrective approach. Many, if not all, are referred to psychiatrists for assessment and assistance.

Child Neglect and Abandonment

In African societies, this problem was unheard of until a few decades ago. This problem has been brought about by social changes, which have led to the gradual erosion of extended family ties. Children who are abandoned are usually malnourished and may have other diseases as a result of low resistance to infection.
A great number of factors have contributed to this social problem in developing countries. Often both parents are economically unable to meet their basic needs due to poverty. Additionally, some children are brought up by single parents, who may not be able to earn enough to support their family. Perhaps the problem originates from the death of a spouse or a divorce, which leaves the remaining partner unable to provide for the family.

The children of physically and mentally handicapped mothers may be abandoned if they are unable to cope with the demands of motherhood. In certain conditions, a child may be separated from the mother for a prolonged period as a result of imprisonment. Similar problems may also be noted when a mother is an alcoholic.

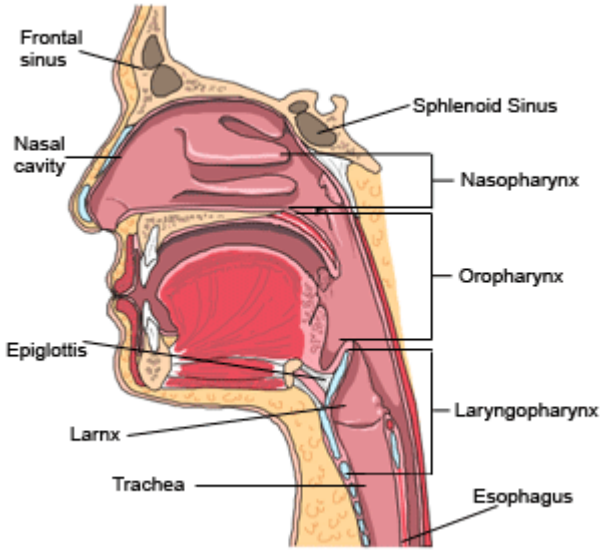
Management of Neglected and Abandoned Children

A child needs love, accommodation and food. You should make an effort to provide these in the health care facility while arrangements are being made to provide a suitable home for the child outside the hospital environment. Apart from these, medical treatment is provided as appropriate.
You shall now move on to the last sub-section, which will assist you in managing children in the unit or rural health centres.

Foreign Bodies in Orifices

Foreign Bodies in Orifices

Children tend to insert foreign bodies into their orifices during play. Unaware of the consequences of their actions, they become victims of injuries or diseases. The problem occurs most often in toddlers and slightly older children when they are left unattended.



Foreign Bodies in the Respiratory Tract

Infants and toddlers between the age of six months and three years are the most common victims of foreign bodies in the respiratory tract. Some may remove the foreign bodies by the reflex action of coughing, but in certain cases these objects remain stuck. The clinical manifestation may be immediate or delayed depending on the level of the airway where the object is stuck and the size of the foreign body. Should the object be large, the child could become asphyxiated within three to five minutes. The pathophysiological effects produced by aspirating or pushing foreign bodies into the respiratory tract are generally dependent on three main things, that is, the nature or composition of the foreign object, anatomical sites where the object is lodged and the degree of the respiratory obstruction.

Clinical Features

What clinical features do you think the child may display?

- Foreign body may be visible on examination
- The child feels uncomfortable and may attempt to sneeze
- Nasal mucosa becomes irritable and swollen
- Local obstruction of the nostril may be evident
- Some objects like beans and maize will definitely swell after absorbing moisture or water, this worsens the situation further
- Infective purulent nasal discharge may occur especially if the foreign body is left inside for a prolonged period of time
- Cough, hoarseness and inability to talk or
  cry properly
- Wheezy respiration leading to dyspnoea and cyanosis leading to choking or suffocation
- Child becomes anxious and restless

Diagnostic Investigations

Investigations include history taking from the parents or any one who may have seen what actually happened.
A physical examination should include an X-ray to examine the larynx, trachea and chest in general. A Laryngoscopy or bronchoscopy may also
be performed.

Management

This is an emergency situation, which must be handled with speed and efficiency if the child is to be saved. During a laryngoscopy and/or bronchoscopy, the visible foreign objects may be removed by using forceps or sucked out if they are in liquid form. Some objects can easily be removed by applying first aid technique.
For example, a piece of meat in the airway may be quickly removed by holding the child upside down (legs up and head downwards) then thumbing the posterior chest a number of times. This in most cases dislodges the object straight away. In case of liquids, suction may be quite sufficient to clear the respiratory tract thereby improving breathing.
The doctor will perform a laryngoscopy or bronchoscopy to investigate and remove visible foreign bodies from the airway using long forceps or a sucker depending on the type of foreign body. After removal, the child may be given oxygen for a while to improve his general condition. The child and their parents are reassured. If the objects have gone too deep into the lower respiratory tract and cannot be removed then a thoracotomy is performed under general anaesthesia followed by lobectomy.

Nursing Care

The patient is kept in hospital for a few days of observations if the foreign body is removed without surgery. If surgery is performed, the duration of hospitalisation is prolonged because of the need for intensive nursing care. Antibiotics are prescribed for possible complication such as pneumonia, which may follow the trauma caused by the foreign body. Analgesics are also recommended.

Foreign Bodies in the Ear

Children may push or insert a foreign body into the external auditory canal. In some cases, these foreign bodies so lodged stay inside until a pathological change takes place causing additional discomfort to the child.
When the object is visible, it may be removed with a forceps, blunt cerumen curet or a wire loop. Whichever method is used, the child has to co-operate or be restrained if the treatment has to be successful. Depending on the type of

foreign body, the ear may have to be irrigated using warm water or normal saline provided the tympanic membrane is intact. Where the foreign body is either a bean or a pea, contact with water should not be allowed because it may swell, making the removal rather difficult.
Otomicroscopy may be performed under general anaesthesia to remove the foreign body after which the tympanic membrane is carefully inspected for any traumatic perforation or inflammation. Thereafter, eardrops may be instilled as necessary.

Foreign Bodies in the Eye

Research has shown that approximately 10% of all bodily injuries involve the eyes and more single-eye loss from trauma occurs during the first ten years of life than in any other time (Harley, 1983). It follows, therefore, that more children of about two years of age and above suffer from traumas, which may lead to blindness.
Foreign bodies in the children's eyes usually include soil, sand, insects, and chemicals. The patient presents with painful irritation of the affected eye, lacrimation, photophobia and closure of the eye. The foreign body may be visible on careful inspection.

Management

Initially, the management is mostly first aid, which may be followed by conservation treatment and nursing care. The child should be kept still, supported and reassured. The parents should be similarly reassured and instructed on what to do while arrangements for referral is being made. Loose particles in the eye may be removed with wet gauze and little restraining. The patient's eye may be irrigated using warm water or mild solution of normal saline. In the hospital casualty department, or in the ward, a pad or eye shield is placed in situ loosely especially when additional medical treatment is considered necessary. Thereafter, the management depends on the type of foreign body and extent of injury.

Prevention

In all cases of accidents with children, however trivial, the parents require sympathy and a kind approach as they often feel guilty and bear the blame. The nurses should offer health education and refrain from criticism. Parents should be advised to ensure adults supervise the children as much as possible. Dangerous objects need to be removed from the playgrounds and venues as a preventive measure. It goes without saying that emphasis should also be made on the parents to urgently take their children to hospital once such unfortunate states of affair occur and not be dissuaded from doing so by the attendant feelings of fear or guilt.

UNIT FOUR PART TWO: PAEDIATRIC NURSING 2

In this unit, you are going to cover diseases and conditions, which commonly affect children up to the age of twelve years.

This unit is composed of eight sections:

Section One: Respiratory Tract Dysfunctions.
Section Two: Digestive Dysfunctions.
Section Three: Urinary Tract Problems and Disorders.
Section Four: Cardiovascular Disorders.
Section Five: Homeostatic, Blood and Lymphatic System Dysfunctions/Diseases.
Section Six: Diseases of Support and Locomotion.
Section Seven: Diseases of the Nervous and Endocrine Systems.
Section Eight: Integumentary (Skin) Conditions and Disorders of the Special Senses.

Unit Objectives

By the end of this unit you will be able to:

- Define each common childhood disease
- List the causes and predisposing factors of each condition/disease
- State the clinical features and investigations to be conducted for each condition/disease
- Describe the management of children with any of the conditions/diseases mentioned

Section 1: Respiratory Tract Dysfunctions

Introduction

As you prepare to study these conditions in depth, you should bear in mind that the management of sick children extends beyond the hospital ward boundaries into the home, community and school.

Nursing of children should not be carried out in isolation. Their care must be related to their environment. Therefore, you must try to work in liaison with the child's parents, community members and other relevant professionals concerned in child care to achieve set objectives.

Objectives

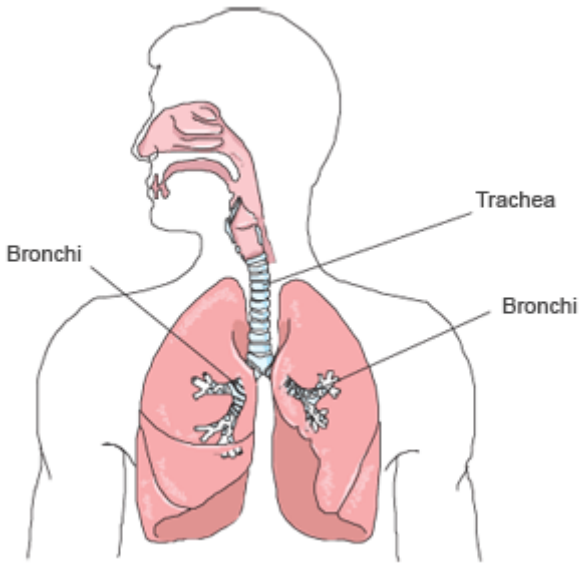
By the end of this section you will be able to:

- Define and list the common respiratory tract diseases
- State their causes and clinical features
- Describe the nursing care and medical management in relation to respiratory tract diseases
- Identify possible complications that may arise

Acute Bronchitis (Tracheobronchitis)

is an acute inflammation of one or more bronchi in children, which affects those below the age of four years. The infection is more prevalent in the younger children than the older ones because the former group have low resistance. Although referred to as bronchitis, the trachea, which is anatomically and physiologically related to the bronchi cannot escape infection when the latter is involved.

The disease is always associated with the upper respiratory tract infections, caused by various types of micro-organisms such as the influenza virus, streptococci, and pneumococci. In some cases, it is associated with certain communicable or infectious diseases such as whooping cough, measles and typhoid fever, just to name a few.



Acute bronchitis may present itself as a mild or severe manifestation. It frequently attacks malnourished and debilitated children from overcrowded homes. Environmental air pollution, allergic conditions and climatic changes, especially cold months and housing may precipitate the condition. Some young children with congenital heart defects or fibrocystic disease of the pancreas also tend to develop acute bronchitis due to their low immunity.

Clinical Features

When you receive a child with acute bronchitis in your area of work, they may present with certain symptons.

- Generally weak and unwell

- Their cheeks and skin may be flushed and their mouth may be dry

- Have dyspnoea leading to restlessness and irritability

- On checking the vital signs, the child will be pyrexial with temperature running between 39 and 40 degrees Celsius, in some cases even above these figures

- The respiration, though increased, is usually shallow due to pleural pain

- Older children normally complain of anterior chest pain, which may increase with frequent coughing at first

- Later on, the cough may become productive and the patient will be exhausted as a result of the above symptoms

Management

Unless the condition is severe, hospitalisation may not be necessary. The child can be treated and managed as an outpatient under the care of the parents.

Should hospitalisation be required, the child should be admitted in a cubicle and barrier nursed. The environment should be kept warm, humidified and well ventilated until the medical personnel are sure the patient does not have any communicable disease. Bed rest should be maintained until their temperature returns to normal. Their vital signs of temperature, pulse and respiration are taken and recorded one to two hourly.

Mechanical methods of lowering the body temperature should be employed as found fit. These include electric fanning or reduction of extra bed clothing. The child can adopt any comfortable position they like. Oxygen administration is given when necessary via a ventimask for older children and a tent for younger ones. Oxygen should be humidified.

The use of a steam tent may be considered for some patients according to their needs. The patient's position in bed should be changed four hourly, paying particular attention to their pressure areas. General bodily care will be necessary to make them feel more comfortable. Bowel activities should also be monitored.

The child requires plenty of oral fluids or intravenous infusion to liquefy the respiratory secretion making it easier to expectorate. Suction may be used where the patient is unable to cough up the secretions. For oral drinks, warm milk or warm lemon and honey are enjoyable and very effective. A light but nourishing diet should be given to older children while the young may benefit from dilute milk feeds. A fluid balance chart should always be maintained until the child is able to feed normally, pyrexia settles and general condition much improved.

Antibiotics such as crystalline penicillin may be given every four to six hours in the first two to three days. This is often changed to other types such as ampicillin, cloxacillin or amoxycillin syrup, which should be given together with vitamin B to prevent thrush and/or diarrhoea, which tend to occur when these drugs are used. Antipyretics such as paracetamol are also prescribed and given to help lower the temperature. They can also control chest pain, which the patient may complain of.

Complications

These may develop if the child was brought to the hospital too late. Similarly, inadequate use of antibiotics may lead to complications occurring.

The most common ones are chronic bronchitis and
broncho pneumonia.

Laryngo Tracheo Bronchitis (LTB) (1 of 7)

This is a combined inflammatory disease process, which affects the larynx, trachea and bronchi simultaneously. Infections of the respiratory tract are generally not limited to one anatomical area in small children, but affect other areas as well because of their close proximity.

Acute infections of the larynx and trachea are more frequent in toddlers than in older children and are considered more serious because young children have relatively smaller airways, which become easily obstructed when the inflammation occurs. The inflammation of the larynx and trachea are collectively called croup syndrome, which involves acute epiglottitis, acute laryngitis, and acute laryngo-tracheo bronchitis.

Pathophysiology

In acute laryngo tracheo bronchitis, the onset is gradual. It occurs more frequently in the course of a viral upper respiratory tract illness. When it occurs, it may increase in severity within a 24 hour period. Maximum airway obstruction occurs below the vocal cords. As mentioned previously, young children have a smaller and shorter airway.

Also, worth noting is that the smooth muscle in the lower respiratory tract still lacks cartilaginous support because this does not develop until adolescence. It follows, therefore, that when infected, there is constriction of the lower airway prompting an increased volume of respiratory secretions. These are the sources of obstruction, which eventually interfere with exchange of gases.

Clinical Features

The child may present with the following symptoms:

- A harsh voice, barking or brassy cough.
- Inspiratory rate gradually increases but expiratory rate may sometimes increase as an alternative. This is referred to as stridor.
- Pyrexial with a temperature of 39 - 40°C
- Tachycardia is present as the infection spreads downwards to the bronchi and bronchioles moderate. There is persistent airway obstruction (rarely complete) with dyspnoea where the patient uses accessory muscles of respiration.
- Cyanosis, restlessness and anxiety are always present.
  The patient gradually looks pale.

Nursing Care

The child with laryngo tracheo bronchitis should be hospitalised and placed in intensive nursing care in a separate room or

cubicle. They should be barrier nursed and on bed rest until their condition improves.

The main objectives of care should be to:

- Promote rest during the acute stage
- Maintain adequate airway for exchange of gases
- Provide high humidity and oxygen in the environment where the patient is being nursed
- Ensure adequate and appropriate fluids and nutrition
- Provide support and health education to parents

Once the child has been admitted, care must be taken to ensure the cubicle or room is well ventilated, quiet and clean. Only a few visitors or carers should be allowed in the room. They should use all the facilities available for barrier nursing.

You, as the nurse, should constantly be vigilant of the patient's condition by taking and recording their vital signs with particular emphasis being laid on their respiratory pattern. This is necessary because, should the condition worsen, they may be unable to breathe properly and mechanical methods to sustain life will have to be used. These may either be tracheostomy or endotracheal intubation.

You should therefore, urgently report any complications to the doctor as soon as they occur.

These complications may include actual or suspected epiglottitis, respiratory distress characterised by progressive stridor, restlessness, rapid pulse rate, hypoxia, cyanosis or pallor or hyperpyrexia in a child who appears toxic.

While the child remains ill, a naso-gastric tube is passed for feeding purposes while intravenous infusion remains in progress. The fluid balance chart should be maintained, paying special attention to urinary output. The child's vital signs of temperature, pulse and respiration are recorded two to four hourly. Humidified oxygen therapy is given, while respiratory suction is carried out as necessary.

The position is changed two hourly but try to allow the child to assume the position they are most comfortable with, provided the airway is clear. Treat pressure areas four hourly. General hygiene, including frequent oral toileting, should be maintained on a daily basis. As the condition improves, most gadgets are removed and patients are mobilised first in bed then gradually out of bed.

The child may be prescribed antibiotics, which may have to be administered by injection initially. These may include ampicillin or chloramphenicol. Other broad spectrum antibiotics may also be considered singly or in combination.

Other drugs used are corticosteroids. The use of corticosteroids is beneficial because their anti inflammatory effects decrease subglottic oedema.

The patient with this condition is distressed and to reduce this the family should be allowed and in fact encouraged to remain with the child as much as possible, especially if this reduces the distress.

Pneumonia (1 of 5)

This is an inflammation of the lung tissue. Although this commonly occurs in infants and

young children, it may be diagnosed at any age. The infection can occur as a primary disease, a complication of other medical problems, or as a foreign substance entering the lungs.

Causative organisms are commonly bacteria, for example, pneumococci, streptococci, staphylococci, and/or viral, for example, haemophilus influenzae. Whatever, the causative micro-organisms, the clinical features seem to be identical.

Pneumonia can be further sub classified into two categories: broncho pneumonia and lobar pneumonia.

Broncho Pneumonia

This tends to affect babies and very weak young children. It is more severe than lobar pneumonia. It is also known to be one of the common complications of many diseases such as fibrocystic disease of the pancreas, whooping cough, measles and severe burns. The disease may present in several ways:

- The mother gives a history of a harmless cold about two to three days previously. Alternatively, the onset may be acute
- Pyrexia and cough soon develop
- Respiration is rapid and distressed with accessory muscles brought into action
- The child becomes very restless and throws the arms towards the head in an attempt to facilitate air entry into the lungs
- The child becomes increasingly cyanosed with dull eye appearance
- The pulse rate becomes rapid, corresponding to the temperature and respiratory rate, which are all elevated above normal
- If an x-ray is taken, the film will show small widely scattered areas of consolidation over both lungs

Nursing Care and Medical Treatment

Acutely ill patients will require long periods of undisturbed bed rest. Care should therefore be planned in order to provide for this eventuality. In the event of an oxygen tent being used, only a light covering should be permitted. The child should always be kept warm and well covered, ensuring fresh air in the surrounding environment. Tube feeds are recommended and only a small amount should be given at a time. In all cases of respiratory disease, warm lemon and honey are very soothing to the cough.

Antibiotics are prescribed and given as ordered, for example, ampicillin, X-pen, amoxyl or sulphonamides. Cough mixture and paracetamol syrup may be incorporated into the treatment.

Remember:
One or more complications may occur if the treatment has been delayed or inadequately administered. These may include pleurisy, heart failure, brochiectasis, lung collapse, convulsions, diarrhoea and vomiting.

Ensure that the family understands that the child should not return to school immediately after leaving the hospital because they need to have more rest.

The parents should be encouraged to make attempts to improve the child's general

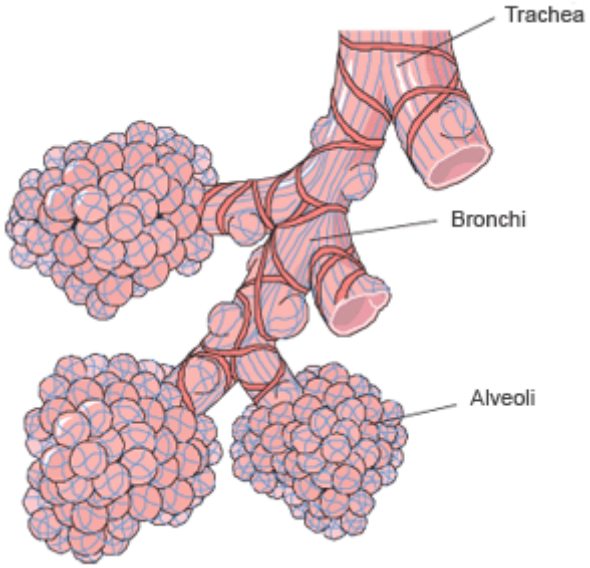
health by providing a high protein diet, which will thereby increase their weight.

Medications prescribed should be taken and completed as instructed and the child returned to hospital should their condition deteriorate.

Lobar Pneumonia

Lobar pneumonia is an infection of the lungs involving not only the bronchi but also the alveoli. Pneumonia is very common among children between six months and three years, those that are malnourished, have measles or whooping cough, or whose immunity has been compromised because of HIV infection.

Pneumonia is most often caused by pneumococci, but in children unlike in adults. It is also caused by haemophilus influenza or staphylococci though it may also be caused by a virus. The distinction between lobar and broncho pneumonia has no practical value as far as children are concerned. Medical treatment and nursing care are the same for both.



Streptococcal Sore Throat (1 of 3)

This condition is caused by a strain of beta haemolytic streptococci. It is classified as a communicable disease of the respiratory tract. The infection can spread from one child to another either by droplets or by direct or indirect contact. It has an incubation period of between two to five days.

After the beta haemolytic streptococci have invaded the throat, their toxins from the site of infection are absorbed into the bloodstream. Unless treatment is effectively administered early enough, the said toxins cause complications, which may affect other body organs and structures.

The disease presents itself in quite different forms. Below are some of those seen in everyday medical practice:

- The child presents with fever, rapid pulse rate and cough, following throat infection
- There is cellulitis of the throat, which may include
  the pharynx
- The older child may verbally complain of headache and dysphagia (painful swallowing)
- Vomiting and thirst may follow this
- The tongue is a reddish strawberry colour and has a white coating on the surface
- The cervical lymphatic nodes are swollen and painful (lymphadenitis)
- The patient gradually becomes delirious and restless, refusing to feed

Nursing Care and Medical Treatment

As soon as the child is admitted into the ward, they should be isolated in a cubicle or

a room, which is warm but well ventilated, with plenty of fresh air. They should be nursed while on bed rest in any position they are comfortable in. The room should be humidified if the facilities for humidification are available. Humidified oxygen therapy is given.

Plenty of oral fluids should be encouraged, but should there be oedema of the throat, which makes swallowing rather difficult, an intravenous infusion of 5% dextrose or normal saline, should be administered. A fluid balance chart is maintained. Depending on the child's condition, they should be given unrestricted diet, which is light and well balanced.

The vital signs should be monitored and recorded two hourly. Vomiting should be similarly observed and recorded. Cold or heat application to the painful cervical lymph nodes is recommended.
The patient's personal hygiene, including mouth care, should be taken care of.

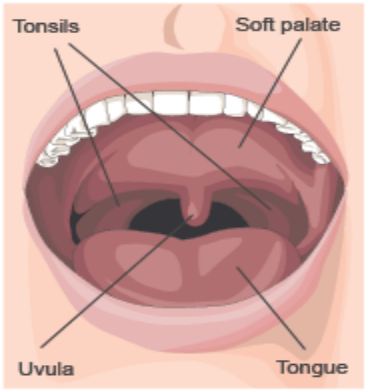
Tonsillitis (1 of 6)

Tonsillitis is normally classified as either acute or chronic.

Acute Tonsillitis

Inflammation of the tonsils is usually an acute infection, which is very common in children, occurring as a result of pharyngitis. It is most frequently caused by haemolytic streptococcus.

Although it is a bacterial infection, the bacteria can also cause enlarged tonsils, which may meet in the midline and obstruct the food and air passages. If the adenoids are also involved, they block the posterior nares resulting in mouth breathing. In addition to this, the eustachian tubes may be blocked resulting in otitis media.



Clinical Features

Nursing Care

The patient should be barrier nursed on bed rest in any comfortable position they choose for the first 24 to 48 hours. A throat swab should be taken to the laboratory to confirm the causative organism before drugs are prescribed. During the febrile stage, their vital signs should be monitored and recorded two hourly. Bed clothing and personal wear should be reduced and a cradle used to keep the weight off the patient. An electric fan and tepid sponge may be used to lower the fever.

Oral care should be carried out four hourly using appropriate approved lotions, such as glycothymoline in saline. Oral fluid intake is encouraged and should be given slowly in small amounts at a time. Meals should be warm and in liquid form, so that the patient can swallow without discomfort as all attempts should be made to prevent convulsions. Parents should continually be reassured.

Crystalline penicillin is given intramuscularly in the early stage and then changed to other oral antibiotics. Soluble aspirin syrup is given three times a day. The dose of medication should be calculated in relation to the weight of the child.

You should note that a tonsillectomy is never performed for acute tonsillitis. The child should be isolated from those suffering from the following conditions: congenital heart disease; nephritis and acute rheumatism. This is because streptococcal infections can cause very serious infections to patients with these conditions.

Chronic Tonsillitis

As one becomes older, the rate of tonsillitis recurrence decreases. Repeated tonsillitis treated medically may require surgical removal due to the fear that peritonsillar abscesses may form
(Boat et al, 1983).

Tonsillectomy and Adenoidectomy

It is a common practice that when a decision to remove tonsils has been taken, adenoids must also be removed at the same time. The operation is rarely performed on children under the age of three years unless they have developed
airway obstruction.

Tonsillectomy and Adenoidectomy

Preoperative Care

The child and a parent are admitted a day before surgery so that they may get used to the ward environment and to the nurses and so that the child may be fully examined. The operation should be clearly explained to the parents. The baseline observations of temperature, pulse and respiration are recorded four hourly.
Any abnormalities noted should be reported to the attending physician. A consent form should then be signed by the parents/guardians. A routine urinalysis should be carried out. Mouthwashes should continue to be given up until the morning of
the operation.

Postoperative Care

The child should be placed in a semi prone position, with the head slightly low to facilitate drainage of respiratory secretions until fully conscious. You should observe and report any bleeding from the tonsillar bed, which may be suspected should you see the child repeatedly swallowing. Any vomiting must also be reported to
the surgeon.

Vital signs should be recorded one hourly initially, but later every two to four hours, as the patient's condition improves. You should pay attention to the patient's breathing. Oral fluids should be given as soon as they are able to swallow, but this should only be in small amounts at a time. Fluids may consist of cold drinks such as fruit juice. Ice cream is also recommended for its soothing and cooling properties. A mild analgesic, such as aspirin or paracetamol for pain relief, may be given,

especially before feeds. Antibiotics are also prescribed. The child may get out of bed the following day, and return home on the second day after operation.

Bronchial Asthma (1 of 11)

This is a very common respiratory disease, which affects the tracheo bronchial tree due to hyper reactivity to various stimuli. It is reversible, episodic and results in obstruction of the airway.

Although it affects all age groups, it is known to cause chronic respiratory disability in childhood. The onset of childhood asthma normally occurs during the first five years of life. It is more common in boys than girls, but later on, in adolescence, the ratio of boys to girls becomes almost equal.

The exact cause of bronchial asthma is unknown but many factors are suspected which can be grouped as intrinsic factors and extrinsic factors. One or more of these factors may trigger the onset of asthmatic attack in any individual.

Intrinsic and Extrinsic Factors

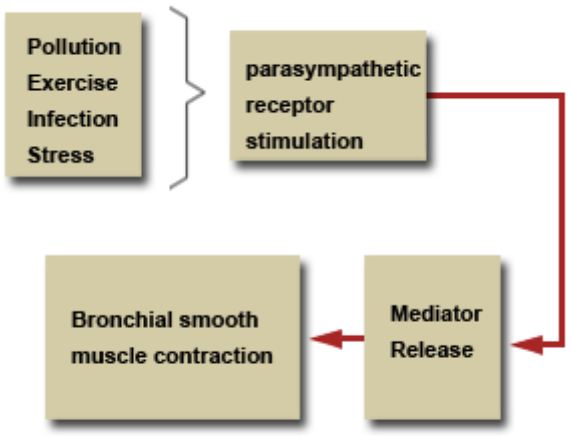
Intrinsic Factors

These refer to some clinical manifestations within
the patient, especially those of the airway obstruction. The onset of a bronchial asthmatic attack is triggered by non specific factors. There is
no allergic response although a family history of asthma may be present. The triggers to broncho spasm and wheezing may include one or more of
the following:

- Viral respiratory infections
- Emotional stress or excitement
- Exercise
- Drugs such as aspirin
- Inhalation of irritating substances such as cigarette smoke,
  strong perfumes or air pollutants

The graphic illustration shows the relationship between the trigger and an asthmatic attack.

Intrinsic and Extrinsic Factors

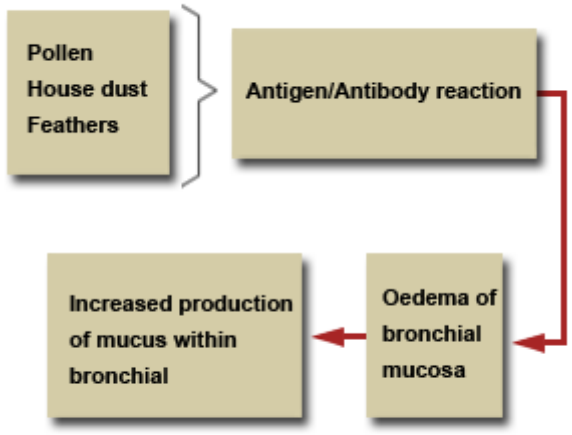


Extrinsic Factors

The patient may be allergic to certain substances found within the environment. These include inhalation of specific allergens, like house dust, feathers, animal hairs and pollen amongst others.

Extrinsic allergies can be detected by performing skin tests using various reagents, which can help to identify the offending substance. A good personal history account may also enable the clinician to associate family allergy to the child's disease.

The graphic illustration shows the relationship between the trigger and an asthmatic attack.



Pathophysiology

There is oedema and swelling of the mucous membrane of the bronchi. This is accompanied by increased secretion and accumulation of tenacious (thick and sticky) mucus inside the bronchi and bronchioles. This state interferes with the normal exchange of gases within the lungs, resulting in clinical presentations.

Clinical Features of an Asthmatic Attack

An asthmatic attack can present in several ways:

- The typical asthmatic attack starts gradually and the patient will notice wheezing and shortness of breath on exertion.
- As the condition progresses, the patient's respiration worsens with the slightest effort, leading to difficulties in expelling the air from the lungs on expiration.
- Dry unproductive cough develops, as mucous secretions cannot drain properly, leading to blockage of the smaller bronchioles. When there is chest infection, there may be mucoid sputum.
- The patient becomes increasingly dyspnoeic and exhausted as he uses accessory muscles of respiration.
- There will be cyanosis and sweating.
- The patient becomes anxious, frightened and tense making the condition worse.
- Pulse and respiratory rates are increased.

Diagnostic Investigations

There is no specific laboratory test for bronchial asthma. However, the following investigations may suffice to confirm the diagnosis. You should be able to accurately take the child's and family history, especially when wheezing is noted in the first instance. History of allergy in the family predisposes asthma in the child. Other information to record should include

frequency; duration, severity, and rapidity of past symptomatic onset
of attacks.

Undertake a thorough physical examination. More often than not, you will find that growth delay is associated with severity of asthma or uncontrolled broncho spasm. You should, therefore, take and record the child's weight and height routinely. During attacks of acute episode, cyanosis and use of accessory muscles of respiration must be noted. Blood from a vein should be taken to the laboratory for a white blood cell count, with specific reference to eosinophil. This tends to be elevated in allergic conditions.

Nursing Care

In order to provide nursing care of children with bronchial asthma, you should have a comprehensive knowledge of the ideal process, medical treatment and expected outcome.

During the acute stage of an asthmatic attack, you should aim at assisting the child towards optimum respiratory functioning, growth and social development. You should provide emotional support and education. You need to ensure that the child is on complete bed rest and is correctly positioned, more significantly, sitting upright and well supported at the back with pillows. This is essential in easing the child's breathing.

One nurse or the parent/guardian should always stay by the bedside to provide psychological support. Oxygen should be administered continuously at low rate to counter cyanosis. The child may have to be put on intravenous infusion, with or without added medication, and you should monitor their progress as the care continues.

Maintain a fluid balance chart to ensure that the child does not become dehydrated from excessive perspiration. A light, nourishing diet with high protein and vitamin content, and oral fluids should be introduced as soon as the condition improves.

The parents should be reassured and given the necessary support during the period of hospitalisation as they, too, become frightened for the welfare of their child. The child's personal hygiene should be considered at all times, as they will have been sweating during early stages. This should be done by provision of a bed bath once they are settled.

Medical Management

There are various medications, which may be prescribed for the child with asthma. The most common ones are broncho dilators.

This category includes adrenaline (epinephrine) given as 1:1000 strength, in a dose of 0.01ml/kg body weight, up to 0.3ml subcutaneously, for three doses at 20 minute intervals during an acute attack. Aminophyllin (theophyllin) with caution may also be given 1-5mg/kg body weight by intravenous route, but can alternatively be added into normal saline infusion and the child observed strictly ¼ hourly.

Steroid Group
These may be prescribed and given to prevent broncho spasms taking place. They include prednisolone or methyprednisolone in a dose of 2mg/kg body weight intravenously, then 1mg/kg six hours later for status asthmaticus.

Antibiotics
Broad spectrum antibiotics may be given when there is evidence of respiratory tract infections. A choice can be made from common varieties such as ampicillin syrup. The dose is prescribed according to the age of the child. Your responsibility in drug administration is to ensure they are given on time, in the correct dosage, and to observe for possible side effects.

Status Asthmaticus

This is a severe asthmatic attack, which is persistent and prolonged in duration where three to four injections of broncho dilators have been administered with no relief of broncho spasms and wheezing.

Status asthmaticus should be regarded as a medical emergency because it will quickly result in asphyxia. The child should be admitted in the intensive care unit or a cubicle in a general ward, for proper care and continuous monitoring.

Nursing Management

You should organise to have one nurse at the bedside to provide care and reassure the parents. The management will include oxygen administration, an intravenous infusion with added continuous aminophyllin (theophyllin), and corticosteroids to relieve airway obstruction. The fluid balance chart should be strictly maintained to help in identifying the onset of dehydration.

Blood gases analysis should be undertaken regularly and any deviations corrected to ensure acidosis does not occur. Any electrolyte imbalance should be corrected after the blood has been analysed. Where there is respiratory distress, intermittent positive pressure respiration (IPPR) is used following the insertion of endotracheal tube, and oxygen therapy given.

Suction of the respiratory secretions is carried out from time to time in addition to postural drainage.

Management

You should begin to give health education as early as the patient's condition improves, instead of waiting until the last minute. This gives the patient and their family time to absorb and understand the information and consider any questions they might have.

Environmental Control
The house and home environment should be kept clean and free from dust. The child needs to be supervised so that they do not get into contact with pollen and perhaps cats or dogs, if these are suspected to be the triggers. The environment has to be free of smoke at all times to ensure fresh air for the child. Breathing and chest exercises should be encouraged at least three to four times a day. The parents should reassure and encourage the child to participate in childhood activities with their peer group.

Drug Administration
Emphasis should be put on the need for the child to comply with the drug administration regimen as prescribed. This includes correct dose, time and duration. The parents should be advised to observe the child for any side effects of those drugs.

Health Maintenance
You should stress to the parents the need to attend clinic appointments. You should also

emphasise that if the condition of the child deteriorates or they are affected by any other illnesses, they should return to hospital as early as possible.

Section 2: Digestive Dysfunctions

Introduction

In this section you are going to cover some congenital diseases affecting the digestive system and other conditions related to the digestive system.

In addition you will need to pay special attention to diarrhoeal conditions that are quite common among children in Kenya.

Objectives

By the end of this section you will be able to:

- Review the various constituents of the digestive system and their functions
- Define and list the common digestive dysfunctions
- Describe causes and clinical features of the most common digestive dysfunctions
- Describe the nursing care and medical management in relation to digestive dysfunctions
- Identify possible complications that may arise
- Describe the common intestinal worms, their clinical manifestations and their management

Congenital Conditions

A congenital condition is one that exists at, and usually before, birth regardless of its causation.

Cleft Lip (Harelip) and Cleft Palate (1 of 6)

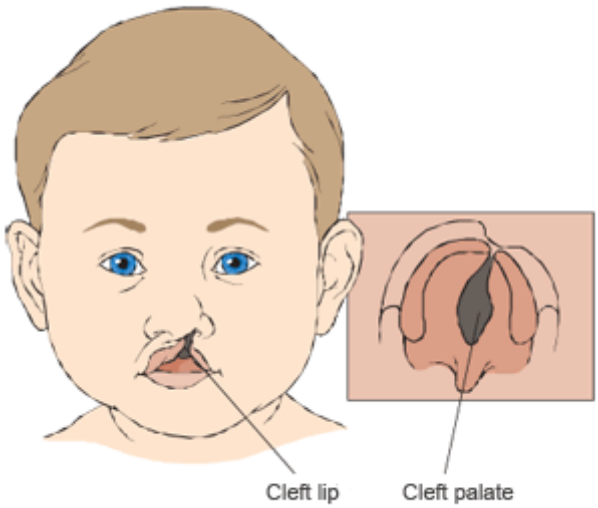
Cleft lip and cleft palate are considered the most common congenital cranio facial malformations within medical practice. They can occur individually or together. Cleft lip occurs with or without cleft palate in about 1 in 1000 births. Cleft lip is more common in males than females. Cleft palate, on the other hand, tends to occur alone in approximately 1 in 2500 births and occurs mostly in females.

Cleft lip occurs when the mouth cavity fuses partially or incompletely. Normal fusion occurs between the fifth and eighth intrauterine weeks. The cleft palate, on the other hand, fuses about a month later in normal circumstances.

The abnormalities appear to run in families, and are therefore influenced by heredity in about twenty per cent of the cases. Some cases have shown a higher incidence with monozygotic twins (that is twins from a single fertilised ovum) than in a diazygotic twins (that is, twins from two separate ova).

Other associated predisposing factors are maternal age (too young or above 35 years), maternal diabetes mellitus, and excessive alcohol intake during pregnancy, drugs used

in the treatment of cancers, and the use of accutane (a drug used in some places in the treatment
of acne).



Diagnostic Investigations

Cleft lip can easily be diagnosed just by observation, but care should be taken to determine whether it is simply confined to the lip or if it is more extensive. Cleft palate can rarely be confirmed by observation. The doctor or nurse/midwife may have to insert their gloved fingers into the mouth and palpate for any incomplete fusions in the roof of the infant's mouth. Occasionally, an x-ray may be ordered to visualise the affected area better.

The major problem associated with cleft palates is the inability to suckle and swallow. If the cleft palate is not diagnosed early, the baby could die because of the inability to swallow food. Other complications or problems the baby will encounter include improper drainage of the middle ear, which causes poor functioning of the eustachian tubes. This can lead to increased pressure in the middle ear, leading to ear infections. This increases the incidence of conductive hearing impairment. Upper respiratory infections are also a long term problem for these children. Speech development may be affected as the baby grows, unless surgical intervention has been undertaken.

Management of Cleft Lip (Harelip)

The baby and parent are admitted into a room in isolation to prevent alimentary and respiratory infections, which may follow surgery. Plastic surgery is usually performed under general anaesthesia when the infant is about three months old, provided it is thriving and weight gain has been satisfactory. Initial repair may be revised at four or five years of age.

As soon as the baby recovers from anaesthesia, glucose drinks in small amounts are commenced followed by breast milk using a spoon or pipette four hourly. The child is nursed on lateral sides to prevent regurgitation and aspiration occurring. The wound is kept clean by frequent swabbing with hydrogen peroxide. The sutures are removed five to seven days post operatively. The arms may have to be splinted most of the time to prevent the baby from rubbing on the lips.

Management of Cleft Palate

The palate can be surgically corrected by an operation called palatoplasty, usually deferred until the child is about twelve months old. During that period attempts must be made to prevent infections and maintain the child's good nutritional status. The cleft lip repair must heal before this second stage of surgery is undertaken.

Preoperative and Postoperative Care

Preoperative Care

The child and the parent are admitted one week before the day of the operation. Any infection must
be contained before surgery. You should take blood
samples from the child to test for haemoglobin, grouping and cross matching. Night splinting of the
arms should be practiced so that the child may get
used to the procedure in preparation for postoperative care.

The child should not be allowed to consume any food for six hours before being sent to theatre but may be put on intravenous dextrose 5% during that period.
Pre medications should be administered as ordered by the doctor. Ask the parents to sign a consent form, as the operation is usually performed under general anaesthesia. You will need to reassure the parents from time to time as they may be extremely anxious.

Postoperative Care

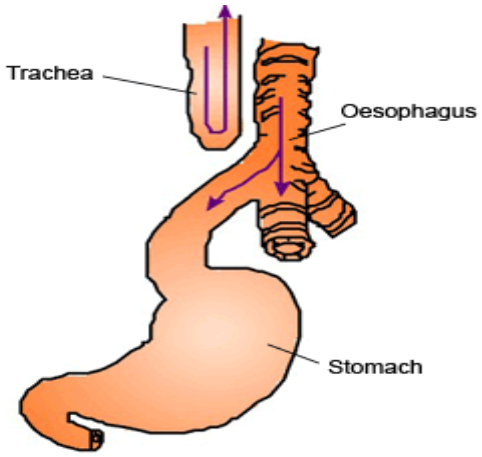
After cleft repair an infant usually accumulates mucus in the nose and mouth. These should be sucked out to clear the airway. A laryngoscope, endotracheal tube and suction machine should always be kept within reach in case of need.
The air in the environment should be humidified.
Mild sedatives should be prescribed and given as necessary.

The child's arms should be restrained in splints to prevent them from rubbing the operated area, but they should be periodically released (every two hours). The parents should be involved in the child's care to provide some comfort. Feeding should be continued frequently as ordered. Additionally, continue to monitor for signs of bleeding. Observations of vital signs are carried out one to two hourly to detect onset of infections. A clinical follow up is necessary to monitor the child's speech. Speech therapy may be necessary if difficulties exist.

Oesophageal Atresia (1 of 2)

This is a congenital abnormality of the oesophagus. In foetal development, the trachea and oesophagus develop from one tube and at birth various abnormalities may be present. The commonest abnormality is atresia or occlusion of the oesophagus, in which the upper portion terminates in a blind pouch and the lower segment joins with the trachea. This

condition is referred to as tracheo oesophageal fistula. It is important that the condition is diagnosed early.



Clinical Features

There is a continuous flow of saliva in the infant's mouth. This is coupled with attacks of coughing and cyanosis. Feeding the infant exacerbates the infant's condition.

Diagnostic Investigation

A fine rubber catheter is passed through the mouth into the oesophagus and an opaque dye, known as lipidol, is injected. This is followed by an x-ray, which will reveal the presence of the pouch. When the infant breathes in the air some of the liquid dye will pass into the stomach and can easily be identified on x-ray film.

Once identification has occurred, arrangements should be made as soon as possible for corrective surgery to be performed.

Preoperative Care

The saliva should be frequently aspirated. The infant should be put on an intravenous infusion with glucose and other nutritional fluids such as aminosol. Start the infant on antibiotics such as penicillin to prevent respiratory infections.

The operation is performed via the patient's neck or through thoracotomy. The blind ends are trimmed and anastomosis undertaken. In some cases a tube may be passed through the oesophagus into the stomach until the anastomosed area heals. The tube may be used for feeding, but often a gastrostomy tube for feeding purposes may be inserted.

Postoperative Care

The baby is best nursed in an incubator, which should have the facility for tipping the bottom end to counteract shock and to raise the head (top) during the feeding period. The baby should be kept as quiet as possible. Aspiration of saliva from the mouth and intravenous infusion should be continued.

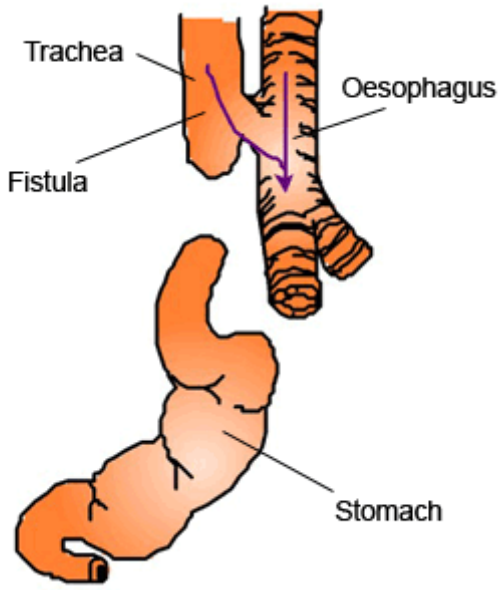
Feed the infant through the gastrostomy tube and ensure maintenance of fluids and electrolytes. Postural drainage should be carried out on a regular basis to prevent chest infections. Analgesics and antibiotics should be administered as ordered.

Oesophageal Fistula (1 of 3)

This is an abnormal opening of the oesophageal wall. In some cases the fistula and atresia may occur together, involving the trachea. Fistulae tend to occur more often in low birth weight babies.

A history of polyhydramnious (an excessive amount of amniotic fluid) during pregnancy is often a pre determinant. In this condition, the foetus normally swallows amniotic fluid.

The commonest abnormalities met with in medical practice are a tracheo oesophageal fistula without associated atresia of the oesophagus and a tracheo oesophageal fistula with associated oesophageal atresia.



Clinical Features

Gastric reflux into the trachea will occur, causing inhalation of secretions and hydrochloric acid, resulting in ulceration of the mucous membrane. The baby will persistently cough and choke due to aspiration of gastric content. This may lead to the development of pneumonia. Cyanosis is present and respiration disturbed. Management of the condition necessitates surgical repair.

Preoperative Care

The infant should be nursed in the incubator, kept warm and given highly humidified oxygen to relieve respiratory distress and liquefy secretion. The infant's head should be slightly elevated and intermittent suction carried out both to the mouth, pharynx and proximal oesophageal pouch. The catheter may have to be changed daily by the doctor or irrigated with normal saline.

At intervals the infant's head may be lowered to facilitate free drainage of secretion. You should continue to take and record the vital signs and monitor respiration to analyse the effectiveness of these procedures. Antibiotics are administered prophylactically.

Surgical Management

As soon as the diagnosis confirms the presence of fistula, a gastrostomy should be performed to decompress the stomach and also serves as a way of feeding after surgery. The gastrostomy tube may be left open to permit the escape of air from the stomach. The fistulae are then repaired.

Attempts should be made to prevent the gastric content entering the lungs. This is achieved by modifying the infant's position.

Postoperative Care

All the preoperative nursing care given should be continued after the operation. Any respiratory difficulties or distress should be reported immediately to the attending physician. The gastrostomy tube should be allowed to drain freely by gravity until the second or third postoperative day. It can be used to feed the infant, beginning with glucose and then graduating to a milk formula.

As the condition improves, oral feeds should be introduced at which point the gastrostomy tube may finally be removed. The nurse should ascertain that the baby can swallow without any problem. Once the gastrostomy tube has been removed and the baby is feeding well orally, their discharge may be planned.

Clinical Follow Up

In three to six weeks postoperatively an oesophagoscopy should be performed to inspect the status of the anastomosis. Oesophageal dilatation may have to be performed if a stricture is suspected.

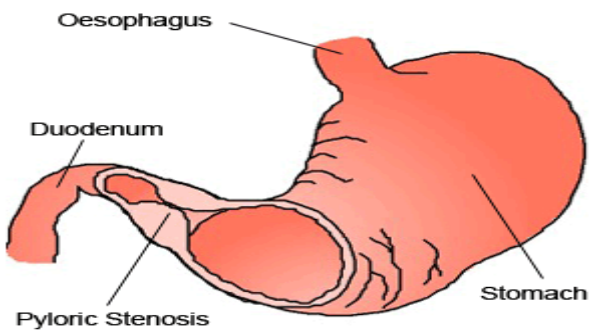
Advise the parents to monitor the child's progress, especially where difficulties with feeding and swallowing are noted, when the child must be returned to hospital immediately without delay.

Congenital Pyloric Stenosis in Infants (1 of 11)

This is an obstruction at the pyloric sphincter caused by hypertrophy of the circular muscle fibres in the pylorus, resulting in gastric stasis and dilatation. The condition occurs soon after birth for unknown reasons.

Pyloric stenosis is a common surgical condition of the gastro intestinal tract occurring in approximately 1 in 150 male infants and 1 in 750 female infants (this denotes a ratio of 1 male to 5 female infants).

It also tends to occur more frequently in the first born children and in some families more than the others. The child is usually normal until three to four weeks old.



Pathophysiology

In pyloric stenosis, there is a diffuse hypertrophy and hyperplasia of the smooth muscle of the gastric antrum and sphincter, which becomes twice its normal size and is almost cartilaginous in its consistence.

This pathological change increases the size of the pyloric circulation muscle, which in turn, results in the narrowing of its orifice. This narrowing can be partial or absolute which leads to obstruction.
The gastric contents cannot, therefore, flow freely through the constricted or blocked pylorus.

Vigorous peristalsis results in hypertrophy and dilatation of the stomach muscle.

Clinical Features

As a result of pathological changes occurring, the infant usually presents with the following:

- Persistent vomiting which gradually increases in severity until it becomes projectile
- The infant becomes dehydrated and develops hypochlorhydric alkalosis (blood becomes more alkaline than usual because of diminished level of hydrochloric acid)
- Gastritis with some bleeding from the gastric mucosa may also occur
- Loss of weight and constipation may follow
- On physical examination, visible peristaltic movement of the stomach is noticeable over the abdominal wall
- On abdominal palpation a lump can be felt indicating thickened pylorus

Investigations

Any investigations should begin with history taking with reference to immediate projectile vomiting which follows feeds. Undertake a physical examination of the child. A radiological study, which may include barium meal, may also be required.

Blood tests should be carried out to determine serum chloride concentration as well as the pH sodium and potassium level. Haematocrit and haemoglobin level estimations, which are normally high because of haemo concentration, should also be tested for.

Management of Pyloric Stenosis

If the operative measures are delayed for one reason or another, the baby should be managed in the interim. Due to persistent vomiting, the feeds should be reduced radically. Gastric lavage should be performed at regular intervals using normal saline. An intravenous infusion of 5% dextrose normal saline should be put up and monitored.

You should also maintain a fluid balance chart. The child's electrolyte balance should be monitored and any deficiencies identified should be replaced accordingly. Muscle relaxant (antispasmodic) drugs, for example, atropine methonitrate (eumydrin) 0.6% alcohol solution, administered by a dropper or pipette direct on the tongue at the back of the mouth, may be prescribed to be given fifteen to twenty minutes prior to each feed.

Surgical Management

The only curative treatment is surgical intervention, known as pyloromyotomy (Rammstedt's operation), which should be undertaken as soon as possible, in order to relieve the obstruction.

The procedure is performed under general anaesthesia or local anaesthesia and involves making an incision through the hypertrophied circular muscle without severing the mucous membrane, which then bulges between the longitudinally split muscle thus widening the passage.

Preoperative Nursing Care

The infant is usually admitted to hospital and because of their lowered resistance to infections, they must be isolated in a cubical, kept warm and the reserve barrier nursing method employed. All the child's carers, including the parents, should be instructed to wear gowns and masks.

In preparation for surgery, you must perform the following functions diligently:

- Regularly take and record vital signs. The temperature should be taken rectally.
- Monitor the amount and characteristics of the vomitus and stool.
- Observe for signs of hunger such as the infant sucking the fingers or fist as well as for signs of hyperperistalsis.
- Collect specimens for laboratory analysis as requested by the surgeon.
- Assist with other diagnostic procedures as required.
- Withhold oral feeds, administer and monitor parentaral fluids as prescribed.

- Perform gastric lavage with normal saline if ordered. In cases where naso-gastric tube is

passed and left in situ, the nurse must ensure it is intact and aspiration is performed regularly, recording the content on the fluid balance chart.

- If feeding is ordered preoperatively, the infant's head should be lifted up a bit to prevent regurgitation. Intravenous infusion of 5% dextrose alternating with normal saline, if ordered, must be given and monitored with a lot of care to prevent overloading the child's circulation.

- Maintain a strict intake/output chart. The solution given replaces the deficit electrolytes such as sodium chloride and potassium. The amount to be given is determined by the metabolic alterations of the individual child.

- The addictive electrolytes such as oral potassium should be administered correctly according to the dosages prescribed.

Postoperative Nursing Care

On return from the operating theatre, the care given before the child went in for surgery must be continued. More attention should be paid to the provision of adequate fluid and nutritional intake. Intravenous fluids are sustained until the infant is able to take oral glucose, electrolyte solution or breast milk or formula milk. This is usually approximately six hours postoperatively, especially when no further vomiting occurs.

The infant's head should be slightly elevated after feeding and then should be placed on right lateral position. Response to feeds must be recorded. You should observe for signs of complications, paying special attention to pulse, skin colour and abdominal distension. Before the baby is discharged to go home, the parents should be taught, and encouraged to get involved in, positioning, feeding, observing for vomiting and inflammation around the operation site. When the time comes for discharge, the parents should be informed about where to go for follow up and review procedure.

Feeding the baby after surgery varies from one hospital to another and from one surgeon to another. The principles, however, remain the same. Below is the guideline, which may be applied in most health institutions.

Postoperative hours	**Type and amount of feeds**
4 to 8	5mls dextrose hourly
8 to 10	10mls dextrose hourly
10 to 12	10mls half strength milk feeds hourly
12 to 18	15mls half strength milk feeds 2 hourly

18 to 24	30mls half strength milk feeds 2 hourly
24 to 30	30mls full strength milk feeds 2 hourly
30 to 36	45mls full strength milk feeds 2 hourly
36 to 42	60mls full strength milk feeds 3 hourly
42 to 48	75mls full strength milk feeds 3 hourly

Thereafter, the baby can be given normal feeds according to accepted weight. If the child is breast fed, attempts should be made to assist the mother to keep the milk supply going. The same feeding schedule should be maintained during the first 48 hours, with a substitute of half strength breast milk. It is also recommended, in consultation with the surgeon, that the baby be put on the breast within 48 hours of the operation.

Imperforate Anus (1 of 3)

This is one of the most common congenital defects in this region among the newborn. It is usually due to failure of the anal membrane to rupture. The imperforate anus can either be superficial (minor) or deep (severe). The imperforate anus encompasses several forms of malformation without an obvious anal opening, and may have a fistula from the distal rectum to the perineum or the genitourinary system. The nurse or midwife attending the infant soon after birth should be on the look out for this type of abnormality.

Whenever it occurs, no meconium is passed and the infant usually develops abdominal distension and vomiting at a very early stage. More serious abnormalities are the absence of anal canal and rectum. This type of abnormality is noted in 1 in every 5000 live births. Alternatively, fistula may develop in the vagina in girls, urethra in boys and urinary bladder in both. The minor case of these abnormalities occurs in 1 in every 500 live births.

Diagnostic Evaluation

Checking for patency of the anus and rectum is a routine part of the newborn assessment and includes observation regarding the passage of meconium. Inspection of the perineal area reveals absence of a normal anus. Digital and endoscopic examination identifies constriction or the blind pouch of rectal atresia.

Stenosis may not become apparent until one year of age or older when the child has a history of difficult defecation, abdominal distension and ribbon like stools. A rectourinary fistula is suspected on the basis of meconium in the urine and confirmed by radiographs of contrast media injected through a tiny catheter into the fistulas. Abdominal ultrasound may be performed to evaluate the infant's anatomic malformation.

Management

These cases must be treated surgically as a matter of urgency. In all cases, the infant is taken off food after the parent has signed the consent form. The infant is put on intravenous drip of 5% dextrose alternating with normal saline before being taken to the operating theatre. The operation is usually performed under general anaesthesia.

The operation for minor cases involves the incision of the anal membrane or the perforation of the membrane using a blunt instrument. This is followed by periodical anal dilation to prevent scar formation.

When the imperforate anus is more severe, that is situated 1.5cm or over between the anus and blind end of the colon above, a colostomy is undertaken. Further intestinal repair and closure is planned about six to twelve months later.

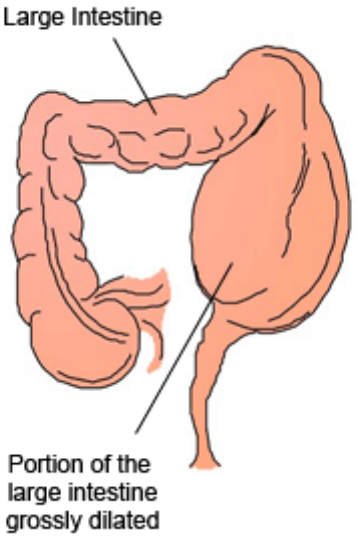
Postoperatively, the intravenous infusion is continued for a few more days, vital sign observations taken and recorded frequently and antibiotics in addition to analgesics are prescribed. You must constantly observe and report regularly the bowel action and the size of the infant's abdomen for any distension.

Megacolon (Hirschsprung's Disease) (1 of 4)

This is a congenital condition in which a portion of the large intestine is grossly dilated. In addition, it is a congenital anomaly that results in mechanical obstruction from inadequate motility of part of the intestine. It was named after Dr Harald Hirschsprung, a Danish surgeon.

The cause of HIrschsprung's disease is unknown but occurs more commonly in male infants than in the females, with a ratio of 4 to 1.

It has been noted that one third of all intestinal obstructions are due to megacolon. In some cases, it is found in children who have Down's syndrome (chromosomal abnormality) and those with congenital urological abnormalities. It tends to be hereditary.



Pathophysiology

In congenital megacolon, there is an absence of autonomic parasympathetic ganglion cells in the sub mucous layer and muscular coat of the large intestine, especially around the sigmoid
rectal area.

As a result of this, there is failure of peristaltic function, leading to accumulation of gas and faeces in the proximal portion of the intestine. This leads to the occurrence of obstructions and the abdomen becomes distended.

Clinical Features

The newborn may present with signs of acute intestinal obstruction having failed to pass meconium. The abdomen is distended within a day or so after birth. In older children, there may be constipation, which in some cases alternates with diarrhoea. Toxaemia and dehydration soon result. The infant may die within hours or days, if the problem is not rectified. If the baby lives longer, they may have anaemia and

proteinaemia caused by malabsorption of nutrients.

Diagnostic Evaluation

Diagnostic investigation begins with the compilation of an accurate personal history. This is then followed by a physical examination whereby, on rectal examination, the rectum is empty of faeces, the internal sphincter is tight and leakage of liquid stool and accumulated gas may occur if the affected segment is short. Occasionally, barium enema may be used to confirm the diagnosis.

Management

The baby should be managed according to the severity of the condition, which may be mild, moderate or severe. The symptoms exhibited will be the guiding factor. It may be necessary to improve the child's general health since they might be severely malnourished and dehydrated.

Usually surgical intervention is the only remedy. The operation is called recto sigmoidectomy with temporary colostomy, which may be closed after several months postoperatively depending on the patient's recovery progress.

If the child's general condition is poor, it may be necessary to delay operation to enable the medical team to improve the patient's general health. In this case, a temporary colostomy must be done first. You should constantly reassure and support the parents during this trying time.

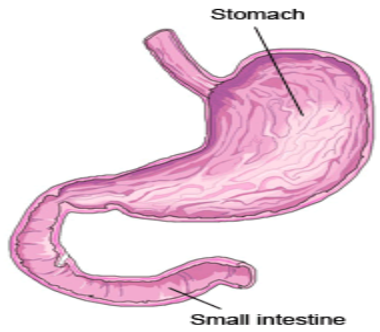
You should prepare and nurse the child as for any other patient who has undergone abdominal surgery including colostomy.

Diarrhoeal Diseases (1 of 13)

This is one of the main paediatric emergencies you may have to deal with. In young children, passage of three or more watery stools, with or without blood, in twenty four hours is referred to as diarrhoea, which is also known as gastro enteritis. The latter technically means inflammation of the stomach and small intestine.

There are two types of diarrhoea: acute diarrhoea mostly caused by infectious agents such as viral, bacterial and parasitic pathogens; and chronic diarrhoea caused by chronic conditions such as malabsorption syndromes, inflammatory bowel disease, immune disease, food allergy, lactose intolerance and chronic non specific diarrhoea or a result of inadequate management of acute infectious diarrhoea.

Diarrhoea in children, especially in developing countries, is still one of the causes of unnecessary deaths. The word unnecessary is used because with a careful approach and proper education, they can be prevented.



Diarrhoea is a very common disease, but cases can be quite easily reduced in simple ways, such as improving nutrition in young children and general standards of hygiene within the community. Additionally, providing adequate hydration early in diseases associated with the symptom is necessary. Lack of hydration is the main cause of death in young children if no urgent action
is undertaken.

The general health of the child is often a predisposing factor. Infants or children who lead a healthy life are less likely to develop diarrhoea than those who are ill and malnourished. The younger the child, the more likely they are to have diarrhoea. Environmental factors should also be taken into consideration. The socio economic status tends to contribute to incidences of diarrhoea in situations where certain facilities such as good sanitation, pure water supply, hygienic food storage, and similar domestic requirements are inadequate.

Pathophysiology of Diarrhoea

Abnormal loss of fluids and electrolytes from the intestines may occur as a result of gastrointestinal disturbance and this leads to diarrhoea. There are three main factors for this loss.

First Factor

The first factor is increased fluid secretion from the intestine. Some micro-organisms such as Vibrio cholerae and Escherichia coli produce toxins, which stimulate salt and water secretion from the absorptive villi cells of the intestine. The bacteria stick to the surface of villi cells without penetrating or destroying the cells. This secretory diarrhoea is very strong and accounts for the severe rise in watery stools and rapid dehydration that is seen in cholera and coli form diarrhoea in infants and children. The intestinal walls are still able to absorb foods and water when the child is given these orally

.

Second Factor

The second factor is poor absorption (malabsorption). Depending on the child's age, about two to eight litres of fluid enter the intestine in twenty-four hours. One quarter of this fluid is ingested from the foodstuff and drinks. The digestive juice produces the rest. Only 50-200 mls of this fluid is absorbed or reabsorbed into the blood stream. The remainder is passed in the faeces. The stimulation or irritation of the intestine results in rapid passage of the bowel contents. This rapidity results in lack of intestinal enzymes to split sugar, which in turn passes to the large intestine. Here it draws water from the surrounding tissues, causing diarrhoea

Third Factor

The third factor is exudation from the intestine. Some pathogenic micro-organisms such as Salmonella typhi normally cause diarrhoea by penetrating the intestinal mucosa, destroying the cells and sometimes gaining access to the bloodstream. Here the mucosa becomes inflamed and exudation (leakage) of fluids containing serum, pus cells, and blood occurs. In some very serious cases, the ulcers bleed heavily and may perforate causing peritonitis as in typhoid fever

Causes of Diarrhoeal Diseases

There are several causes of acute diarrhoea in children. You will now cover some of these causes in greater detail.

Enteral Infections

This group encompasses several micro-organisms and parasites gaining access to the intestinal tract. Some of these are non pathogenic and are usually present within the tract but may change with circumstances to cause diarrhoea. Some of the organisms and intestinal parasites in this category include escherichia coli (e.coli), schistosoma, crystosporidium associated with HIV, entamoeba histolytica, salmonella, vibrio cholerae, shigella. rotavirus and other types of viruses.

Parenteral Infections

Any fever in children, and infections which are unconnected to the gastro intestinal tract, can cause diarrhoea or diarrhoea and vomiting. The diseases which fall under the category of parenteral infections include urinary tract infection, pneumonia, otitis media, tonsillitis, malaria and measles.

Associations

Diarrhoea may be associated with upper respiratory tract infections, urinary tract infections and otitis media.

Dietary

These include overfeeding, introduction of new foods, reinstituting milk too soon after diarrhoeal episode, osmotic sugar from excess sugar in formula, excessive ingestion of sorbitol or fructose.

Medications

Medications such as antibiotics and laxatives may also result in diarrhoea.

Toxics

Resulting from ingestion of heavy metals such as lead and mercury and
organic phosphates.

Functional

Especially Irritable bowel syndrome.

Other Factors

Here the cause may be known or unknown. Causes may include psychological factors, for example, a child who is fearful, anxious and lives under a tense environment may develop diarrhoea due to increased gastro intestinal activities. Acute abdominal problems such as intussusception may result in diarrhoea and/or bloodstained stools. The ingestion of poisonous substances, which include traditional herbal medicine administered in the community, may also be contributing factors. Some children have diarrhoea of unknown origin. Physical and laboratory investigations do not reveal the cause, though in treatment attempts are made to control it just like any other form. Gastro enteritis is associated with feeding defects and vitamin A deficiency.

When a child has developed diarrhoea, investigations should be carried out to exclude parenteral and enteral infections. Dehydration tends to develop very rapidly in children and the degree of this should be carefully assessed. Any dehydration must be corrected.

Clinical Features

- History of diarrhoea and vomiting with recent weight loss
- Dry mouth, lips, tongue, eyes and skin
- Thirst
- Sunken eyes and depression of fontanelle
- Loss of skin elasticity (turgor). Lift up a skinfold over the abdomen or neck and see whether it sinks back slowly. (Note that loss of skin elasticity also occurs in marasmus.)
- Restlessness, apathy (loss of interest in surroundings), coma
- Low urine output
- Rapid acidotic respiration
- Rapid weak pulse

Management of Diarrhoeal Diseases

The major goals in the management of acute diarrhoea include assessment of the fluid and electrolyte imbalance, rehydration, maintenance fluid therapy and reintroduction of adequate diet. As the basis of treatment, the child's condition should be assessed and fluid replacement commenced according to the degree of dehydration. Their nutritional requirements are maintained as soon as is practical. Any parenteral and enteral infections are effectively treated with appropriate antibiotics or drug preparation, whether these infections are either suspected or confirmed.

The child should be kept warm, while their vital signs of temperature, pulse and respiration are monitored for positive improvement or deterioration of the child's condition. The parents should be constantly reassured. An accurate fluid balance chart should be maintained. Pay particular attention to the child's urinary output. The child's personal hygiene must be maintained. Ensure the child has a daily bed bath, regular care of pressure areas and change of beddings when they are soiled.

The nurse in dispensaries and health centres should be on the look out for certain signs, which may dictate the need for referral to the main hospital for further management.

These should include suspected surgical problems such as appendicitis or intussusception or acute dehydration that

cannot be managed in a small health facility within 48 hours.

If a child has had continuous diarrhoea for more than three days where the actual cause cannot be identified, this child requires referral. Likewise, any child with chronic diarrhoea or suspected HIV infection or lactose intolerance ought to be transferred to a well equipped health facility.

Assessment of Dehydration and Fluid Deficit Table

Signs and Symtoms	**Mild Dehydration**	**Moderate Dehydration**	**Severe Dehydration**
General appearance and condition. Infants and young children	Thirsty, alert restless	Thirsty, restless or lethargic but irritable when touched	Drowsy, Limp, cold sweaty Cyanotic extremities Possibly comatose
Radial pulse	Normal rate and volume	Rapid and weak	Rapid, feeble sometimes impalpable
Respiration	Normal	Deep may be rapid	Deep and rapid
Anterior fontanelle	Normal	Sunken	Very sunken
Systolic blood pressure	Normal	Normal-low	Less than 60mmHg or may be unrecordable
Skin elasticity	Pinch retracts immediately	Pinch retracts slowly	Pinch retracts very slowly (2 seconds)
Eyes	Normal	Sunken deeply	Deeply sunken
Tears	Present	Absent	Absent
Mucous membranes	Moist	Dry	Very dry
Urine output	Normal	Reduced amount and dark	None passed for several hours, empty bladder
Body weight loss %	4-5%	6-9m/per kg	10% or more
Estimated fluid deficit	40-50ml/kg	60-90ml/kg	100-110ml/kg

Rehydration

When carrying out the management in terms of principles, the first principle of management is to replace the water and salts already lost in the diarrhoeal stools within the first few hours. This is called rehydration. Rehydration requires the immediate assessment of the severity of the dehydration so as to know first, the amount of water and salt to be given and second, the method by which the water and salt will need to be given.

	Mild dehydration	**Moderate dehydration**	**Severe dehydration**

Method	Oral	Oral (plus i.g tube if necessary)	IV (or IP) plus oral (IG tube if necessary
Fluid	Glucose electrolyte sachets and/or home-made sugar/salt or cereal based fluids	Glucose electrolyte sachets	Half-strength Darrow's solution
Rehydration phase (first 4 hours)	50ml/kg plus 100ml/stool or vomit	100ml/kg plus 100ml/stool or vomit	100-150ml/kg (50ml/kg in first hour) plus 100ml/stool or vomit
Maintenance phase	100ml/kg plus 100ml/stool or vomit	100-150ml/kg plus 100ml/stool or vomit	150-200ml/kg (oral replacing i.v slowly)plus 100ml/stool or vomit

Maintenance

The second principle of management is to replace the water and salts as long as the diarrhoea continues, day by day, so that the child does not become dehydrated again. This is called maintenance of hydration. Maintenance of fluid therapy consists of three components:

1. Normal maintenance requirements – the amount of fluid needed daily, whether the child is sick or not.
2. Repair fluid – the amount of fluid already lost; this has to be added as long as there is any clinical dehydration present.
3. Extra replacement fluid – for the extra fluid that is going to be lost in the next 24 hours as long as there is diarrhoea, vomiting or fever.

The route used is either orally or intravenously but oral route should always be used unless the child is severely dehydrated and showing signs of shock.

Sustenance

The third principle of management is to feed the usual diet such as breast milk, cereals or weaning food as soon as the child will take it.

Provided that there are no complications or other infections, this is usually possible when rehydration is successfully completed after the first four hours. This is called sustenance because it sustains the child's nutritional status.

Preventive Measures

Health education is the most important approach to
prevention of diarrhoeal diseases in any community.
It should, however, be recognised that as much as

the health care worker can actively provide health education, some of the problems are socio-economic in nature and ought to be handled in cooperation with governmental organisations and community leaders.

These are some of the issues, which should be included when giving health education on diarrhoeal diseases. All mothers should be encouraged to breast feed their babies for several months even after introducing them to other meals. As children grow, proper weaning procedures should be introduced to the mother, so that she is aware when and how it should be done.

More emphasis should be placed on the importance of hand washing before and after meals and also after visiting the toilet. It ought to be a habit formation for everybody regardless of age and sex. To minimise further infections, feeding utensils should be clean and food handled in the most hygienic manner. Parents should avoid using bottles as a means of feeding children. Instead they should use cups and spoons.

Fly breeding environments should be eradicated by proper disposal of refuse. All members of the community must make use of latrine facilities. All drinking water should be collected from a safe source and should be boiled. Nutritional improvement should be considered for all, with a special emphasis on growing children. Children should be taken to health facilities for a comprehensive vaccination programme.

Early treatment of diarrhoea should be enforced in all health facilities. Sharing of relevant health messages should be intensified with emphasis on giving of plenty of oral fluids when diarrhoea occurs, when mothers bring their children for clinic follow up, and in hospital wards before discharge.

Rehydration Kit for Demonstration

A rehydration kit should always contain:

- Water container, possibly a pot with clean water and cover
- Mugs, cups and spoons
- Maize meal and rice
- ORS (Oral Rehydration Salts) sachets in sufficient supply (alternatively salt and sugar in airtight containers)

The nurse or health care worker should demonstrate how to prepare a home made solution. An experienced mother among those present may be requested to demonstrate for her colleagues if she has previously undertaken such exercise. Each and every mother should be encouraged to perform a return demonstration and asked to taste what they have prepared.

Hookworm (Necator or Ancylostoma) (1 of 7)

To begin with, intestinal worms are an indication of poor sanitation.

The Parasite

Adult worms, which are about 1cm long, live in the upper part of the small intestine. Their heads are attached to the wall of the intestine by hooks. They feed by sucking blood and protein from the patient.

The adults pass eggs (ova) into the faeces. If the faeces are left in warm, moist surroundings the eggs develop into larvae. These larvae are mobile and able to penetrate human skin if they come into contact with it. In this way the hookworms are passed from person to person. The larvae pass via the lymphatics and bloodstream to the lungs. Finally they migrate up the trachea, are swallowed and reach the small intestine, where they grow to be adults.

Clinical Features

A few hookworms in a well nourished child do not cause any sickness as the small amount of blood loss can be replaced. Sometimes when the larvae are passing through the lungs, they irritate the lungs and cause a temporary cough and wheezing. Blood examination at this stage of the life cycle shows an eosinophilia (white blood cells that contain granules staining pink with eosin and that increases in numbers in allergic diseases).

In hookworm disease there is chronic anaemia caused by a
heavy infestation.

The degree of anaemia is dependent on:

- The number of worms present (and so the amount of blood and protein sucked)
- The child's nutrition. In malnourished children the iron intake, iron reserve and body protein are usually already reduced. In heavy infestations, the anaemia slowly becomes more severe and, especially in malnourished children, tiredness, pallor, swelling (oedema) and breathlessness with heart failure
  may develop.

Diagnosis of Hookworm Disease

- Hypochronic anaemia (Hb less than 10g/dl)
- Many hookworm eggs seen in the stool specimen

Treatment

Iron deficiency anaemia is treated with iron orally. Give ferrous sulphate for children, three times daily for children over six years, preferably between meals. If the anaemia is severe (below 7 g/dl Hb), or if the child is unlikely to take oral iron for long enough, intramuscular iron is given.

Total dose of intramuscular iron (Imferon or Jectofer) in mg = weight in kg x (14 Hb in G/100ml) x 3.

1 ml Imferon or Jectofer contains 50mg iron. An average dose would be 20mg iron/kg = 0.4ml Imferon or Jectofer/kg.

This total amount is given in 50-100mg doses (1-2ml) IM every other day. Blood tranfusion is rarely necessary.

A high energy and high protein diet is necessary in all cases of hookworm anaemia to replace protein and calorie loss. Educate the mothers on available high protein energy foods (eggs, milk, meat, fish, and beans).

Deworming: the primary objective of deworming treatment is to reduce the worm load of an individual child to an insignificant level, not necessarily to eradicate the infestation. There is evidence that the presence of a few worms maintains an immunity by which a balance of power is reached. The body learns to live in health (symbiosis) with a very small number of parasites.

A further objective is to reduce the worm load within the community and thus the

infection pressure to which new arrivals or treated individuals are exposed.

There is a situation in which total eradication of the worm infestation in individuals may be required, for instance, in a child returning to a situation where there is no transmission of infestation, although even here the worm infestation eventually dies out.

The presence of new broad spectrum anthelminthics has changed the management of many helminthic infections considerably, especially when control rather than eradication is required. A single dose of one of the following drugs administered to everyone will effectively control the infestation within a community and almost completely eradicate the disease for many months to a year or more.

Albendazole 400mg in a single dose or mebendazole 100mg twice a day for three days are the treatments of choice (the doses should be halved in children under two years of age).

Levamisole (ketrax) in a single dose of 3mg/kg
Bephenuim (alcopar)
Give a single dose of 2.5g in children up to 15kg
Give a single dose of 5.0g in bigger children
Pyrantel (combantrin)
Give a single dose of 10mg/kg (to a maximum of 1g)

Health education is an essential part of the treatment. If you just deworm, a child will return to the same environment and immediately get reinfected.

Albendazole, mebendazole, levamisole, bephenium and pyrantel are suitable in mixed infections with roundworms.

Prevention

- Health education: teach the mothers how the disease is spread, so that they will not allow children to walk on contaminated soil or to pass stools on the ground
- Latrines: much health education is needed before these are properly used; an improperly used latrine is worse than no latrine at all
- Wearing of sandals by older children
- Deworming campaigns: single doses of broad-spectrum anthelminthics are now being used to cover many of the common worms, particularly hookworms and roundworm:
  Albendazole 400mg (200mg under two years of age)
  Mebendazole 400 mg (200mg under two years of age)
  Levamisole (ketrax) 3mg/kg
  Pyrantel (combantrin) 10mg/kg

These campaigns should be accompanied by sanitation programmes to reduce reinfestation.

Roundworm (Ascaris) (1 of 4)

The Parasite

The adult worms are large, about 30cm long, and live throughout the small intestines.

Eggs are passed in the stool and may contaminate the ground or uncooked

vegetables. The eggs survive best in moist shady soil. If a human swallows these eggs, they develop into larvae. These larvae bore into the wall of the small intestines and are carried by the circulation to the lungs, penetrate into the alveoli, ascend the bronchi and trachea, and are swallowed into the intestines again, where they mature into adult worms.

Clinical Features

- A few roundworms in a well fed child usually will cause no trouble at all, although parents usually become alarmed if the child passes a worm in the stool or vomits them up. Occasionally, mild abdominal pains, loose stools or vomiting may occur.
- Temporary cough and eosinophilia may occur during the migration of the larvae through the lungs (as with hookworm larvae).
- Intestinal obstruction is a serious complication of heavy roundworm infestation; a tangled ball forms, usually at the narrowest part of the intestine, the iliocecal junction, where the small intestine enters into the large intestine. The child is ill with abdominal pains, constipation, vomiting, abdominal distension and an abdominal lump. If obstruction is complete, urgent surgery is needed.
- Wandering roundworms may leave the small intestines and go to unusual places: into the stomach, where they may be vomited, into the larynx causing difficulty in breathing, into the peritoneal cavity (by perforating the intestine) causing peritonitis, rarely into the bile duct, causing jaundice or liver abscess.
- Effect on nutrition: very heavy infestation will lead to malnutrition, especially in poorly nourished children, as the worms eat the child's food.

Diagnosis

Ascaris eggs seen in the stool on microscopic examination, or the passing of adult worms.

Treatment

Deworming with one of following:

- Albendazole 400mg in a single dose (200mg under two years of age)
- Mebendazole 100mg twice a day for three days as in hookworm infestation
- Piperazine (antepar) as syrup or tablet. Dose: 150mg/kg in a single dose orally up to maximum of 4g
- Levamisole (ketrax) 3mg/kg as a single dose
- Pyrantel (combantrin) 10mg/kg as a single dose

In incomplete obstruction:

- Fluids only by mouth, pass a gastric tube
- Give a high tap water, or preferably normal saline, enema twice a day
- Piperazine as above by intragastric tube

In complete intestinal obstruction:

- Try milking the worms by gentle intermittent palpation
- Maintain fluid intake intravenously (100mg/kg/24hours)
- Urgent surgery if no relief after a few hours
- Pass a gastric tube, no piperazine

Prevention

- Health education (clean hands)
- Proper disposal of faeces

- Deworming campaigns as in hookworm infestation

Tapeworm (Taenia Saginata or T. Solium)

The Parasite

Tapeworm infestation occurs from eating undercooked meat (beef or pork). It is a common infestation in cattle breeding communities. Pork tapeworm is rare in East Africa. The adult worms measure up to 10 metres long. There are usually no complaints until the flat moving white segments are passed in the stool. Malnutrition can occur in poorly fed children.

Treatment

Deworming:

- Praziquantel in a single dose of 20mg/kg
- Niclosamide (Yomesan) 2g (four tablets) are given in two divided doses, one hour apart, on an empty stomach; children under six years – 1g (two tablets)
- Albendazole 400 mg in a single dose (200mg in children under two years of age)

Prevention

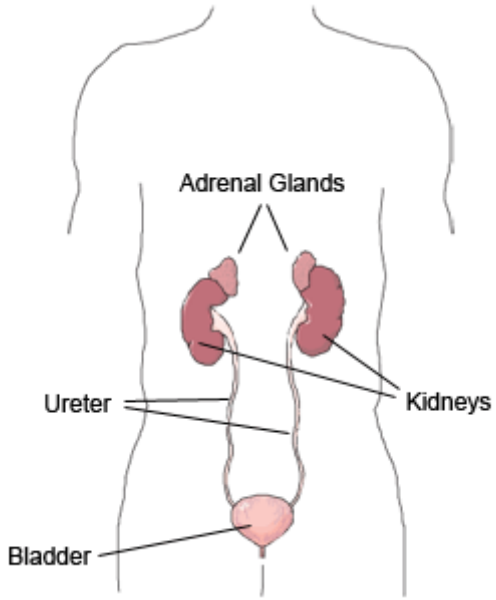
Tapeworm can be prevented if all beef and pork is eaten only after it has been fully and thoroughly cooked. Cooking destroys the infective stages of the tapeworm, which are in the meat (muscles) of the intermediate hosts (cattle or pigs).

Section 3: Urinary Tract Problems and Disorders

Introduction

In this section, you are going to look at some diseases and conditions that are related to the urinary tract.

Section 3:
Urinary Tract Problems and Disorders



Objectives

By the end of this section you will be able to:

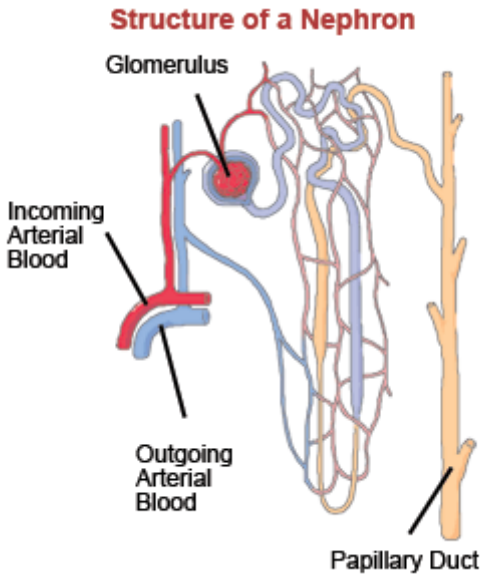
- Define and list the common urinary tract problems
  and disorders
- Describe causes and clinical features of the most common urinary tract dysfunctions
- Describe the nursing care and medical management in relation to urinary tract dysfunctions

Acute Glomerulonephritis (Acute Nephritis) (1 of 5)

This is a disease that affects the glomeruli of both kidneys. It may follow exposure to a variety of foreign protein substances, the most common of which are bacterial (haemolytic streptococci) and viral infections. Note that, it is not the streptococci that cause the problem directly but their toxin/poisonous products. However in many cases the antigen causing glomerulonephritis is unknown.

Pathophysiology

The condition is as a result of an antigen antibody complex reacting with the glomerular tissue to produce swelling and death of capillary cells. The organism causes sore throat or skin disease initially; then ten to fourteen days later, an allergic inflammation occurs in the kidneys. It tends to occur more commonly in children and young adults. Recovery is complete in over 95% of cases



Clinical Features

Some of the characteristics to look for in patients presenting with acute nephritis include:

- History of sore throat seven to ten days earlier
- The patient has fatigue (tiredness)
- Complaints of pyrexia and tachycardia present
- Hypertension with mild, moderate, severe headache
- Oedema, which may be generalised but more noticeable in the face. This is due to salt and water retention. In a few cases ascites/pleural effusion may be present
- Oliguria
- Haematuria
- Proteinuria
- Dyspnoea due to pulmonary oedema
- Uraemia, that is, blood urea and creatinine raised above normal (normal blood urea is 15-40mg/100mls)
- Anorexia is usually present

Nursing Management

The following points are important in the management of the condition. The patient should be put on complete bed rest in a warm well ventilated room until their temperature subsides, the blood pressure (BP) falls and no blood or protein is visible in the urine.

Vital signs should be recorded four hourly. Any abnormalities should be reported. BP should be taken lying down and standing to exclude postural hypotension. You should maintain an input and output chart.

Restrict the patient's fluid intake to 20mls/kg/day plus the amount of urine passed during that period until diuresis occurs. Aim to lessen kidney activity. All urine should be tested four hourly for protein and blood. Twenty four hour urine collection to estimate the amount of protein lost in the urine may be sent to the laboratory. Esbach's urine testing at the ward level may also be performed 24 hourly.

Diseased kidneys need rest, therefore, a low protein diet is recommended (40g daily).

Nursing Management

More carbohydrates should be consumed, such as glucose and orange drinks. A normal diet is gradually resumed according to the urinary output. The patient should be weighed once daily as a means of determining whether the oedema is decreasing. Ensure that you pay special attention to the hygiene of the skin, mouth and pressure areas.

Occupational therapy and psychological care are also important. The child should be occupied by playing or reading in bed as they will feel bored and need reassurance. Parents should also be involved in the care for their child and should also be constantly reassured.

While providing nursing care for the patient, you should be aware of the main complications that may present, which in this case are chronic nephritis and acute or chronic renal failure.

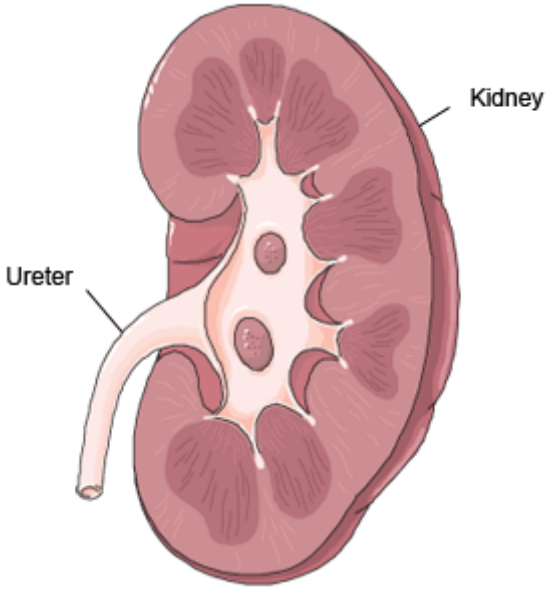
Complications can include:

- Severe hypertension
- Cardiac failure due to increased blood volume
- Convulsions
- Acute renal failure with raised urea and creatinine levels

Nephrotic Syndrome (1 of 5)

This term refers to a condition involving increased permeability of the glomeruli. It is associated with a variety of renal diseases generally characterised by oedema, proteinuria and low serum albumin(albuminuria). It affects children and adults alike.

When the kidney fails to perform its normal function of filtration, there is an excessive loss of protein in the urine. This loss of protein leads to low serum albumin. Low serum albumin causes a low osmotic pressure in the blood. This consequently results in generalised oedema.



In 75% of cases in childhood, the cause is unknown (idiopathic).The remaining 25% cases occur as part of variety of disorders.

These include:

- Glomerulonephritis, which is an inflammation of the kidney glomeruli (filtrate)
- Amyloidosis, which is a condition leading to an accumulation of starchlike substances in various body tissues. Causes of these are unknown
- Diabetic nephropathy, that is, a degenerative condition of the kidneys due to diabetes
- Acute infections with septicaemia
- Drug overdose, for example, of sulphur drugs
- Allergy and poisons, for example, lead, mercury, gold
- Renal vein thrombosis
- Severe malaria
- Bee stings
- Lupus
- Hepatitis B

Clinical Features

A patient with nephrotic syndrome may present with some of the following symptoms:

- Oedema, which results because of salt and water retention
- Puffy eyes in the morning
- Swollen feet and ankles later in the day and the patient may also have swollen genitalia
- Susceptibility to infection
- Pyrexia and tachycardia whose degree depends on the extent of onset of infection
- Proteinuria (loss of protein in urine) usually confirmed by testing urine and to the naked eye urine appears dark
- There may be blood in urine
- Blood pressure is normal in idiosyncratic cases (but may be raised in other cases)

Investigations

Medical investigations will include a daily Esbach test, routine examination of urine, urine culture and sensitivity. You should also test for blood HB, haemogram, WBC, casts, culture and sensitivity, urea, electrolytes, ESR and plasma protein levels.

Management

The patient should be nursed in Fowler's position and you should take precautions to prevent pressure sores. Bed rest should be prescribed if the oedema is severe. Otherwise, the child should be allowed to move around.

Diuretics, for example, frusemide (lasix), are normally administered to reduce the oedema. Potassium chloride is given in order to prevent potassium loss due to the lasix. Corticosteroids, for example, prednisone is given and continued until the urine is free from protein and remains normal for 10 days to two weeks. Immunosuppressant drugs, for example, cyclophosphamide is recommended if a relapse occurs after prednisone.
A weekly WBC is also necessary, particularly if the patient is on cyclophosphamide.

Management

Give the patient meals that are high in protein and carbohydrates and low in salt. Restrict fluid intake and maintain fluid chart strictly. Weigh daily to assess degree of oedema. You should set Esbach 24 hourly, or alternatively, send urine to laboratory for protein loss estimate. In addition, you should observe TPR and BP four hourly and ensure that good hygiene is maintained.

Do your best to involve the parents in the care, and share relevant health messages during all stages of the nursing process.

Urinary Tract Infection (1 of 5)

This infection occurs in infancy affecting both girls
and boys equally. In the first years of life, however,
more girls than boys are infected because the former tend to have shorter urethra. Children tend to
suffer more from lower urinary infections, that is,
infections of the urethra and bladder.

The micro-organisms commonly responsible for
urinary tract infection are Escherichia coli (E. coli).
They ascend from the vulva and urethra to the
bladder. Occasionally, as the problem develops,
the ureters and renal pelvis are involved resulting in
pyelonephritis.

There are many predisposing factors, but only a few
are directly responsible for childhood urinary tract
infections. These include congenital abnormalities
of the renal tract, especially those that interfere with
the flow of urine, for example, hypospadias and epispadias. Meningomyelocele and paralysis of the urinary bladder, especially those associated with spinal injuries (paraplegia) are also common causes. Unrecognised phimosis and local infections due to injuries caused by children playing or inserting foreign bodies into their own genitalia may also be causal factors.

Pathophysiology

The *Escherichia coli* (E. coli) is the most common causative micro-organism but others may also
be responsible.

The infection begins in the lower portion of the urinary tract, causing inflammatory

changes and involving the sphincter valve at the base of
the bladder.

This makes the valve incompetent and results in urinary reflux to the ureters. The reflux allows upper urinary tract infections to occur, causing a gradual dilatation of the renal pelvis. Recurrent bladder infections cause tissue irritation, which makes the patient have desire to frequently micturate.

Clinical Features

The patient with a urinary tract infection will present with some of the following symptoms:

- There will be burning painful micturition (dysuria)
- Lower abdominal pain and desire to pass urine
  more frequently
- The patient is pyrexial and irritable
- An unexplained persistent fever
- Diarrhoea and/or vomiting
- The child is usually restless and unable to sleep at night. They may cry frequently
- Urine passed may have foul smell and be bloodstained
- Loss of appetite

Diagnostic Investigation

Commence by taking a concise personal history from the parents, guardians or older siblings. Carry out a physical examination and order a laboratory urinalysis for microscopy culture and sensitivity, blood and albumen.

Nursing Management

Unless the child looks very ill with high temperature, they should be managed at home as an outpatient.

If in hospital, the child should be nursed on bed rest until they are apyrexial. Temperature, pulse and respiration are taken and recorded four hourly.

You should report any abnormalities to the doctor as soon as possible. The child should be given plenty of oral fluids to flush the urinary system. A fluid balance chart should be maintained.

General skin hygiene, especially in the genital area should be emphasised. A high protein diet should be encouraged. Oral toilet on a four hourly basis is also maintained. In case there are indications of chronic urinary tract infections, an x-ray investigation of the renal system must be performed.

Medical Treatment

The following medication may be prescribed:

Septrin (co-trimoxazole) syrup

Dosage: Six weeks to five months – 120mg BD x 14 days.

Six months to five years – 240mg BD x 14 days.

Sulphadimidine mixture/tablets

Dosage: 100mg/kg per day six hourly x 14 days.

Nitrofurantoin(furadantin)

Dosage: 3 - 5mg/kg tds up to 400mg per day x 7 days.

Other antibiotics

Amoxycillin 50mg/kg per day (in divided dose

given qid).
Ampicillin 50mg/kg per day (in divided dose given qid).

Wilm's Tumour (Nephroblastoma) (1 of 6)

This is one of the most common childhood tumours.

The tumour is usually unilateral but may occasionally be bilateral. It is often malignant and spreads very rapidly. Metastasis tends to occur early in the lungs and prognosis is grave. However, if diagnosed early, about 4% are cured by surgical intervention, chemotherapy and deep x-ray therapy.

Clinical Features

When diagnosing a patient with nephroblastoma, the following characteristics should be kept in mind:

- In early stages it is symptomatic
- The condition occurs in the first three years of life
- The child is usually brought to hospital because of gross abdominal enlargement and pain
- Renal colic and haematuria
- Urinary suppression and urinary infection
- Anaemia and growth failure
- Later there may be urethral obstruction

Diagnostic Investigations

Proper diagnostic investigations should always begin with accurate history taking. This should be followed by a careful physical examination, which should include an intravenous pyelogram, cystoscopy to exclude ureteric involvement, abdominal and chest x-ray to assess the extent of metastasis and blood tests for full blood count, haemoglobin, grouping and cross matching.

Management

The condition is best managed by a
Nephrectomy or
Nephro uterectomy.

Preoperative Care

This should be commenced as soon as the diagnosis is confirmed. The patient should be nursed on bed rest while the investigations and management are being organised. An intravenous pyelogram is aimed at detecting whether the renal pelvis is distorted and the kidney displaced. Abdominal palpation should be carried out carefully and kept to a minimum to prevent the systemic spread of cancer cells to the renal veins.

The patient is prepared for nephrectomy or nephro uterectomy, the latter being very extensive.
A blood transfusion should be given to correct anaemia before surgery and during the operation.

Postoperative Management

The nurse must make every effort to prevent infections, to accurately observe and record fluid intake and output and to selectively manage the patient's dietary intake.

On return from the theatre, the child is nursed in semi prone position and the airway cleared to ensure adequate ventilation. After recovery, they should be nursed in recumbent and finally upright position to facilitate drainage from the nephrectomy bed. Clinical observations of TPR/BP and general appearance should be recorded every one to four hours as the condition improves. Specific observations include drainage from redivac, corrugated tube and wound. Strict urinary output is observed, recorded and reported to the doctor. A fluid balance chart should be accurately maintained.

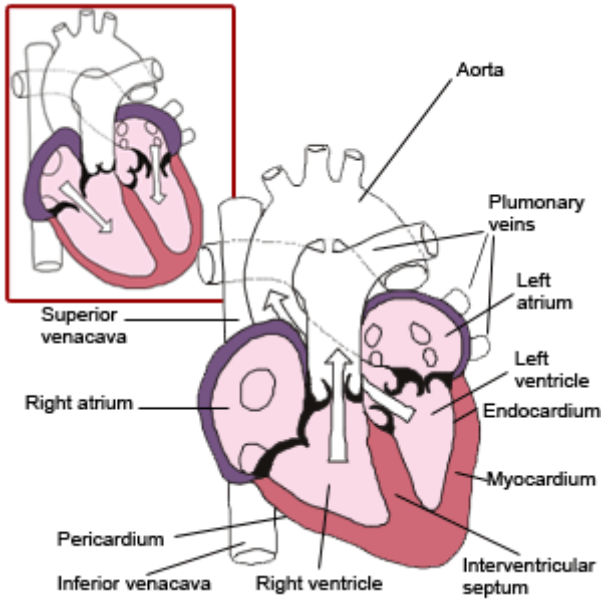
If oedema or oliguria is found to be present, you should restrict fluid intake. If stones have formed in the renal system, or there is an onset of infection, you should increase the fluid intake. This however must be done in consultation with the doctor. The patient should be given low salt and low protein diet for oedematous and uraemic patients, while the carbohydrate intake should be increased.

Regular blood tests are necessary to monitor electrolyte levels, haemoglobin, blood urea and creatinine. Naso gastric tube aspiration in the early stages is necessary, especially when the patient feels nauseated. Oxygen therapy is recommended but only when necessary. Strict oral toilet should be maintained four hourly throughout. Physiotherapy and early ambulation should be encouraged to prevent complications.

Section 4: Cardiovascular Disorders

Introduction

You are now going to look at diseases of the heart and the vascular system.



Objectives

By the end of this section you will be able to:

- Define and list the common diseases of the cardiovascular system
- Describe causes and clinical features of the most common cardiovascular system diseases
- Describe the nursing care and medical management in relation to the cardiovascular system diseases
- Identify possible complications that may arise

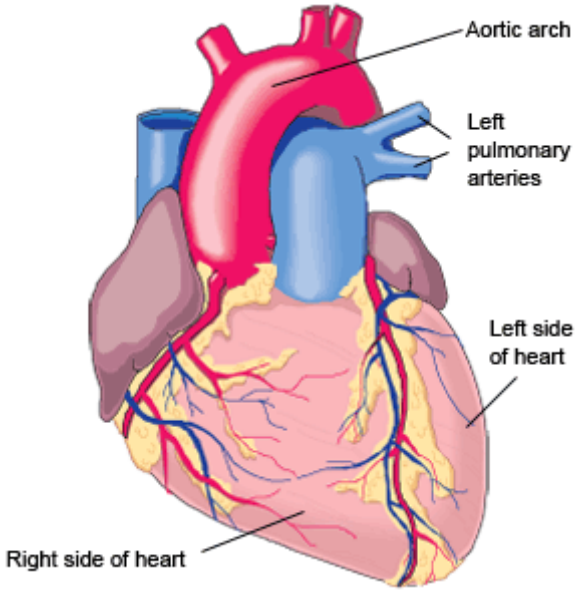
As with the other systems, cardiovascular problems may be congenital or acquired.

Congenital Heart Failure (1 of 17)

Congenital heart failure is the major cause of death (other than prematurity) in the first year of life.

The most common is the ventricular septal defect. Congenital heart defects lead to heart failure. In foetal life, much of the pulmonary arterial blood is passed through the ductus arteriosus to the aorta (carrying blood of mixed gases). This is because the pressure on the right side of the heart is higher than the pressure within the aorta.

At birth the wall muscles of the ductus arteriosus constrict in readiness to close. Complete closure may not occur sometimes until the second or third month of life. Soon after birth, the pressure on the left chambers of the heart becomes higher than that on the right side.



Pathophysiology

The foetal heart is completely developed in the first eight weeks of pregnancy. At this stage, one of several anomalies may occur from mal-development of the heart or the great blood vessels, leading to heart disease.

Such defects may be hereditary, caused by inherent
genetic defects. They may also be caused by a vitamin deficiency or viral infection such as rubella
(German measles) occurring in the first three months of pregnancy. Foetal intra cardiac disease
is possible.

After birth, there may be failure of closure of the
ductus arteriosus. Other factors known to contribute to these abnormalities are the effects
of radiation and drugs such as thalidomide, phenytoin, sodium and alcohol. Cardiovascular malformation is known to

occur in about eight per 1000 births. It causes about half of the deaths due to congenital defects in the first year of life.

Common Heart Defects

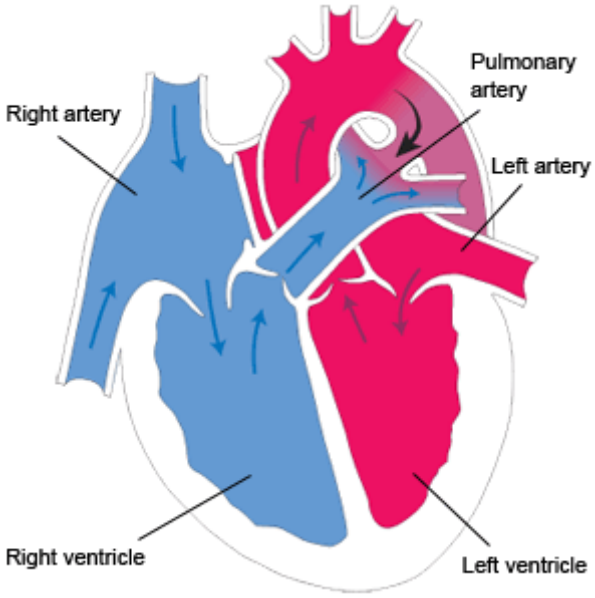
There are several types of heart defects. These include:

- Patent ductus arteriosus
- Coarctation of the aorta
- Ventricular septic defect
- Atrial septic defect
- Aortic stenosis
- Transposition of the great blood vessels

Patent Ductus Arteriosus (PDA)

The collateral circulation in infants is normal when blood flows from the bifurcation of the pulmonary artery to the descending thoracic aorta. At birth due to constriction and change of pressures on both sides, the ductus degenerate to what is called ligamentum arteriosum within 24-72 hours. When this ductus arteriosus does not close, oxygenated blood from the aorta flows to the pulmonary artery, mixing with the deoxygenated blood there. A large PDA will result in heart failure with all its complications.

It is twice as common in female babies as in males (ratio 2:1). Reasons for its occurrence are unclear. In most cases, the diagnosis may not be made until the child is three to four years old, when the heart murmur may be detected on a routine medical check up.



Clinical Manifestations

Patients may be asymptomatic or show signs of congestive heart failure. There is a characteristic machinery like murmur. A widened pulse pressure and bounding pulses result from runoff of blood from the aorta to the pulmonary artery. Patients are at risk of bacterial endocarditis and pulmonary vascular obstructive disease in later life from chronic excessive pulmonary blood flow.

Management

Administration of indomethacin (prostaglandin inhibitor) has proved successful in closing a patent ductus in premature infants and some newborns. Surgical intervention is also possible in correcting this condition. Closure with placement of an occluder device during cardiac catheterisation is done in some places.

Coarctation of the Aorta

This is a localised narrowing near the insertion of the ductus arteriosus, resulting in increased pressure proximal to the defect (head and upper extremities) and decreased pressure distal to the obstruction (body and lower extremities). It is also a localised malformation caused by deformity of the aorta resulting in the narrowing of the lumen of that vessel.

There are two types of malformation: the infantile or pre ductal type, where constriction occurs between the sub clavian artery and the ductus arteriosus and the post ductal type, where constriction occurs at or distal to the ductus arteriosus.

This condition presents clinically in the following manner:

- Since there is increased pressure proximal to the defect and decreased pressure distal to the defect, the patient becomes hypertensive
- Headache, dizziness and fainting
- Epistaxis and later cerebral vascular accident (stroke)
- Pulse rate in the lower limbs is very low. The legs are colder than the arms. Any active exercise results in cramps of the lower limbs due to tissue anoxia
- Heart murmur may or may not be present

The condition is managed through surgical repair (corctectomy) before adulthood. It involves removal of narrow areas followed by anastomosis. Prognosis is usually good.

Atrial Septal Defect (ASD)

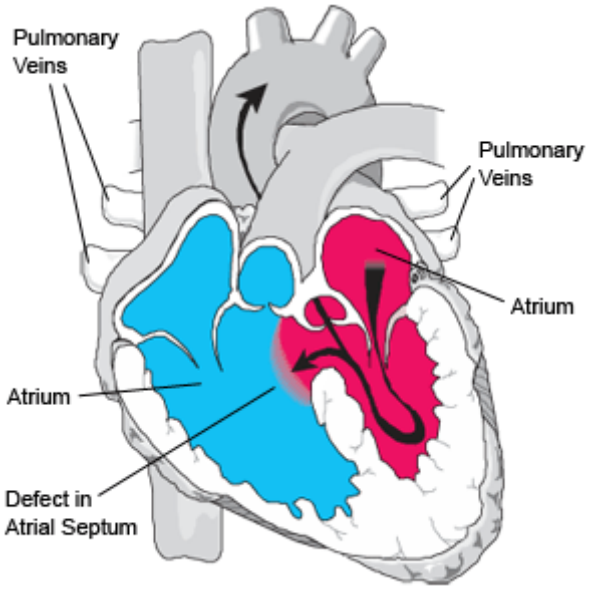
This is a defect whereby the blood shunts from the left atrium to the right atrium under pressure from the left side of the heart or an abnormal opening between the atria, allowing blood from the higher pressure left atrium to flow into the lower pressure right atrium. This results in increased right ventricular output and pulmonary engorgement.

This condition is usually discovered on routine medical examination when systolic pressure is found to have a blowing murmur in the area of pulmonary artery. Children suffering from atrial septal defects tend to be susceptible to pneumonia and rheumatic fever.

They are of three types:

1. ASD 1 – Opening at lower end of septum; may be associated with mitral valve abnormalities
2. ASD 2 – Opening near centre of septum
3. Sinus venosus defect – Opening near junction of superior vena cava and right atrium; may be associated with partial anomalous pulmonary venous connection

Management of this condition involves surgical repair either through close or open heart surgery.



Ventricular Septal Defect (VSD)

This is an abnormal opening between the right and the left ventricles. If the defect is large enough, the blood flows from the left ventricle to the right ventricle resulting in right ventricular overload and hypertrophy. The small openings tend to close spontaneously.

Manifestations

A child suffering from this condition will present with:

- Dyspnoea and tachypnea
- Frequent upper respiratory infections
- Growth developmental failure
- Mild cyanosis when the child cries
- Congestive heart failure is common

Diagnostic Investigations

Diagnostic investigation is mainly done through cardiac catheterisation and chest x-ray, which will show cardiomegally. Management requires open heart surgical repair with the aid of heart lung machine (cardiac pulmonary bypass). Hypothermia is used before and during operation. Post operative care is carried out in the Intensive Care Unit.

Mitral Stenosis

This is narrowing of the mitral valve. It may either be congenital or acquired. If it is acquired, it is associated with rheumatic heart disease. Clinical features include breathlessness on exertion, repeated respiratory infections and growth failure.

Management procedures require open heart surgery involving the use of heart lung machine or cardiac by pass machine. Intensive post operative care will have to be carried out in the Intensive Care Unit.

Aortic Stenosis

A congenital aortic stenosis is the narrowing of the aortic semi lunar valve caused by an obstructive lesion. This hinders the normal blood flow from the left ventricle to the aorta. It is more common in male babies than the females. The thickening of the semilunar valves results in stenosis.

Pathophysiology

The aortic stenosis causes over dilation of the left ventricle and back flow of blood to the left atrium via the mitral valve. The backpressure is further extended to the pulmonary veins resulting in pulmonary vascular congestion.

Clinical features of the condition include:

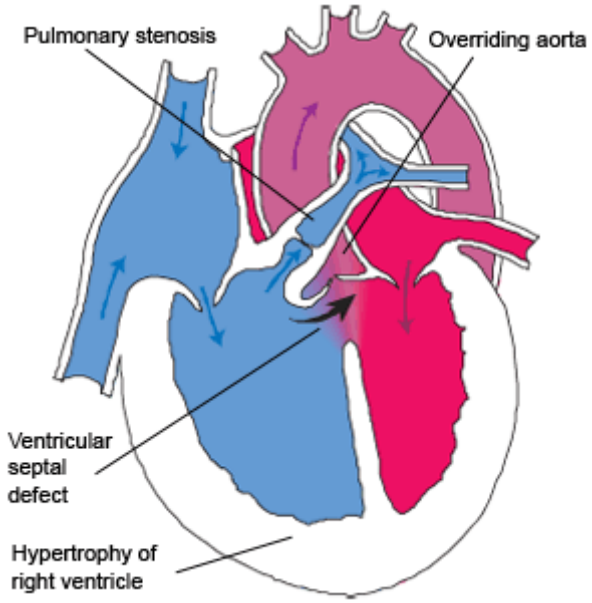
- Growth failure in severe cases but could be normal in
  mild cases
- Cardiomegally, more marked on the left side of the heart
- The patient is fatigued due to exercise intolerance
- Dizziness and fainting may occur
- Pulmonary oedema may be experienced
- Chest pain and cardiac murmur

The management of the condition entails surgical intervention by operation called valvotomy, which is a method of dividing the fused flaps of the valve. Prosthesis may be required in some cases (valve replacement). Open heart surgery is undertaken so that the valve can be seen directly. Postoperative management is best carried out in the intensive care unit with the appropriate equipment.

Fallot's Tetralogy

This is the most common type of congenital heart disease. It varies in severity but is characterised by a combination of four defects presenting themselves at the same time. These defects are:

- Pulmonary artery stenosis
- Ventricular septal defect
- Overriding aorta (dextroposition)
- Hypertrophy of the right ventricle



Pathophysiology

In this condition, the blood from the systemic circulation returning to the right atrium and right ventricle is restricted by the pulmonary stenosis so that it flows through the ventricular septal defect into the left ventricle and then to the aorta (right to left shunt). The pressure exerted against the pulmonary stenosis leads to right ventricular hypertrophy.

Since the blood from the right ventricle is deoxygenated, the child becomes cyanosed. Although the blood cannot leave the right ventricle the normal way, the pulmonary blood flow may be increased by pulmonary collateral circulation and sometimes by ductus arteriosus.

Section 4:
Cardiovascular Disorders

The body will attempt to compensate for the deoxygenated blood by producing more red blood cells which will result in an increase of red blood cells (polycythaemia). This will lead to an increased blood viscosity, hence thrombophlebitis, emboli or stroke (cerebral vascular accident).

Clinical Features

- Cyanosis, which may be mild or severe and occur depending on the degree of the defect. If blood shunts from the right side to the left side of the heart, the cyanosis will be more marked and noticeable on the mucous membranes of the lips, mouth, pharynx and fingernails.
- Dyspnoea, due to pulmonary oedema and increased carbon-dioxide level in the blood (systemic anoxia).
- Polycythaemia (excessive rise of red blood cells in the circulation). This increases blood viscosity resulting into arterial thrombosis, which may block the vessels supplying the brain with blood and result in growth failure.
- Clubbing of fingers and toes may be present after the first year of life.
- Cardiac murmur is recognised during medical examination, especially when stenosis is present.

Management

Depending on the child's condition the management can be divided into two categories.

Palliative Surgery

This is a temporary approach used when the patient's condition does not allow for corrective surgery. There are several methods involved. The first is the Waterston shunt side to side anastomosis of the ascending thoracic aorta and right pulmonary artery. The Blalock Taussig procedure is commonly used for older infants and children. In this procedure, the sub clavian artery is joined to the pulmonary artery. Finally Pott's procedure involves joining the upper descending aorta to the left pulmonary artery.

Corrective Surgery

This operation requires the use of deep hypothermia and cardio pulmonary by pass approach for young children and heart lung by-pass for the older children. Transposition of the great vessels is performed. These activities are undertaken in special health facilities with intensive care units.

Cardiac Surgery

Preoperative Care

You should admit the patient several days before the planned operation date. The patient is received into special hospital cardiac unit so that an assessment may be carried out. History taking and physical examinations are undertaken in a quiet, calm environment.

Preoperative radiological and laboratory investigations are carried out and any shortcomings rectified before the operation day. These include blood chemistry, grouping, cross matching and so on. Blood prepared for transfusion should be kept ready. Electrocardiography and renal assessment are conducted too.

Baseline observations of the vital signs, to include weight and height, are recorded and maintained. Any illnesses, such as respiratory tract, dental, urinary tract or skin infections, are treated with antibiotics. The physiotherapist begins therapy to prepare the child for activities that will have to be continued post operatively. Being a minor, the guardians/parents will be requested to sign a consent form permitting the surgery to proceed.

Postoperative Care

The patient is transferred from the operating theatre to the intensive care unit with several attachments, which include an intercostal underwater seal drainage tube, naso gastric tube, intravenous drip (infusion or transfusion) and urinary catheter, which may be in situ in addition to a cardiac monitor. You must observe these as necessary and keep up to date records on the charts provided.

Vital sign observations, fluid intake and output and central venous pressure must be strictly monitored to detect any abnormalities. A nursing care plan should be prepared to allow for a period of rest in between other activities. Physiotherapy plays a very vital part of this child's care. It includes postural drainage, coughing for older children, limb exercises, regular changes of position and care of pressure areas. In about two to three days most of the attachments are removed and the child should be transferred to a general surgical ward. Analgesics, anti emetics and antibiotics should be administered as ordered. Mechanical ventilation through endo tracheal tube will have been employed during the early hours of the child's return from theatre. This is usually accompanied

by oxygen administration. Suction is repeatedly performed when necessary to clear the airway.

Postoperative Complications

One or more complications may occur at times. These may include cardiovascular complications, for instance, arrhythmias, hypotension, haemorrhages or embolism formation. Respiratory complications include pneumonia and atelectasis pneumothorax and finally, renal failure can result in various types of infections.

Acquired Heart Failure (1 of 3)

Heart failure in childhood is usually acute but may later become chronic, if not dealt with effectively and promptly.

Heart failure is commonly caused by anaemia, pulmonary diseases and/or inflammatory lesions of the heart, which can cause carditis. Acute heart failure in children needs to be recognised early and treated immediately in order to preserve life. The very young may collapse within hours or days, whereas the older children might fight for their lives for several weeks or months before the condition becomes serious.

Clinical Manifestations

- Cyanosis and pallor of the mucous membranes
- The infant may become dyspnoeic with rapid respiration
- Sweating and tachycardia
- A persistent cough accompanies breathlessness and this leads to production of thick viscid secretion, which may block the airway if not sucked out immediately
- The infant becomes restless and irritable and often throws their arms above the head in an attempt to improve respiration
- Difficulties in feeding, which is often slow and
  rarely completed
- The infant tends to put on weight in spite of refusal to feed. This weight gain is brought about by the fluid retention, which results in oedema
- Abdominal distension and vomiting may be present
- Jugular venous distension is marked if congenital cardiac failure is developing
- Tachycardia
- Hepatomegaly

Medical Treatment

The drugs used in the treatment of childhood heart failure are similar to those used in adults with similar conditions, except that the dosages are different.

Digoxin (Lanoxin)

This is given according to body weight. The most recommended
dosage is an initial digitalizing dose in the first 24 hours 0.1mg/kg
body weight. The first dose is half the total, followed by a second
dose, which is a quarter of the total, followed by a third dose,
which is a quarter of the second or the previous total. A maintenance
dose of 0.02 mg/kg body weight in 24 hours is recommended.

You should take and record the pulse rate or apex for one whole minute before digoxin is given to the

patient as serious bradycardia may occur.

Other toxic effects to observe and report to the doctor include anoxia,
vomiting and irregular coupling heartbeat.

Frusemide (Lasix)
A quick acting diuretic is given to facilitate excretion of urine.
The recommended dose is 0.5 mg/kg body weight IM.
Then 2mg/kg body weight orally. Due to rapid fluid and potassium
depletion when this drug is used, extra potassium should be
administered on a daily basis.

Morphine Sulphate
This is commonly given to older children to sedate the patient and
to reduce metabolism. The recommended dose is 0.2mg/kg body
weight six hourly when necessary.

Chloral Hydrate
This mixture is a relatively useful sedative for the restless, anxious
older child to ensure rest is maintained.

Antibiotics
These are also administered as a prophylactic measure to guard
against infections.

Rheumatic Heart Disease (1 of 5)

Acute Rheumatic Heart Disease (RHD) is an acute inflammatory reaction. It may involve the endocardium, including the valves, resulting in scarring, distortion and stenosis of the valves. It may also involve the myocardium where necrosis occurs and on healing, leaves scars, or the pericardium where it may cause adhesions to surrounding tissues. The development of symptoms of chronic RHD in later life depends on the location and severity of the damage and other factors.

This type of heart disease, which usually occurs in children, has its origin in rheumatic fever. The fever is associated with haemolytic streptococcal infection of the throat, mainly tonsillitis and pharyngitis, experienced two to three weeks before the onset of the fever. About 90% of first fever attacks occur among persons aged five to fifteen years of age.

Pathophysiology

All the three layers of the heart gradually become affected, especially the endocardium.

This is known as endocarditis of the left side of the heart. The infection may also progress to affect the mitral valve or other valves in the heart. The flaps, which form the valve, become swollen and oedematous with small and firmly attached vegetable like deposits.

In the acute stage, the valve becomes incompetent, resulting in subsequent fibrosis and thickening. The tendonous cords (cordae tendineae) become shortened. This causes stenosis, with or without incompetence.

Clinical Features

Now you will look at the clinical features of rheumatic fever. When the child arrives at your health facility, you should observe for some or all of the following features, in attempting to make your diagnosis:

- The child complains of headache, vomiting, moderate fever of 37.2 degrees Celsius to 37.8 degrees

Celsius but can be higher, fur tongue, sweating and occasionally constipation. These are signs of emerging toxaemia.

- Pulse rate is elevated, corresponding to temperature.
- On examination, the patient has a severely painful moveable joint, which begins with one and spreads to others. Normally the knees, elbows, wrists, ankles are affected.
- Occasionally these joints are reddened, swollen and warm to the touch. There may be nodules over these joints.
- When the child has been ill for a prolonged period of time, anaemia will develop, indicating danger of permanent
heart damage.
- Some patients may occasionally faint and develop slightly pinkish rash appearing on the chest. This may occur intermittently for several months.

Nursing Care

The following procedures should be followed when providing care to a child with
rheumatic fever:

- Nurse the child in recumbent position in a well ventilated room, with minimal disturbances.
- Vital signs observations of temperature, pulse and respiration should be taken and recorded every two hours, and any abnormalities immediately reported to the doctor.
- Take particular interest in the painful joints. Small soft pillows should be used to support the affected limb providing comfort. You should ensure that bed cradle is in place to keep beddings off the lower limbs.
- The child should be on complete bed rest with all activities carried out by the nurses. You should explain to older children and their parents why such steps are being taken.
- The child should be given light well balanced meals, you should assign one nurse to feed them if they are too ill to do it for themself or if they are in pain.
- Slowly progressive passive exercise in bed and occupational therapy is advised. As the child's condition improves, they will be mobilised within the ward.
- Involve the family in the child's care, as this care will have to continue at home. Reassure the parents that the child with rheumatic heart disease should be encouraged to continue with normal activities as far as possible and emphasise that over protection will not facilitate recovery.

Medical Treatment

Good nursing care is the most significant remedy for this patient. However, several drugs may be given, mainly to control pain and for prophylaxis. Antibiotics, such as penicillin V, or amoxil as prophylactic, are commonly used. Analgesics, such as aspirin or brufen, may be the alternative choice. The doses depend on the age and individual patient's needs

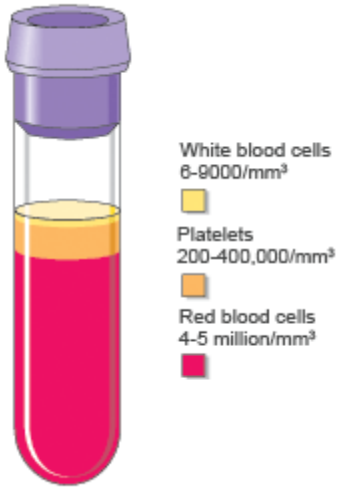
.**Complications**

One or more complications may occur. These include heart failure, mitral stenosis, aortic valve incompetence and pericarditis. You should be on the lookout for the onset of these.

Section 5: Homeostatic, Blood and Lymphatic System Dysfunctions/Diseases

Introduction

You are now going to turn your attention to body fluids and tissues and cover diseases related to the blood and lymph. Homeostatic dysfunctions were studied at length in unit three: Adult Nursing, so here there will be only a brief review of these dysfunctions.



Objectives

By the end of this section, you will be able to:

- Define and list the common diseases of the homeostatic, blood and lymphatic system
- Recognise causes and clinical features of the most common homeostatic, blood and lymphatic system diseases
- Describe the nursing care and medical management in relation to homeostatic, blood and lymphatic system diseases
- Identify possible complications that may arise

Blood Disorders

The most common blood disorder that affects children is anaemia.

Anaemias (1 of 17)

Anaemia can be defined as a reduction of the oxygen carrying power of the blood. This is either due to reduction of the volume of the red blood cells in circulation, a reduction in the haemoglobin concentration, or both. Anaemia is one of the most common haematological disorders in childhood although it cannot, on its own, be considered to be a disease.

Diagnostic Investigations

The cause of anaemia has to be identified first. A complete nursing assessment, including history taking and a physical examination should be undertaken. Blood samples should be obtained for Hb, grouping, cross matching, full haemogram and electrolytes. Stool samples should also be taken to test for occult blood, ova and cysts.

Nursing Management

The patient is confined to bed rest during the initial period of treatment and is given a high nourishing protein diet, rich in vitamins, with plenty of fluids. Every effort must be made to prevent infections and control pain. Vital signs are recorded hourly. Oxygen is administered as need arises.

Blood transfusion should also be given where necessary, guided by the haemoglobin level estimation. The patient and their relatives will require
constant reassurance.

Drug treatment is given where appropriate to replace any deficiencies. This may include folic acid and vitamin B complex. Analgesics and antibiotics may also be prescribed.

All drug dosages are determined according to the needs of the individual child, based on age, type and degree of the anaemia.

There are several types of anaemia, which you will now cover in greater detail.

Deficiency Anaemia

Iron deficiency anaemia is most common in infants and children who are fed only milk after four to five months, when all the reserves of iron stored in the liver have been used up. Iron is essential for the production of haemoglobin and its deficiency may be due to a variety of reasons.

- Premature or multiple births
- Maternal anaemia before the birth of the baby
- Insufficient iron in the diet
- Failure to absorb iron in the gastro intestinal tract, following neo natal surgery, or as a result of malabsorption syndromes, for example, coeliac disease

Pathophysiology

Iron deficiency develops gradually over a period of time. Iron is essential for the production of haemoglobin. A depletion of iron is followed by a reduction of serum transferrin (serum beta globulin). This results in a decrease in haemoglobin production. As new haemoglobin lessens, new red blood cells (RBCs) become smaller in size (microcytic), less well filled with haemoglobin, and pale (hypochromic). Iron deficiency, therefore, results in reduced haemoglobin level and reduced oxygen carrying capacity of the blood.

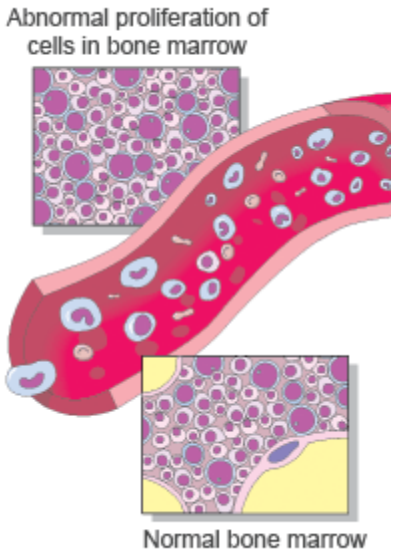
Haemorrhagic Anaemia

In this condition, blood loss can be acute or chronic, depending on the quantity and speed at which the blood is lost from the body. The causes of this type of anaemia in children may include epistaxis or accidents and various injuries.

Aplastic/Hypoplastic Anaemias

Aplastic anaemia refers to a condition of bone marrow failure in which the formed elements of the blood are simultaneously depressed.

In aplastic anaemia, it is not only the production of the red blood cells that is affected, but also the white blood cells and platelets. The patient, therefore, suffers from anaemia, infections and haemorrhage. There are several causes of aplastic anaemia.

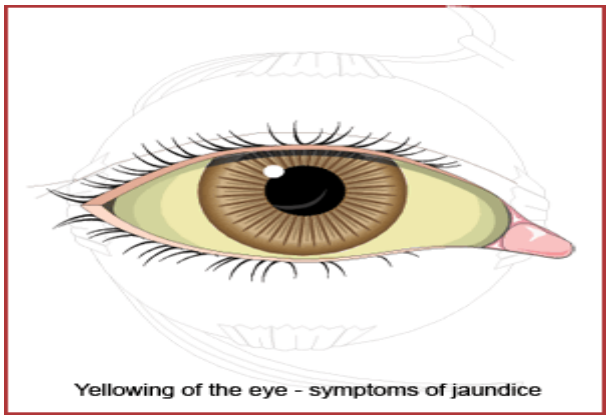


- Suppression of the bone marrow to produce adequate red blood cells
- Primary bone marrow failure of unknown root
- Toxic preparations, including drugs like chloramphenical and phenylbutazone
- Metallic substances, such as lead and gold also fall under this category
- Chronic or extensive infections such as osteomyelitis, carcinoma of the bones, tuberculosis of the bones
- Over exposure to radiation, x-rays, radioactive substances, which include radium and isotopes

Haemolytic Anaemia

This is brought about by excessive and rapid destruction of the red blood cells. The effect of this physiological process leads to a reduction in the number of the red blood cells and the haemoglobin level. The child presents with jaundice as a result. The causes of haemolytic anaemia are variable and may include:

- Infections such as septicaemia
- Abnormal red blood cells such as those found in sickle cell disease
- Toxic or allergic factors, which may be due to certain drugs or chemicals
- The presence of red blood cells antibodies
- Incompatible blood transfusion, although this is rare because all blood used for transfusion is grouped and cross matched
- Haemolytic diseases of the newborn and rhesus factor incompatibility
- Diseases such as malaria


Yellowing of the eye - symptoms of jaundice

Clinical Features

The clinical features of haemolytic anaemia depend largely on the severity of the haemolysis. The child may present with yellowish colour on the skin, mucous membranes and sclera of the eye, brought about by excess bile pigment (bilirubin) in the blood stream. The patient may also complain of skin irritation, caused by bile salts, namely sodium glycocholate. In cases of severe jaundice the pulse rate may be slow.

Sickle Cell Anaemia (A Haemoglobinopathy)

In this condition, the red blood cells contain abnormal levels of haemoglobin. Sickle cell

anaemia is most common among people of Black, Asian and Arab descent. Medical research has shown that the disease tends to occur as a result of disorganisation of certain amino acids in the human body.

For unknown reasons, the amino acids in the polypeptide chains are not arranged in their usual orders. The more specific amino acids blamed for sickle cell anaemia are:

- Glutamic acid in Hb A are in the sixth chain of polypeptides
- Valine in Hb S
- Lysine in Hb C

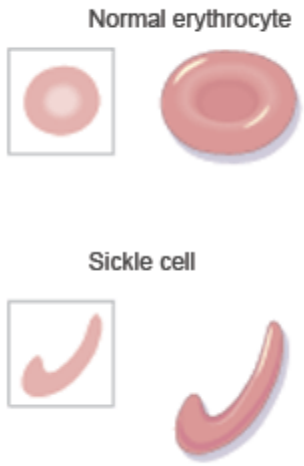
Sickle cell anaemia is a congenital genetic disease, which is transferred from parents to their offspring. The parents do not necessarily have to suffer from the disease but may be able to carry and pass the abnormal gene. The sickle celled red blood cells have very short life span of approximately 20 days as compared to normal red blood cells, which have an average life span of 120 days.

Pathophysiology

The consequences of sickle cell disease are secondary to the blockage of the small vessels by the sickle red blood cells. This obstruction can be repeated from time to time. There is increased destruction of red blood cells because of their abnormal shapes, fragility and inflexibility.

The blood cells, which are sickled, causing vascular blockage, can be permanently trapped therein, resulting in blood viscosity, circulatory stasis, hypoxia or further sickling. When vascular obstruction occurs, some of the symptoms experienced include: death of the tissues (Necrosis); severe pain, especially in the joints, and headache; vaso-occlusive sickle cell crisis, where repeated crisis can lead to progressive organ failure.

Sickle red blood cells are less able to withstand the stresses of the circulation and have a shorter survival time than normal, ultimately resulting in haemolytic anaemia.



Sickle Cell Trait

Sickle cell trait refers to heterozygous persons who have both normal HbA and abnormal HbS.

This is a benign existence of sickle cell, which an individual can live with under normal physiological conditions. However, if this individual develops severe hypoxia from shock, strenuous physical exercise, anaesthesia or flying at high altitude in an unpressurised aircraft, or if an older female patient becomes pregnant, occlusion of the blood vessels results in a sickle cell crisis. Sickle cell trait has a greater incidence in

areas where malaria is endemic. When malarial parasites infect red blood cells, they destroy them together with the sickle cells.

Clinical Features

- The child gradually becomes weak
- Painful large joints of extremities
- Headaches and pyrexia
- Older children will complain of abdominal pain and backache
- Anorexia and vomiting may be present
- Growth failure, that is, stunted weight and height
- For older children, sexual maturity may be delayed
- Cardiomegaly caused by stress and chronic anaemia
- Pneumonia may occur in crisis
- Splenomegaly and hepatomegaly

Management of a Patient with Sickle Cell Anaemia

The main objectives of management are to minimise energy expenditure and oxygen consumption, promote hydration, replace electrolytes and blood, and treat and control pain by using antibiotics.

Success in child management requires understanding on both sides. The doctor, nurse, parents and patient must work together and be frank. The parents/guardians of a child with the sickle cell must be informed that sickle cell anaemia is incurable. They should also be aware that medical treatment is not necessary except when the child is sick or in a crisis. Finally, the patient should avoid situations that may lead to infections, stress or anxiety.

Nursing Management of a Patient with Sickle Cell Anaemia

The patient in sickle cell crisis should be admitted to hospital on complete bed rest to alleviate stress and anxiety. Oxygen therapy should be given and pain controlled by correct positioning of the limbs plus administration of appropriate analgesics. It is advisable to give the child plenty of fluids orally and/or intravenously to dilute the blood in the circulation. The fluid balance chart should, therefore, be strictly maintained.

Periodically, the blood is checked for electrolyte levels and this is replaced. Blood transfusions may also be given depending on the haemoglobin levels. As soon as the condition has improved and pain abated, gradual physiotherapy must be commenced to facilitate venous return. General bodily hygiene, including oral toilet, is encouraged to prevent infections. The diet should consist of high protein and vitamin rich meals.

Medical Management of a Patient with Sickle Cell Anaemia

Medical treatment includes the prescription of analgesics, such as pethidine or similar pharmaceutical preparations, for the purpose of controlling pain and headaches. Antibiotics are given as a prophylactic measure but may also be prescribed therapeutically if there are indications of systemic infections. For example, penicillin V 250-500mg qid, amoxyl or ampicillin 250-500 mg qid may be administered for a few days. Other drugs used in treatment include folic acid and vitamin B complex.

If surgical Intervention is necessary, a splenectomy may be performed. This is the removal of the spleen, which may be undertaken if it is grossly enlarged for fear

of a rupture. Should the spleen rupture accidentally, internal haemorrhage may occur.

Sickle Cell Disease

Several possible complications associated with Sickle Cell Disease include:

- Infections of the skin, respiratory tract and so on
- Anaemia
- Congestive cardiac failure
- Ruptured spleen if enlarged resulting in internal haemorrhage
- Renal and hepatic insufficiency
- Gall stone formation
- Bone changes

Health Promotion

As a means of promoting health, both the child with sickle cell and their parents will require constant follow up.

Genetic Counselling
Since young children may not be able to grasp the dangers and effects of this condition, the parents of the child should be counselled so that they understand how it is passed from parents to their offspring. At a later stage, when the child is older, they will then be able to impart this information to them, so that they are aware of possible implications when they have their own children.

Public Education
Communities of all races and social persuasion need to be educated about the problems faced by children who are sickle cell positive. Where economic status permits, literature should always be available and well distributed, and informative seminars may be held. The objective here is to enable communities to assist the patients in time of crisis.

Screening
Education will encourage expectant mothers to voluntarily come to a health facility for screening and counselling. Similarly, better education might serve to make health care workers more aware of the risks of sickle cell anaemia and ensure that newborn babies are screened for sickle cells early.

Care of Children at Home
The parents of children with sickle cell anaemia should be advised to consult their doctors and nurses regularly for help and guidance so that these children may be helped to lead as normal a healthy life as possible. If the children are unwell, however minor their symptoms may be, they should be returned to hospital for treatment.

Leukaemia (Leucocythaemias) (1 of 6)

This is a malignant condition of the blood-forming cells in which the number of white blood cells is abnormal and increased in number (leucocytosis). The condition may be acute or chronic. It is sometimes referred to as cancer of the blood. In acute cases, the patient may die within six months. In chronic type leukaemia, however, the patient may live for several years without treatment.

In children, leukaemia can be accompanied by either leucocytosis or leucopenia. The most important point is not the total number of the white blood cells but their abnormal structures. Inside the bone marrow, the white blood cells are abnormal both in quality and quantity. This results in infection because they fail to perform their normal functions of protecting the body.

The abnormal increase of white blood cells also causes a diminished number of red blood cells and platelets resulting in anaemia and bleeding tendencies.

Predisposing Factors

Although the actual cause of leukaemia is still unknown, certain factors have been identified and blamed. They include exposure to radiation, viruses, chemicals and some drugs as well as familial predisposition/genetic factors.

In paediatric practice, leukaemia tends to be common in children under the age of fifteen years, with the majority being between four and eight years. It occurs twice as often in white children than in black children and more male children than female children at the ratio of 1.3:1.

There are several different types of leukaemia.

Myeloid Leukaemia
This type of leukaemia affects granular/polymorph nuclear leucocytes. It can be acute or chronic and is equally distributed between both sexes. It tends to affect the slightly younger age group, who are more susceptible to the acute form. The chronic type is more often seen in adults aged between 35 to 75 years old.

Monocytic Leucocytes
In this type of leukaemia, the monocytes are abnormal, both in structure and population. Both sexes and any age group may be affected. It is usually seen in its acute form. Monocytic leukaemia is the only form that is uncommonly seen in clinical practice.

Lymphocytic Leukaemia
This leukaemia affects the lymphocytes. The lymph nodes and lymphatic tissues produce too many abnormal lymphocytes, which then overcrowd the bone marrow. The overcrowding of the bone marrow results in a reduction of the red blood cells, platelets and polymorph levels and corresponding clinical consequences. It can be acute or chronic. The acute stage is common in children, while the chronic stage is more likely to be found in adults.

Leukaemia can present in several ways.

- Anaemia, signs of which depend on the extent of the disease
- Bleeding tendency
- Splenomegaly
- Hepatomegaly
- Lymph gland enlargement
- Leucocytosis or leucopenia with abnormal cells seen in blood smear
- The parents will give history of the child gradually becoming weak and having a tendency to bruise easily
- There is complaint of frequent and repeated infections, especially those of the respiratory tract
- The child becomes pyrexial with corresponding tachycardia due to infection
- Nausea and vomiting may present once septicaemia has developed

Diagnostic Investigations

Begin by taking a detailed personal history. The information given by the parents, touching on the onset and progression of illness, will give the clinician a picture of what possible conditions they may be dealing with. A physical examination is helpful in assessing the enlargement of the spleen, liver and superficial lymphatic nodes.
A bone marrow puncture may be performed.

In children this procedure is best performed on the iliac crest.

Refer to Procedure Manual Nursing Council of Kenya, page 38, for details on bone marrow puncture.

A blood test for full blood cells, white blood count and differentials, platelets, haemoglobin and erythrocyte sedimentation rate should also be carried out. Finally, an x-ray of the long bones, spinal column and joints may be taken. This may indicate myelosclerosis, that is, the hardening of the spinal cord.

Nursing Care of a Child with Leukaemia

General nursing care should be applied unless the child's condition has adversely deteriorated. The child should be admitted on bed rest until the temperature falls back to normal and vital signs of TPR are taken and recorded four hourly. Further investigations should be conducted in order to assess the extent of the disease.

You should be on a constant look out for signs of haemorrhages, which in some cases may be internal. There is a need to maintain a high standard of cleanliness by giving bed bath, care of pressure areas and oral toilet.

The child should be encouraged to take nourishing high protein diet, rich in vitamins, and plenty of fluids. Depending on the haemoglobin level, a blood transfusion may be advised and given at regular intervals.

Medical Management of a Child with Leukaemia

The doctor may prescribe one or more drugs selected from a number of groups.

Cytotoxic drugs for leukaemia are carefully determined according
to weight.

Chlorambucil (leukeran) may be prescribed in a dose of 200 micrograms per kg. body weight daily. For children this dose should be very carefully determined.

Nitrogen mustard is often used in the treatment of lymphoid leukaemia, with a dose of 0.1 mg per kg body weight in a normal saline drip.

Steroids from the cortisone group, for example, adrenocorticotropic hormone (ACTH), prednisolone, prednisone or dexamethasone may be ordered according to each patient's needs.

Finally, radiotherapy (deep x-ray therapy - DXT) may be necessary, mainly to prolong the patient's life and to relieve symptoms. Here the spleen and lymphatic nodes are bombarded with radiation.

Common Neoplastic Conditions in Children (1 of 3)

You will now concentrate more specifically on dysfunctions of the lymphatic system.

Burkitt's Tumour (Burkitt's Lymphoma)

This is a form of lymphoblastic beta cell lymphoma (immature lymphoma), which is predominantly found in tropical Africa and New Guinea but less frequently seen in other parts of the world.
It is highly malignant, which means it can spread to other parts of the body.

It is most common in children aged between four and eight, although a few incidences have been recorded among older patients. It tends to predominantly affect male children. The causes are unknown but it is thought to be viral in origin.

Clinical Features

Burkitt's lymphoma may present in some of the following ways:

- Lymph glands in the neck are swollen but may be one sided or bilateral (jaws)
- The mandible and maxillary bones gradually become affected resulting in marked bony deformity
- The teeth become loose in the process
- Later the eyeball protrudes outwards, resulting in loss of sight
- As the condition progresses the kidneys, adrenals, ovaries or abdominal lymph nodes become involved, giving rise to abdominal tumours
- When the spinal cord is involved, it may result in sudden onset of paraplegia
- Although uncommon, affected females, especially young adult women, may develop bilateral tumours of the breasts

Secondary metastases may also involve long bones, salivary glands, thyroid, testes and the heart.

Any investigations for the condition should include taking down a personal history and conducting a physical examination.

Refer to Module One: Unit Two for more information on how to conduct a physical examination.

A biopsy for histology should also be performed.

Management

The patient should be admitted into hospital for further investigations to detect the extent of metastasis. Surgical removal of the swollen lymph gland under the jaw may be attempted. If there is a localised tumour, this may be managed medically by the use of cytotoxic drugs and radiotherapy.

Some of the drugs used include cyclophosphamide (endoxan), which is prescribed as 40-60 mg/Kg body weight intramuscularly once every two weeks up to six doses. Methotrexate can be given in a dose of 5-10 mg IV or up to 100 mg weekly intrathecally, if the spinal cord is already affected. Analgesics, which are strong enough to control pain and discomfort, should also be prescribed.

You will conclude this section by reviewing some
homeostatic dysfunctions.

Homeostatic Dysfunction (Review) (1 of 10)

You have already covered this topic in unit three of this module and will now briefly review the fluid and electrolyte balance.

Fluid and Electrolyte Balance

Water forms about 70% of the body weight in an average adult. In childhood, it varies according to age. This fluid is generally distributed and found in certain parts of the

body. This fluid can be classified into extra cellular and intra cellular.

The extra cellular fluid can be further categorised as intra vascular fluid (inside the vessels) and interstitial fluid (between the cells). On the other hand, intracellular fluid is found within the cells.

In normal human physiology, these fluids should always be balanced, as the nutrients and waste products are transported through them to the appropriate organs. The fluids play a very important role in the maintenance of an internal equilibrium.

Fluid and Electrolyte Balance

It is important that the plasma proteins and salts are present in the right proportion. The salts, which are referred to as electrolytes, include among others sodium chloride, potassium, magnesium, bicarbonate and a minimal quantity of calcium.

In addition to the fluid shift from one compartment to another, large quantities of water are withdrawn daily from the tissues and vessels and poured into the alimentary tract for the purpose of digestion and absorption. Thereafter, the fluid is absorbed into the large intestine and returned to its original place while most of the water from the bloodstream filtering through the renal glomeruli is absorbed in the kidney tubules.

The body fluid is balanced between the fluid intake and the
fluid output.

Dehydration

Excessive fluid loss from the body is called dehydration. This condition can have very serious consequences. Dehydration can be mild, moderate or severe, especially in children.

There are several causes of dehydration

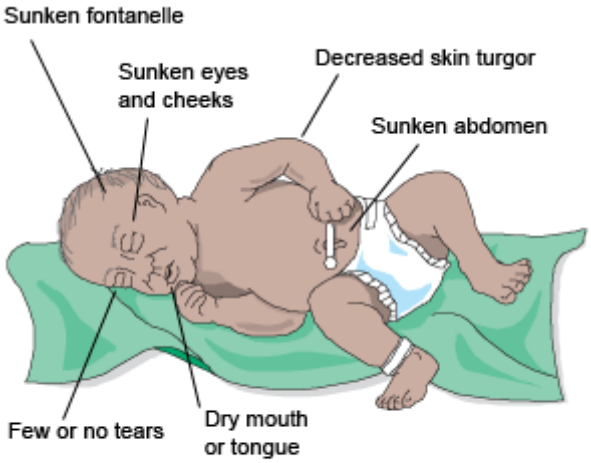
Causes of dehydration

- Diarrhoea and/or vomiting
- Excessive sweating
- Failure to eat or drink
- Starvation
- Polyuria

Clinical Features

Dehydration can present in the following ways. As a nurse, you should be vigilant for any or all of these symptoms:

- Depressed fontanelle
- Sunken eyeballs
- Dry skin and mucous membrane
- Inelastic skin
- Subnormal body temperature
- Rapid pulse rate
- Low blood pressure/shock
- Mental confusion/lethargy, the child may become comatose



Management

A dehydrated child looks weak and, therefore, needs to be kept at rest until the condition improves. The doctor looking after the child will rely on the history given, physical examination performed and basic laboratory blood tests. The tests here include blood for white blood cell count total and differentials, and haemoglobin. Physical examination is helpful to ascertain the degree of dehydration, which is necessary for determining the amount of fluid required. The child should also be weighed for the same purpose.

The cause of dehydration if known, for example, diarrhoea and/or vomiting, has to be controlled. The child's parents can manage mild dehydration at home after they have been given some basic health education and an adequate supply of drugs and ORS.

Moderate and severe dehydration may have to be managed in the following manner. Solid foodstuff and milk may have to be suspended temporarily to rest the alimentary tract in the case of diarrhoea and vomiting. Oral fluid (ORS) should be administered in small amounts at regular intervals. A liquid diet should be prescribed, to be given at regular intervals unless contra indicated. Parenteral fluid intake may also be prescribed. This should consist of sodium chloride alternating with dextrose 5% intravenous. Hartmann's solution or a similar infusion may be given according to the cause of dehydration. The infusion must run slowly. In some cases, especially when the child's veins have collapsed, a venous cut down may be performed or subcutaneous infusion may have to be given slowly.

You must at all times ensure that a fluid balance chart is maintained strictly in anticipation of possible renal failure. The electrolyte level must be monitored because a depleted level may indicate onset of cardiac complication. Electrolyte replacement in the drip may be indicated. Vital signs should be taken and recorded every two to four hours to ensure the child's circulation is not overloaded with fluids.

Always be observant for possible complications. These include renal failure, cardiac failure and venous thrombosis due to haemo concentration.

Oedema

This is the presence of an abnormally large amount of fluid in the intercellular tissue space of the body. Although commonly applied to accumulation of fluids subcutaneously, oedema may be systemically distributed. When all organs and tissues of the body are diffusely swollen including subcutaneous tissues the oedema is called anasarca. Oedema may be localised or generalised depending on the cause.

Swollen ankle due to oedema

Causes of Localised Oedema

Localised oedema may be caused by locally increased capillary pressure due to impaired venous drainage produced by tumours, tight Plaster of Paris or surgical dressing. It may also be the consequence of increased vascular permeability resulting from allergic reactions or an inflammatory process. An obstruction of the lymphatic vessels resulting from injury, malignancy, surgery, radiation or inflammation can also be a causal factor.

Causes of Generalised Oedema

Generalised oedemas may result from reduced plasma protein levels as seen in the nephrotic syndrome and kwashiakor or increased venous hydrostatic pressure as seen in congestive cardiac failure. Other conditions associated with generalised oedema include hypothyroidism

Immuno Deficiency in Children (1 of 12)

Immuno deficiency disorder is a condition whereby the immune system does not adequately protect the body. It involves impairment of one or more immune mechanisms which include: phagocytosis, humoral response and cell mediated response (T cells or B cells or both).

The disease may be categorised as either primary or secondary.
It can also present as mild, moderate or severe.

Primary immune deficiency disease includes:

- Phagocytic defects
- B cells deficiency
- T cells deficiency
- A combined B cells and T cells deficiency, usually referred to as gammaglobulinaemia

Pathophysiology

Some of these conditions are congenital and are said to be genetic in origin. The thymus gland lymphoid tissues, for unknown reasons, fail to carry out their normal physiological responsibilities. As a result, the patient becomes more susceptible to infections. The symptoms usually manifest in an infant within the first three months. In severe immuno deficiency disease, the disorder is manifested by severe viral, bacterial, fungal or protozoa infections that occur within the first two years of life. Death may occur a few years after.

Secondary Immune Deficiency Disease

Here the disease occurs when an interference with the immune system develops. The secondary disorders are more common than the primary ones.

There are several causes of secondary immune deficiency diseases. These will now be covered in more detail.

Malnutrition

This impairs cell mediated immune responses. When protein is deficient over a prolonged period of time, atrophy of the thymus gland occurs and lymphoid tissue decreases, which leads to susceptibility to infection. Irradiation tends to destroy lymphocytes either directly or through the depletion system cells. The increased radiation dosage causes atrophy of the bone marrow leading to suppression of immune response. However, it is usually not a common practice to subject children to

frequent x-rays as a method of diagnostic procedure for various illnesses.

Drug Induced Immuno Suppression

This is one of the most common disorders. The cytotoxic drugs used in the treatment of neoplastic conditions and those used postoperatively to prevent transplant rejection can lead to serious immune deficiency disease. They result in leucopoenia, which in turn causes a decrease in humoral and cell mediated response. The patient, therefore, becomes susceptible to infections.

Human Immunodeficiency Viral Infection (HIV)

The disease ranges from asymptomatic clinical presentation to severe immunosuppression.
This later state of affairs is related to opportunistic diseases.

Aetiology

Human Immunodeficiency Virus is the causative organism, and is transmitted via a number of body fluids including blood, breast milk, semen and vaginal secretions. In children, the means of acquiring the virus are the following:

- An infected woman may pass the virus via the placenta to her unborn baby. The risk of this occurring is 20-40%. This is the greatest source of cases of AIDS in childhood.
- A newborn infant may acquire the virus from the breast milk of an infected mother. The risk of this is probably low (in the region of 5-10%).
- Transfusion of infected blood products. This has been a problem in children who receive frequent transfusions, particularly those with haemophilia or chronic anaemias. Testing of blood products should prevent this.
- Sexual contact at any age (this is obviously a risk in sexual abuse).

Pathophysiology of HIV in Simple Terms

When the HIV enters the body, it depletes the
T-helper (T4) cells. This virus is an RNA virus (ribonucleic acid) and a member of the family
of retroviruses.

HIV invades T-helper lymphocytes. The genetic material of the virus subsequently changes into DNA by action of the viral enzyme. The virus remains intact for a long period until it is activated to reproduce inside the lymphocytes, where it remains for life.

The destruction of T4 cells results in a severely compromised immune system. In addition to invasion and destruction of lymphocytes, the virus can also infect monocytes. HIV infected monocytes may cross the blood brain barrier to cause the spread of viral infection to the central nervous system.

Clinical Features

Symptoms of the disease will usually appear between six months to two years, but there may be quite wide variation. The symptoms include some of the following:

- Repeated or prolonged diarrhoea
- Seborrhoeic dermatitis
- Oral thrush
- Poor growth or failure to thrive

- Generalised persistent lymphadenopathy
- Enlargement of the spleen and/or the liver and/or the parotid glands
- Repeated infections, including pneumonia, otitis media, urinary tract infections, meningitis and septicaemia
- Neurological features such as delay in, or even reversal of, development
- As the disease progresses there are repeated severe and life threatening infections, particularly pneumonia with unusual organisms
- Reactivation of tuberculosis is common
- In older children and adolescents, the presentation resembles that in adults, with fever, weight loss, and generalised lymphadenopathy

Diagnosis

Accurate diagnosis of paediatric HIV infection depends on laboratory tests. This is done by testing for HIV antibodies by means of the ELISA test, which is very sensitive but can be falsely positive. Because of this any positive test needs to be confirmed by the Western Blot test, which is more accurate. Infants of HIV positive mothers may test positive during the first 15 months because of maternal antibodies. This makes the definite diagnosis of infection in the young infant difficult. It is now possible to test for the virus itself rather than for antibodies to the virus. This makes it possible to distinguish between an infant who is infected with the virus, and one who is merely carrying maternal antibodies.

It is normal practice to obtain informed consent of the parents before testing a child for HIV antibodies.

Management

The goal of therapy for HIV Infection includes slowing the growth of the virus, preventing and treating opportunistic infections, and providing nutritional support and symptomatic treatment.

Antiretroviral (ARV) Therapy

Antiretroviral drugs work at various stages of the HIV life cycle
to prevent reproduction of functional new particles. Although
not a cure, these drugs can suppress viral replication,
preventing further deterioration of the immune system, and thus delay disease progression.

Classes of the Antiretroviral Agents and their Mechanism

1. Nucleoside Reverse Transcriptase Inhibitors (NRTIs)
   These prevent HIV from effectively converting its simple RNA into DNA (transcription) hence interrupting or preventing HIV replication. Drugs under this class include: zidovudine (AZT), didanosine (ddI), lamivudine (3TC), stavudine (d4T), and abacavir (ABC).

2. Non Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)
   These act against HIV at the moment when it is transcripting its RNA into DNA to take over a CD4 cell, that is they attack at the same stage as nucleoside analogues. However, they act directly against the chemical that converts the RNA into DNA, whereas nucleoside analogues are built into the DNA and make it unstable. They include efavirenz and nevirapine.

3. Protease Inhibitors (Pls)
   These interfere with the assembling of the raw materials of new HIV particles into new virus particles. The new

particles of HIV produced in the presence of a protease inhibitor are said to be immature and non-infectious. Unfortunately, if these drugs are not correctly taken, the unsuppressed virus will be able to reproduce in the presence of the drug leading to drug resistance. These drugs include: lopinavir, nelfinavir, and ritonavir.

4. Fixed drug combination.

Assessment of the HIV Infected Infant

Before initiating ARV therapy, HIV infected infants or children should be treated by paediatric HIV specialists. When this is not possible the treating clinician should seek consultation with a paediatric specialist. When a child is identified as HIV infected, the clinician should begin an immediate assessment of the child's clinical and immunological status, viral burden, resistance profile and ability to adhere to an ARV regimen.

This assessment should be repeated at least every three to four months to monitor for changes that may necessitate initiating ARV therapy or may affect a child's ability to receive or tolerate
ARV therapy.

Before initiating therapy, the clinician should ideally perform a comprehensive physical examination and should obtain a complete history and the following laboratory evaluations:

- Complete blood count (CBC)
- Assessment of kidney and hepatic function
- Amylase, lipase, glucose, and lipid profile
- Viral load
- CD4 count and percentage
- Resistance profile

Management of the HIV Infected Infant

Management of HIV involves the use of multiple drugs that interfere with viral replication and preserve immune system. Generally, two NRTIs and one NNRTI or one PI.

Pneumocystic carinii pneumonia (PCP) is the most common opportunistic infection of children infected with HIV. All children born to HIV-infected mothers should receive prophylaxis in the first year of life according to the national guidelines.

Education concerning transmission and control of infectious diseases, including HIV infection, is essential for children with HIV infection and anyone involved in their care.

Parents/guardians should be given guidance to promote the well-being of the child. Emphasis should be placed on the provision of good nourishing nutrition because failure to thrive is associated with frequent infections.

Thorough, regular skin and mouth care should also be emphasised as it enables the patient to prevent infection, especially fungal caused by Candida albicans. The child should be protected from exposure to micro organisms found in unclean environments, facilities or infected individuals.

Safety issues, including storage of special medications and equipment (for example needles and syringes), are emphasised. Your role in the care of the child with HIV is multifaceted. You serve as educator, direct care provider, case manager, and advocate.

Section 6: Diseases of Support and Locomotion

Introduction

In the previous section some congenital and acquired diseases
of the cardiovascular, lymphatic and homeostatic systems
were highlighted. In this section you are going to focus on orthopaedic disorders.

Objectives

By the end of this section you will be able to:

- Define and list the common diseases of the
musculoskeletal system
- Recognise causes and clinical features of the most common musculoskeletal system diseases
- Describe the nursing care and medical management in relation to the musculoskeletal system diseases
- Identify possible complications that may arise

You will start with congenital abnormalities.

Congenital Abnormalities (1 of 5)

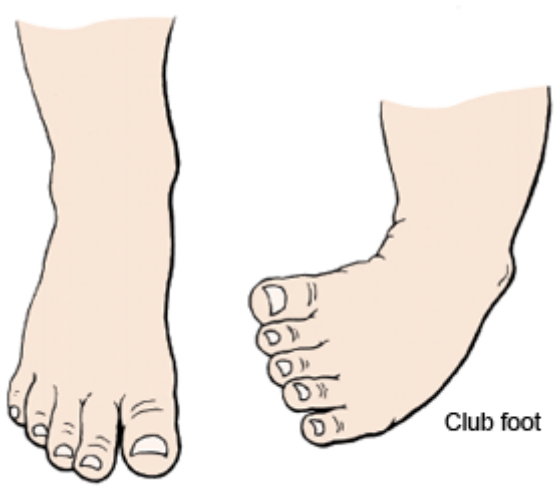
Talipes

This is a term used to describe a group of foot deformities. Any foot deformity involving the ankle is called talipes, derived from talus meaning ankle and pes meaning foot. It is one of the most common congenital orthopaedic deformities, which occurs in approximately 1 in 700 to 1 in 1000 live births. For unknown reasons, it is more common in boys than in girls.

Causes are unknown, but there are several theories. It is believed to be hereditary and may be a developmental defect in utero as a result of malpresentation.

Pathophysiology

Talipes, or clubfoot as it is sometimes called, is characterised by an abnormal twist or position in utero, which remains fixed. The pathology varies from slight changes in the structure of the foot to abnormalities in the metatarsals and tarsals (bones of the foot and ankle).



Talipes Equinovarus

In this condition, the foot is fixed in plantar flexion and deviates medially, that is, the heel is elevated off the ground. It occurs in 95% of those children who have talipes. If not corrected early, the child will walk on the toes and outer border of the foot. These types of talipes may occur unilaterally or bilaterally.

Talipes Calcaneovalgus

The foot is dorsiflexed and deviates laterally, resulting in the heel turning outwards from the midline of the body, and the anterior part of the foot is elevated on the outer border. If not corrected, the child will walk on an outwardly turned heel and the inner border of the foot. It tends to occur unilaterally.

Talipes Cavovarus

The heel is turned inwards (inverted) from the midline of the leg but only the outer portion of the sole rests on the ground.

Talipes Equinovalgus

The heel is elevated and turned outwards (averted) from the midline of the body.

Talipes Calcaneovarus

The heel is turned towards the midline of the body and the anterior part of the foot is elevated. Only the heel rests on the floor.

Differential Diagnosis

When a child is born you should be able to differentiate the structural abnormalities from paralytic deformity, which may occur in conjunction with meningomyelocele, that is, the protrusion of meninges, and possibly nerve structures through congenital opening in the lower spinal column. Radiographic investigation by a doctor may be helpful if there is doubt.

Management

Success in management will depend on how soon the treatment is commenced. In most cases, it is recommended that it be commenced soon after birth, preferably within 36 to 48 hours.

The short term goal is to correct deformity and to maintain the affected area in the normal position as much as possible. The long term goal is to prevent recurrence of deformity. Any delay in treatment makes the corrective measures more difficult because the bones and the muscles of the foot and leg tend to develop abnormally while the tendons become shorter.

Conservative Management

Manipulation of the foot is carried out manually together with an exercise programme several times a day. These should be done very gently to avoid pain and swelling, which may occur if the management is not properly carried out. The mother may also be taught to participate in the care of this child, under supervision.

After some months a strapping should be applied to the foot. Plaster of Paris (POP) or a splint may be applied to maintain the position after the

manipulation has been performed and the correct position achieved. Where a splint (Denis Browne Splint) or POP. is used, the mother should be instructed to inform you should any skin redness occur in the area. Special boots

may also be used, especially for the older children who may come to the hospital later for talipes correction.

Parents should be given health education in preparation for their child's discharge from hospital. The need for follow up with the clinic should be emphasised as the condition may recur.

Surgical Management

Where conservative treatment has failed, or where the older child is brought to hospital rather late, surgical corrective measures may be undertaken. The operation is called tenotomy. This is cutting and realigning the Achilles tendon. The division of contracted soft tissues may be necessary, especially among those children who are aged about ten years or more.

Fractures, Dislocations and Sprains (1 of 5)

These injuries in children are very common. In most cases, the diagnosis is more difficult than that in adults because of the inaccuracy of the history being given and uncooperative nature among children during physical examination.

Fractures

A break in continuity of a bone may be accompanied by swelling in the part of the injury. This is usually due to tissue damage and bleeding in the affected area. The fracture can either be simple or compound. It can also be complete or incomplete. With very young children, a greenstick fracture may be sustained.

Investigations

A diagnostic investigation should commence with a personal history and then a physical examination. Occasionally an x-ray diagnosis may be taken on selected individuals according to the age and extent of the injury sustained.

Clinical Features

These vary from patient to patient and extent of injury. Some features may include:

- Pain on palpation. The injured area is painful to touch.
- Shortness of limb. This is more marked and can easily be noticed by the naked eye. It does not always present itself in those broken bones whose ends remain in line.
- Swelling and redness due to damaged tissues and blood loss in the area of injury.
- Loss of function, that is, inability to freely utilise the affected area due to pain
  and swelling.
- Paresthesia or loss of feeling in the affected side usually due to injuries of the sensory nerves.
- Deformity of limb or area as compared to nearby surfaces.

Management of Children with Fractures

The principles of management are generally the same as those used for adults although slight modifications on how to handle the children may be made because of age differences.

Reduction

This can either be closed or open method. Closed reduction means manipulation and/or skin traction. For young children, Bryant's traction is commonly used. The child in a cot

has a pulling force applied in the longitudinal direction while the buttocks are off the bed. The older child on skin traction may have a pulling force applied horizontally towards the foot of the bed.

In open reduction, the surgeon makes a surgical incision to reach the fractured ends of the bone in question. The bony fractures are corrected and internal fixation undertaken using either plate and screws or pins depending on the type of fracture. The tissues and skin are then sutured. POP may be applied thereafter to immobilise, especially in limb fractures.

Immobilisation

Splints or POP are used to immobilise the fractured bone after fixation has been completed. Once done, it should be allowed to remain in situ for a prolonged period depending on the patient's age. You should check the circulation and neurological defects and report your findings to the surgeon.

Rehabilitation

You must make every effort to restore normal function as far as possible in order to prepare the patient for their return home. This should include gradual mobilisation, physiotherapy, and body cleanliness.

While caring for compound fractures, you must ensure that infection is prevented by covering the wound until surgical treatment has been completed. Aseptic wound dressing, use of antibiotics, analgesics, high protein and calcium diets are all essential requirements of good patient care. Blood transfusion after grouping and cross matching may be indicated according to haemoglobin level estimation.

For more information on the care of the patient on traction and POP refer to the Nursing Council of Kenya Procedure Manual, page185.

Dislocations

This is a displacement of bones at a joint usually caused by trauma, pathological processes or congenital malformation. Clinical features include painful swelling, deformity and loss of function.

Management

This is done by closed reduction, which is effected by manual manipulation and/or traction as soon as the child's condition permits. Open reduction is indicated in some cases in order to repair soft tissue damage. Immobilisation of the affected part until pain and swelling are resolved is required. This is followed by physiotherapy to restore normal function.

Sprains

This is the stretching of the ligaments at a joint, which results in painful swelling, caused by fluid effusion. Laceration may also occur within the joint. The most common joint involved in this type of injury is the ankle joint.

Management of Sprains

In case of effusion, application of cold or heat, a firm bandage or a splint is essential to rest the affected part. Gentle massage may similarly be indicated and mild analgesic prescribed.

Juvenile Rheumatoid Arthritis

This childhood disease is found in three different forms.

Polyarticular Disease

In this condition many joints, especially the small ones of the hands, are involved. More girls are affected than boys. Clinical features include:

- Gradual and slow development of joint stiffness
- The affected joints are warm and swollen
- Patient complains of pain
- The child is anxious and irritable and resists any attempt to touch the hands
- Arthritis often begins symmetrically in the knees, ankles, wrists and elbows. Cervical spine, temporomandibular joints and hips may be involved at a later date as the condition progresses
- Involvement of the hip results in a major disability
- Growth development may be retarded if the tissues adjacent to inflamed joints are affected
- The child may have general malaise, anorexia, mild anaemia and low pyrexia
- Slight hepatomegaly and lympho-adenopathy may or may not be present

Pauciarticular Disease

This is arthritis, which affects only particular joints such as knees, ankles and elbow, although it may on rare occasions affect other joints. It tends to affect about 33% (1/3) of all children with juvenile rheumatoid arthritis. Girls are more susceptible than boys. This form of arthritis may be recurrent or chronic but does not cause serious disability. Children with pauciarticular disease are likely to suffer from inflammation of the iris and ciliary body during the course of the illness.

Rheumatoid Arthritis

The cause of this particular arthritis is unknown. Boys and girls are equally affected. It presents in the following ways:

- Intermittent pyrexia to about 39.4°C or more
- Rheumatoid rash may be present in about one quarter (25%) of the affected children
- Leucocytosis and anaemia are present
- Generalised lymphadenopathy and hepatosplenomegaly are also present

General Nursing Care

During the acute phase, the child is nursed on complete bed rest until apyrexial. Assistance with feeding, bathing and dressing are important. You should ensure that they are comfortable and should monitor response to pain, exercise and treatment.

Similarly the family members require support and a clear explanation that there is no cure. They need to understand, therefore, that they have to accept the situation as it is. You need to be patient and understanding in your dealing with both the patient and family members.

Physiotherapy is essential to prevent stiffness caused by muscle shortening. The joints may have to be splinted at certain times to prevent contractures.

Section 7: Diseases of the Nervous and Endrocine Systems

Introduction

This section deals with a group of common diseases and conditions of the nervous and the endocrine systems.

Objectives

By the end of this section you will be able to:

- Define and list the common diseases of the nervous system and the endocrine systems
- Identify causes and clinical features of the most common diseases of the nervous system and endocrine systems
- Describe the nursing care and medical management in relation to the diseases of the nervous system and endocrine systems
- Identify possible complications that may arise

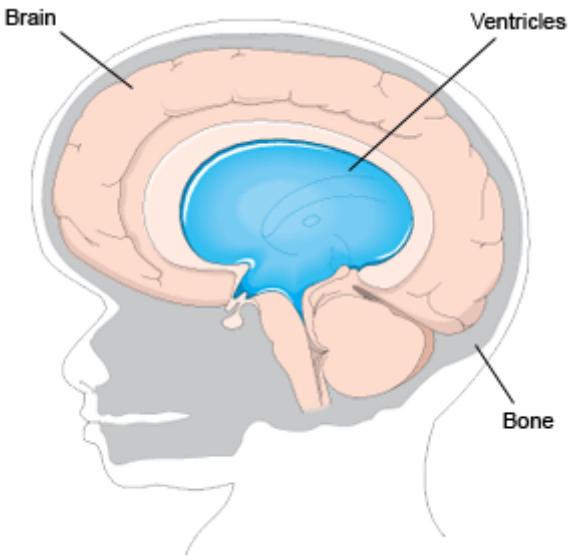
You will start with the congenital abnormalities related to the nervous system.

Hydrocephalus (1 of 7)

This is an abnormal condition of fluid around the brain or inside the ventricles. The incidence varies according to the geographical location where it occurs. It is usually a result of an interference with the circulation or absorption of cerebral spinal fluid (CSF).

The production of CSF is dependent largely on active ion transportation across the epithelial membrane of the choroid plexus. The ion mostly transported into the cavities of the ventricles is sodium. The amount of cerebral spinal fluid produced is normally equivalent to
the amount reabsorbed.

There are two distinct types of hydrocephalus according to anatomical positions.



Communicating (or Extra Ventricular) Hydrocephalus

In this type of hydrocephalus, the obstruction is outside the ventricular system. The problem is caused by blockage or occlusion of the sub arachnoid cisterns around the brain stem. The fluid, which is not being absorbed, compresses the brain and distends the cranial cavity.

There are several identified causes of communicating or extra ventricular hydrocephalus.

- Subarachnoid haemorrhage
- Bacterial meningitis, for example, tuberculosis
- Toxoplasmosis
- Diseases of the connective tissues
- Sardocoidosis
- Head injury
- Idiopathic causes

Non Communicating Hydrocephalus

The obstruction here is within the ventricular systems, leading to interference with the flow of the cerebral spinal fluid to the sub arachnoid space. Causes include:

- Congenital defect developmental, for example, arnod chiari malformation and aqueduct stenosis.
- Acquired defects, for example, cerebral abscess, compression of the aqueduct by either aneurysm or haematoma, brain tumour of either cerebellar haematoma, brain stem haematoma and/or colloid cyst.

Management

A physical assessment should be undertaken to ascertain the extent and seriousness of the condition, taking into account the infant's age and period of onset. The head circumference (occipito frontal circumference) should be regularly measured. Medical treatment with acetazolamide (diamox) should be commenced to reduce the production of cerebral spinal fluid in mild cases of hydrocephalus. Repeated lumbar punctures may be performed to maintain normal celebral spinal fluid pressure. Surgical intervention may also be undertaken, depending on the severity of the condition. This consists of the removal of obstructions such as tumours, cysts and haemorrhage (haematoma).

Another procedure that may be performed is a ventriculostomy, which involves the destruction of the third and fourth ventricle or the choroid plexus. A radio opaque ventricular catheter is inserted to shunt cerebro spinal fluid (CSF) from the ventricle to another area outside the central nervous system, for example, the abdominal cavity. These catheters have valves to prevent flow

back of blood or any other secretion into the ventricles. Types of valves in use are the Spitz Holter valve system, Hakim shunting system and Heyer Schulte Pudenz catheter.

Preoperative Nursing Care

You should monitor signs of increased intracranial pressure and report to the surgeon any changes. Also, continue to frequently measure the head circumference. Palpate the fontanelles gently for possible separation of sutures and tension. Vital signs should be taken and recorded (TPR/BP) every one or two hours. Any deviations should be reported immediately.

The child's behavioural changes, including persistent cries, should be recorded and reported. Regularly change the child's position in bed to prevent bed sores, that is, two hourly. The neck should be supported when the child is being moved. The parents are encouraged to participate in their child's care during their hospital stay, in preparation for discharge.

Postoperative Nursing Care

The preoperative care provided should continue after surgery, in addition to routine postoperative care. Immediately after surgery, vital signs should be monitored and recorded in one hour intervals, paying particular attention to increasing intracranial pressure (blood pressure/pulse rate, temperature and respiratory rate carefully noted). Other neurological observations, for example, the assessment of the level of consciousness, should also be continued.

The dressings on the operation site needs to be checked regularly. Always ensure that the child lies on the good side to prevent pressure on the shunt valve. Alternatively, they can lie flat on their back. Careful regular feeds should be given. Parental education should be continued from admission until discharge. Analgesics and antibiotics are also given.

Remember:
Be vigilant of possible postoperative complications and inform parents or guardians of this risk. These include infection, vomiting and meningitis.

Microcephaly

This is a relatively uncommon congenital condition where there is a defect in the growth of the brain. The size of the brain becomes three times smaller than normal. There are several predisposing factors which include:

- Foetal radiation
- Maternal phenylketonuria, which is an inherited metabolic amino acid phenylalanine because the liver has failed to release an enzyme called phenylalaninase
- Congenital infections may also contribute to this condition, for example, syphilis, neonatal herpes, rubella
- Intrauterine or neonatal anoxia

The condition presents in several ways: the ears are relatively large, the forehead slopes backwards and the head appears smaller.

Nursing Management
There is no treatment available for this condition. Parents should be supported and made to understand that.

Spina Bifida (1 of 3)

This is a congenital abnormality, which results from a defect in the formation of the skeletal arch enclosing the spinal cord. Although it may occur in any part of the spinal column and on the skull, it is more common in the lumbar region.

There are three degrees of abnormality.

Pathophysiology

Spina bifida is a common developmental defect of the central nervous system occurring in 1-2 of every 1000 newborn infants. The posterior portion of the lamina of one or more vertebrae fails to fuse with or without defective development of the spinal cord, and tends to occur mostly in the lumbar or lumbo sacral region. In the milder type (spina bifida oculta), there may be no need for any medical intervention while in the meningocele and meningomyelocele surgical intervention is
called for.

Management of Spina Bifida Cystica

Since meningomyelocele occurs more commonly than the other two forms, and is more severe in its clinical presentation, surgery is indicated and should be performed at the earliest opportunity to prevent possible neurological damage.

Pre and Postoperative Nursing Care

The objectives of care should be to prevent infection and injury to the sac, skin damage and urinary tract infection, which is likely to occur. These are achieved by performing aseptic technique dressing using warm normal saline until the operation is performed. The dressing should be changed at least four hourly.

You should continue with your assessment of the child's general condition, paying particular attention to the musculo skeletal functions, which may occur due to exposure of the nerve fibres. The vital signs should be taken and recorded every two to four hours and any deviation from norms reported to the surgeon.

Epilepsy (1 of 6)

Epilepsy can be defined as a neurological condition characterised by recurrent seizures. It is also referred to as a seizure disorder or a brain functional disorder that may be manifested as an episodic impairment or loss of consciousness.

A seizure is a sudden attack of altered cerebral function.
An epileptic seizure is the result of altered cerebral function
caused by abrupt, abnormal and excessive, uncontrolled
repetitive electrical discharges of cerebral neurons. A convulsion refers to a series of forceful, involuntary contractions and relaxations of the voluntary muscles.

Most epileptic patients experience their first seizure in childhood, but the age of onset varies from one person to another. Infantile spasms commonly start before one year of age, commonly between three to four

months. Thereafter, more generalised seizures occur.

For further information on epilepsy see unit three of this module.

Classifications of Epilepsy

This condition can conveniently be divided into three types.

The Three Types of Epilepsy

Petit Mal (small sickness)
This epilepsy, commonly seen in children, is characterised by sudden momentary loss of consciousness with only minor colonic jerks. The facial expression during an attack is blank.

Jacksonian Epilepsy
This is a moderate type of epilepsy named after a London neurologist called Dr. John Hunghlings Jackson (1835-1911). It is characterised by unilateral chronic (sporadic muscular rigidity and relaxation) movements that start in one group of muscles and then systematically spread to adjacent groups of muscles reflecting the match of epileptic activity through the motor cortex. Seizures are due to a discharging focus in the contra lateral motor cortex.

Grand Mal (Major Epilepsy)
This type results in loss of consciousness. It always occurs with usually well defined stages. This begins with the aura (warning) stage, which is characterised by certain unusual feelings such as peculiar sensation, funny smell, feeling nauseated, abdominal discomfort (gastric secretions) and flashing light. You should note that only some of these symptoms may be experienced by the patient at any given time.

This is followed by the tonic stage, which usually lasts about 10 to 20 seconds. All muscles become rigid, eyelids open, eyes look up and respiration stops temporarily resulting in cyanosis. The tongue is bitten causing bleeding, which can be seen from the mouth.

Next is the clonic stage, which usually lasts about 30 seconds. It begins with muscle relaxation, which completely interrupts tonic muscle contraction. There are brief violent muscle spasms of the whole body , frothing of the mouth and incontinence of urine and sometimes faeces as well.

The final stage is the comatose stage, where the patient goes into deep coma for minutes or hours. On recovery, they look confused and unaware of what has happened.

Investigations

The following investigations should be carried out to assist in identifying the causes of epilepsy.

Begin with a personal history, which must be specific. It should include when the condition started and the frequency of seizures in terms of how many seizures per day or per week. Also find out whether there was any warning such as an abnormal feeling or sensation before the onset of seizures, if there was loss of consciousness, speech interruption and so on, and confirm the duration of seizures.

You should then undertake a physical examination. This too may help to determine the cause of the fit. Any signs of physical

injuries following an epileptic attack may also be detected. An electroencephalogram (EEG) is extremely useful in demonstrating the type of fits according to areas of the brain which may function abnormally. However, some epileptic patients may also have normal EEG. You should take a blood test. Venous blood should be sent to the laboratory for urea level and microscopy. You should also undertake a blood pressure assessment and estimate arterial blood pH. Blood glucose level should be checked to exclude hypoglycemia.

Nursing Management

Since this is a medical emergency, commence care provision with first aid. While the seizure continues, ensure the patient's safety by removing all harmful tools or equipment around.

An epileptic seizure is a medical emergency! Remember the "ABC" rule. Ensure a clear Airway, to enable the patient to Breathe and loosen the clothing to facilitate Circulation.

The head should be protected from injuries by placing a blanket or a folded sheet underneath it.
If possible, ensure an airway in the mouth. Avoid restraining the patient, because that may cause further injuries, especially of the limbs. Ensure fresh air by removing onlookers.

During an attack you should observe the patient to identify the parts of the body that go into violent contraction or twitching to see how long each seizure takes and other abnormal activities during seizure.

Care after Seizure

Change into lateral position to facilitate drainage of respiratory secretions from the mouth. Observe skin, eye and mouth colour. Take and record vital signs to monitor tachycardia and hypertension. Observe the degree of consciousness and mental status, the length of sleep, response to sensory stimulation. Any sensory impairment such as vision and hearing should be reported.

Medical treatment involves the administration of anti convulsant drugs to control the seizure so that it is not prolonged thus
causing physical exhaustion. Common drugs prescribed may be either/or phenobarbitone (luminal) with a dose of 3-6mg/kg body weight or phenytoin sodium (epanutin), with a dose of 10-20mg/kg body weight.

Status Epilepticus

This is a very serious neurological condition whereby the patient has repeated seizures or convulsions one after another without recovering consciousness between attacks. If untreated, the patient may die from exhaustion.

Diseases of the Endrocine System

Following the brief overview of common disorders of the
nervous system, you will now look at some disorders affecting
the endocrine system.

First, you will look at diabetes mellitus, which is a common medical condition that you should find easy and enjoyable to learn about since, in your practice, you must have come across many adult patients suffering from it.

Diabetes Mellitus (1 of 7)

Diabetes mellitus is a clinical symptom characterised by hyperglycaemia due to relative deficiencies of insulin action caused by either a diminished excretion by the islets of Langerhans of the pancreas or due to the presence of insulin antagonists which render any insulin produced ineffective for carbohydrate metabolism resulting in glycosuria, ketosis and eventually coma. Although diabetes mellitus can occur in childhood, it is very rare in those under the age of two, and where it occurs there is a family history
of diabetes.

The real cause of this failure to function of the pancreatic islet of Langerhans is unknown. However, several possible predisposing factors have been identified.

Predisposing Factors of Diabetes Mellitus

- Infection, particularly viral, has been blamed for precipitating the problem
- Genetic factors account for a third of the cases
- Environmental factors promote clinical presentation
- Diet may play a role, for example, children on cow's milk early in their infancy are more likely to get the condition
- Stress stimulates the secretion of counter regulatory hormones and also modulates immune activity

Pathophysiology

Diabetes mellitus occurs from a relatively deficient, or complete absence of, insulin. This changes the metabolism of the body. In order to maintain life, the use of insulin may be necessary, especially in insulin dependent diabetes.

When insulin is deficient, or its action is hindered, glucose uptake and the storage of glycogen and fat are decreased. These events lead to the starvation of body cells and the accumulation of glucose (hyperglycaemia) and fat in the blood in the form of free fatty acids and ketone bodies. The failure of glucose to enter the cells leads to increased blood glucose level. The increased concentration causes fluid movement from the intracellular to the extra cellular spaces and into the kidneys.

Once the renal threshold is exceeded, glycosuria (glucose in urine) follows and this is accompanied by polyuria. Polyuria leads to electrolyte depletion and dehydration, which increases thirst (polydipsia), while cellular starvation results in hunger. Fat breakdown causes increased free fatty acids in the blood, which the liver converts to ketone bodies beta hydroxybutyric acid, acetoacetic and acetone. These, being acidic, lower blood PH.

Clinical Features

Although there is always some similarity of clinical presentation in diabetic children to that of adults, some differences tend to exist.

- In children the onset is usually very sudden.
- It appears as though emotional stress and infections such as measles and tonsillitis tend to trigger its onset.
- Excessive thirst and polyuria with high specific gravity.
- The child who never wets the bed at night changes to bed wetting. The child gradually becomes lethargic, weak and irritable.

- As dehydration occurs, the skin and tongue become dry.
- Rapid weight loss and developmental deterioration.
- The child may complain of abdominal pain.
- The penis or vulva is often red and irritated due to high sugar content in the urine.
- The urine contains sugar and acetone.
- Vomiting may be present as ketosis increases.
- This tends to speed up the occurrence of diabetic coma.

Diagnostic Investigations

Diabetes mellitus is more often overlooked or missed because other childhood illnesses overshadow the symptoms. Certain investigations are essential in confirming the diagnosis.

A personal history should be taken from the parents. A physical examination should then be undertaken, which includes blood specimen for sugar level estimation, a glucose tolerance test and urine testing for sugar and acetone.

Nursing Management

The child with diabetes mellitus should be admitted to the paediatric ward. Depending on the child's age, the parents should be requested to stay so as to participate in the care. This is important because, when the child finally returns home, the parents will be able to continue with the home care. You should continue to reassure the patient and parents periodically. You are responsible for monitoring the vital signs of temperature, pulse, respiration, blood sugar level four hourly, plus fluid intake and output. These must be recorded on the available charts.

An intravenous infusion of normal saline and dextrose 5%, calculated on drops per minute on a volume controlled pump to maintain continuous flow rate without overloading the circulation should be administered. The doctor and nurses should aim at stabilisation of the child's diabetes as soon as they are admitted in hospital. The child's own appetite should be allowed to regulate their blood sugar level. A very energetic child will become hungry from time to time and all this needs to be taken into account when planning their dietary requirement and insulin needs.

In order to maintain normal development, a diabetic child should normally be allowed to eat a less restrictive diet with the exception of large amounts of foods high in carbohydrate. Plenty of oral fluids should be encouraged as well as good general body hygiene. The child and parents should be taught how to manage diabetes. This includes insulin administration, urinalysis, diet control and any other essential health care pertaining to this condition. They should be helped to learn how to calculate insulin dosages, vary sites of injections and how to maintain the diabetic chart at home. Above all, they should be assisted to come to terms with the incurable medical condition as a disability.

Complications

Possible complications need to be pointed out to parents and older children. This is important, especially if other illnesses emerge when the patient is at home. The family should, therefore, be given elementary information to enable them to overcome any problem before the child is returned to hospital. The main complications to be highlighted are susceptibility to

infection. Any infections occurring should be promptly and adequately treated in an approved health institution. Coma is also a possibility.

Unconsciousness may result due to insulin given without food (hypoglycaemic coma). The parents should not administer insulin without a meal or glucose drink having been taken. Hyperglycaemic coma may also occur, especially if the child on insulin skips the dosages and does not adhere to the prescribed diet.

Hypothyroidism (Cretinism) (1 of 6)

This is an endocrine disorder in which the thyroid gland under secretes its hormone, thyroxine. In children, this condition is known as cretinism. As a paediatric condition, hypothyroidism is usually congenital and can be sporadic and familial. It can easily be missed at birth because the infant carries a small amount of thyroxine from maternal circulation. As the amount of thyroxine decreases, the general metabolism is slowed down and symptoms appear. The condition occurs in approximately one in every 5,000 births and for unexplained reasons, is twice as common in girls as in boys.

Pathophysiology

Congenital hypothyroidism is most commonly due to developmental defects of the thyroid gland. It can also be caused by various biosynthesis defects of the thyroid hormone. At eight weeks of pregnancy, the thyroid gland has fully developed to occupy its usual space and becomes active by the twelfth week. The activity remains slow and gradually increase after twenty two weeks.

Clinical Features

The clinical manifestations of congenital hypothyroidism may appear in the first few weeks or months after birth. However, early diagnosis may be rather difficult because the symptoms tend to emerge gradually.

Symptoms of Congenital Hypothyroidism

- Delayed physiological jaundice (yellow appearance), pallor and anaemia
- The skin is cold, coarse (rough in texture) and dry
- The hair is brittle (hard and easily broken)
- Broad, flat nose with a depressed bridge lies between small widely spaced eyes
- The lips are thick and the tongue apparently too large for the mouth, and therefore, protrudes
- Large abdomen, constipation and umbilical hernia are common features
- The neck looks short due to pads of adipose tissue over the clavicles
- Retarded bony development leads to late closure of the fontanelles
- The head is disproportionately large and there is delayed appearance of the teeth
- The affected infants are dull looking, placid (calm and not easily excited or upset) and
  good natured

- There is subnormal temperature and slow pulse rate due to suppression of general metabolism
- Speech develops late and, in some children, only elementary vocabulary may be achieved as they become older
- The child has feeding difficulties
- If the condition is not arrested early, the child becomes mentally severely subnormal

Investigations

Unlike in adults, the basal metabolic rate is not commonly performed. In cases where it is, it will be found to be far below the normal range. You should take a personal history and carry out a physical examination. Blood is taken to the laboratory to test for cholesterol and serum lipid levels which will rise in hypothyroidism, as well as for creatinine and protein bound iodine levels, which are generally low. An electrocardiography may be used to detect the effect on the heart. Additionally, a bone x-ray may be performed in older children as a means of estimating the
bone age.

Nursing Care

Remedial measures should be taken before the child becomes retarded. Once the condition is confirmed, the infant should be kept warm and fed as frequently as possible, increasing the amount of food as the condition improves. The infant's safety must be assured, especially when in their cot, paying particular attention
to respiration.

Vital signs, that is, temperature, pulse and respiration should be monitored two to four hours initially, and later twice a day. Endeavour to encourage the mother to participate in the care of her baby by playing with them in order to encourage the infant's physical and mental development. The child should be weighed at least twice a week as a way of monitoring their progress.

As soon as the condition is diagnosed, the infant should be commenced on drug treatment. Observe the side effects of the prescribed drugs and teach the mother to do the same, reporting any progress or development in the process. The drug of choice is Thyroxine, prescribed as 25 micrograms daily for infants. This dosage may have to be increased gradually until the baby has tachycardia, diarrhoea and alertness. This is undertaken to determine the maintenance dose, which becomes life long treatment for hypothyroidism.

Section 8: Integumentary (Skin) Conditions and Disorders of the Special Senses

Introduction

You have now come to the last section of this unit. In this section you will look at the organs through which you see and hear, that is, the eye

and the ear, and the organ that gives the sense of touch, that is, the skin. The skin can also be viewed as part of the elimination system.

Objectives

By the end of this section you will be able to:

- Define and list some common skin conditions and disorders of the special senses
- Recognise causes and clinical features of the most common skin conditions and disorders of the special senses
- Describe the nursing care and medical management in relation to the most common skin conditions and disorders of the special senses
- Identify possible complications that may arise

You will start with the most common skin problems.

Integumentary (Skin) Conditions

Children, unlike adults, tend to develop skin problems due to the fact that they play a lot with various objects, which are often not clean.

You will now study the common childhood skin conditions on the following pages.

Eczematous Dermatitis (1 of 4)

This is a skin disease, which is characterised by the inflammation of both the epidermis and dermis. It can be classified as acute or chronic, non infectious or infectious, and non contagious or contagious. It can be further categorised as primary or secondary, infantile eczema or primary contact eczema.

Types of Eczema

The two main types of eczema are infantile eczema (atrophic eczema) and primary contact eczema.

Infantile Eczema

The cause of infantile eczema is unknown but is thought to be primarily the result of allergies. It tends to affect babies of about three months old, with baby boys more commonly affected than girls. Often, the affected boy will have blue eyes. Another predisposing factor is a history of allergic conditions in the family, for example, asthma or hay fever. Such allergies may develop later in the child when they grow up.

Clinical Features

The disease usually manifests with a general itchy rash when the baby is only a few months old. At the age of two years, the rash tends to become localised around the joints such as wrists, elbows, knees and ankles. The face and neck are then affected. The eczema normally weeps and forms crusts. The severity of the disease varies from mild to severe, with the latter especially evident when the child is under psychological stress. Most cases under this category clear up by the time of adolescence.

Primary Contact Eczema

This type of eczema is more common in adults but is briefly addressed here because it can affect any age group including children. As the name suggests, it occurs when a person's skin gets into contact with certain irritant substances. Substance within this category may include:

- Foodstuffs, for example, cow's milk, fish, chicken and eggs
- Industrial chemicals, for example, soap powder/bathing soap or certain types of petroleum oil
- Drugs, for example, antibiotics such as streptomycin, penicillin
- Others, for instance, house dust, pollen, animal fur and so on

Clinical Features

A rash is commonly detected first on the forehead, cheek and/or scalp, with the area surrounding the mouth remaining clear. This rash then spreads to the elbow and behind the ears and finally to the rest of the body. Blisters on the affected areas are filled with clear fluids, known as vesicles.

Following this, redness and itching cause the patient to scratch. Minute papules and vesicles form, which weep and ooze out. They become crusty and will eventually scar.

Diagnostic Investigations

The following diagnostic investigations should be undertaken:

- History taking from the patient, parents or guardians
- Physical examination to identify vesicle distributions all over the body
- Skin tests to exclude the possibility of other causes
- Swab specimens from oozing fluids of vesicles should be tested in the laboratory to exclude other secondary bacterial infections

Nursing Management

The child should be nursed in a cool environment with plenty of fresh air. Bodily hygiene is paramount and you must encourage and provide a daily bed bath, change of clean clothes and bedding. A high protein diet with plenty of fluids should be provided to promote the healing process. Once the offending substances have been identified, they should be avoided.

The medical treatment for this condition involves the administration of potassium permanganate 1:5000 solution in saline bath daily. An antihistamine, for instance phenergan or piriton, should be orally ingested to ease itching. Topical application of steroid creams such as hydrocortisone cream or fluorinated steroids can also help to ease skin irritation. Antibiotics should also be administered orally or topically for secondary infections.

Complications of Eczema

There are several complications associated with the disease.

- Staphylococcal infection
- Localised eczema, which becomes widespread and can lead to secondary eczema
- Acute eczema can become chronic unless controlled early
- Fungal skin Infections

There are a number of fungal skin infections commonly seen among children in tropical countries. Read on for some, which are also seen in clinical practice in Kenya.

Ringworm/Tinea

This is a contagious fungal skin infection, which usually affects the horny layer of the epidermis. There are many types of ringworms, but in this section, only those common in children will be discussed, which are:

Tinea Capitis (Tinea Tonsurans)

This type of ringworm is common in children under the age of ten years and affects the scalp.

Clinical Features

The child presents with non painful circular or ring like patches on the scalp or anywhere on the body. The patches appear pinkish in colour with slightly raised borders of very small vesicles.
On the head, the red patches tend to scale off leading to hair
loss (alopecia).

Treatment for Ringworm/Tinea

Although the diagnosis is obviously confirmed by physical examination, skin scraping for culture and sensitivity may be performed in some cases. The patient should be instructed to maintain general body cleanliness by washing and changing all clothing daily.

The patient's hair should be cut short around any ringworm infection on the scalp. Sharing of combs, towels, clothes and beddings is discouraged, especially between infected and non infected children. The infected area needs to be kept dry at all time. Although spontaneous resolution may occur in certain cases, some lesions may require treatment for about two weeks.

Whitfield's cream is the drug of choice, although gentian's violet 1% may be applied to the affected areas twice daily. In some resistant or widespread lesions indicating severe scalp infections, the patient should be transferred to the hospital for further investigations and management. Antifungal ointments and antibiotics may, in certain cases, be prescribed.

Bacterial Skin Infections (1 of 5)

Impetigo Contagiosa

This is a very common contagious bacterial skin infection, which affects the superficial layer of the epidermis, especially the horny layer. It tends to affect mostly young children and spreads very rapidly from one child to another. Flies are also known to play a part in its spread.

The main causative micro-organisms are Staphylococcal aureus and beta haemolytic streptococcus. This later group can also be responsible for rheumatic fever or acute glomerunephritis.

Clinical Features

The typical lesion starts with a small blister, which becomes purulent. Sometimes the small blisters become larger containing yellow fluids. From the surface of the pustule, serum and pus
leak through. The lymphatic nodes around the affected areas become enlarged.

The main areas of the body usually affected include the face, that is, around the mouth and behind the ears, the scalp and chin and eventually, the rest of the body. Low grade pyrexia and general malaise are present.

Note that malnourished children are more prone to impetigo.

Clinical Investigations

A personal medical history is obtained from the child's parents. A physical examination of the child is also undertaken. This includes a skin scrape for microscopic examination to rule out scabies and a swab specimen from the itching scabs or crust for culture and sensitivity tests. You should also take nasal swabs for microscopic examination, culture and sensitivity and determine whether they show a heavy growth of streptococci.

Nursing Care

It is essential that the patient is isolated in a cubicle to prevent spreading the infection to others, given the contagious nature of the disease. Isolation should continue until the scabs have cleared.
The parents and the nursing staff must make every effort to take precautionary measures to prevent cross infection occurring in the ward.

Sources of staphylococcal or streptococcal infections should be investigated. Trace any routes of contact in the family circle and ensure that anybody found with streptococcal infections in the nose is treated with antibiotics.

The child should be given a daily bath to remove the thick crusts. A starch poultice can also be used. Temperature, pulse and respiration are to be monitored regularly, either every four hours or twice a day. The child's head is best shaved.

Medical Treatment

Apart from bathing with soap and warm water, half strength of hydrogen peroxide, hibitane or phisohex may be ordered if readily available. Local application of gentian violet 1% solution or tetracycline ointment may be useful.

Systemic antibiotics such as cloxacillin or erythromycin may also be prescribed. Calamine lotion should be used to soothe itchiness.

Endeavour to ensure that certain precautions are taken to minimise the incidence of impetigo in the community. Family members in the community should be examined and those found to be infected should be treated immediately. Sharing or borrowing of cloths, towels, combs should be discouraged. Overcrowding in sleeping rooms, especially the sharing of beds, bed sheets and blankets, should be avoided as much as possible. General bodily cleanliness should be encouraged at all time.

Scabies (1 of 2)

Scabies is a very common contagious skin condition caused by the female parasite called the itch mite (acer's scabie or sarcoptes scabie). It tends to spread rapidly as a result of close contact with an infected individual. Mites normally burrow at night and, thus, the infection is much more likely to spread if an infected and uninfected individual share a bed. Sharing the infected person's bed sheets and personal clothes can also spread the disease.

The female mites burrow under the skin where they then lay their eggs. The mite is as tiny as a dot in print and can be seen as raised lines on the laying site. In about four days, the larva hatches and leaves the tunnels to go to the skin surface where a few form moulting pockets and cause intense irritation.

Clinical Features

The infection manifests in the following manner:

- The skin lesions are chiefly vesicles and papules.
- The patient experiences severe itching of the skin, particularly during the night and more so when it is warm. This itching leads to scratching, which in turn causes secondary infection with bacterial agents such as impetigo.
- The infection is mainly found in between the fingers, wrists, arms, legs, toes, anxillae, groin and buttocks.
- There are small whitish burrows with greyish spots on the skin.
- Excoriations (abrasions) and scratch marks are most profuse around the affected areas.
- Persistent papules are common on and around the scrotum and on the anxillae.

Diagnostic Investigations

Begin by taking the patient's personal history. Undertake a physical examination of the affected areas. Take samples of scraping from lesions, which can be examined under microscope for parasites.

Management

The aim should be to prevent the spread of infection whether or not the patient is hospitalised. More often than not they will be treated as an outpatient. If hospitalised, the child should be isolated from others to minimise the spread of infection.

The child should be washed with warm water to soften the vesicles. The crusts should then be scrubbed, after which benzyl benzoate 25% emulsion should be applied, starting from the neck downwards. The application should be repeated the following day, omitting the bath, and on the third day after the patient has been bathed. All beddings and clothes must be thoroughly disinfected.

In order to prevent the spread of infection in the community, the patients, close relatives, and friends of the child should be examined and those suspected to be infected should be treated immediately. Members of the community, especially young children, should be encouraged to have a bath at least once daily or every other day. Overcrowding in sleeping rooms should be avoided or discouraged. Borrowing of clothing should similarly be discouraged, as these are some of the ways skin diseases spread.

Insect Bites (Papular urticaria)

Bites of various kinds of insects (mosquitoes, fleas, mites, ticks, lice, bedbugs) may cause rather severe local reactions in sensitised individuals. There is localised oedema with surrounding redness, and frequently intense itching. Secondary infection may occur.

Treatment

- Clean the body.
- Apply calamine lotion locally.
- Antihistamines are only useful systematically, that is, promethazine (Phenergan) 1mg/kg/day in three

divided doses orally. Antihistamine ointment is of no use and is liable to cause sensitisation.

Jiggers

The pregnant female sandflea (tunga penetrans) burrows into the skin, especially on the toes and feet, and ultimately grows to discharge its eggs if not removed. These may hatch out on or in the skin to grow into adult fleas and cause superinfection. This produces severe itching and inflammation.

Fatal tetanus infection can be a complication in an unimmunised child

Treatment

- Clean the infected areas properly.
- Remove the flea with a sterile needle.
- Cover the wound with antiseptic gauze.
- You can also ask the mother to remove the jiggers with a fine, clean instrument if she has ever done it at home. Advise her to wash the child's feet thoroughly with soap and water before, and for two days after, the procedure.

Conditions of the Ear (1 of 5)

Otitis Media and Mastoiditis

The ear, nose and throat are anatomically closely related. This means that infections can quite easily spread from one to the other. The inflammation of the middle ear is a common condition in children, which emerges as a secondary infection following a sore throat, common cold, tonsillitis, dental problems, mouth infections and ascending infections from the upper respiratory tract through the Eustachian tube.

Predisposing Factors

The function of the eustachian tubes is to clear secretions produced by the middle ear into the nasopharynx in order to equalise the external air pressure with the pressure in the middle ear.

Disease in the middle ear is usually common in infancy and early childhood for several reasons:

- The eustachian tubes in very young children are wider, shorter and lie in a more horizontal position than those of adults and older children.
- Young children's eustachian tubes open more easily than those of adults and older children because the supportive cartilage is stiff.
- Children have numerous lymphoid tissues plus adenoids in the pharynx, which can easily obstruct the openings of the tube.
- Infections easily occur in young children because they have an immature humoral defense mechanism.
- Children have frequent incidences of the upper respiratory tract infections, thereby permitting micro-organisms to ascend through the eustachian tubes to the middle ears.
- The drainage from the eustachian tubes is reduced by frequent accumulation of liquids and milk in the pharyngeal cavity because infants and the young children usually assume supine position.

Clinical Features

Clinical features of the disease include the following:

- A history of insidious onset with one of the first signs being the child rolling their head on the pillow and pulling their ear because of severe irritation.
- Pain becomes increasingly severe as the body temperature rises to about 39-40 degrees Celsius.
- The child is very irritable, resents being touched and looks toxic.
- Diarrhoea, vomiting and convulsions are common features of otitis media.
- The blood vessels of the tympanic membrane (eardrum) look dilated and congested on examination.

- The eardrum may be opaque due to the presence of pus.
- Mobility of the eardrum is lost and bulges outwards.
- Hearing may be temporarily impaired.

Diagnostic Investigations

There are a number of simple investigations, which will confirm the diagnosis. Begin with a personal history from the parents or guardians of the child. A physical examination, to include the ears, throat and cervical lymph nodes, should be undertaken. Additionally, take pus swabs for culture and sensitivity from the discharging ears.

Nursing Care

Due to severe pain, pyrexia and discomfort, the child is best nursed on bed rest with the affected side downwards to facilitate drainage of pus if any. This is done until the temperature settles.

Pain is best controlled by use of mild analgesics such as paracetamol given three times a day. This will also help to lower the temperature. The child's vital signs are best taken and recorded four hourly. Any abnormal findings should be reported to the doctor without delay.

Mechanical methods of reducing body temperature may be used depending on the degree of pyrexia. These include exposure, that is, reducing bed linen and night wear, open windows (do not subject the child to direct draughts), tepid sponging or use of an electric fan.

Medical Treatment

The doctor may prescribe antibiotics such as ampicillin or amoxyl syrup to be administered orally or by intramuscular injection. Alternatively, septrin syrup may be prescribed. When the eardrum is grossly bulging, surgical measures may have to be undertaken. This procedure is known as a myringotomy (incision of the eardrum) to facilitate pus drainage from the middle ear. Daily or BD aural toilet should be performed using normal saline. A pad is held over the ear with a strapping (no packing of ear should be carried out in such cases). Pain usually abates after pus has been drained out.

Complications of Otitis Media

In a few cases, where the infection is inadequately treated, complications may develop. These include meningitis, chronic otitis media, mastoiditis and otitis intima, leading to deafness.

Chronic Otitis Media

This is a chronic suppurative inflammation of the eardrum. It is characterised by recurrent or persistent purulent discharge from the external auditory meatus.

Clinical Features

Chronic otitis media usually presents with

some or all of the
following symptoms:

- Persistent or recurrent pus draining from the ear
- There is some degree of hearing loss
- Necrotic inflammatory changes occur in the middle ear
- The patient may have pyrexia but not always
- History of previous acute otitis media is usually given by parents/guardians

Management

The patient should be nursed on bed rest until apyrexial. A pus swab from the ear should be taken to the laboratory for microscopic culture and sensitivity, so that the appropriate antibiotics may be prescribed by the doctor. The ear is gently cleaned three to four times a day before instillation of eardrops. The ear should be covered from outside (never packed) to facilitate drainage. The skin around the ear should be kept clean to prevent excoriation and to maintain comfort. Parental reassurance and education are also essential.

Mastoiditis (1 of 3)

The inflammation of the mastoid very commonly occurs as a complication of chronic otitis media. Inflammation involves the mastoid cells and antrum. The canal, which connects the middle ear with the mastoid antrum, becomes blocked resulting in the accumulation of pus under tension within the antrum and its associated air cells. The condition can be acute or chronic in itself.

Clinical Features

Mastoiditis presents in several ways. These include the following:

- The child looks miserable, febrile and toxic.
- There is increased pain in the affected ear.
- The pain extends to the mastoid process, which becomes swollen, tender red and oedematous as a result of increasing pressure.
- This process causes the pinna of the ear to be pushed forward.
- More often, the patient has a history of otitis media or upper respiratory tract infection.
- In some cases, the accumulated pus bursts through the outer wall of the mastoid process to form an abscess under the skin behind the ear.
- The abscess may also form under the sternocleidomastoid muscle, a condition called 'von Bezold's abscess'.
- The infection can also extend to cause cerebral or cerebellar abscesses or lateral sinus thrombosis.
- Due to pain and pyrexia, the child becomes restless, cries a lot and spends sleepless nights.

Management

In the early stages of infection, the child can be treated medically. The child is confined on bed rest until the fever settles down. Temperature, pulse and respiration are taken and recorded four hourly. Hyperpyrexia calls for mechanical methods of lowering the temperature, that is, the removal of extra bed clothing and personal wear, use of electric fan, tepid sponge and so on. You should constantly monitor the child's condition and inform the doctor should there be any changes in the child's condition.

Depending on the age of the patient, they may be put on intravenous infusion to counter toxaemia, although this may not be necessary. You should encourage frequent oral fluid intake, which must be recorded in

a fluid balance chart. A light, soft nourishing diet should be given to facilitate the healing process. The parents will require constant reassurance and should be encouraged to participate in their child's care while in the hospital ward.

Medical Treatment

With the advent of modern antibiotics, acute mastoiditis can easily be cured provided the patient is brought to hospital early on in the development of the infection. The prescribed drugs may include penicillin, gentamycin, ampicillin, amoxycillin or tetracycline. Analgesics/antipyretics, such as soluble aspirin or paracetamol, may also be ordered. The dosage prescription of any drugs will depend on the age and condition of the patient.

Surgical Management

The majority of children with acute mastoiditis improve on medical treatment. A few, who may come to hospital too late, or those who have not responded, will require surgical intervention. There are two methods employed in the surgical management of mastoiditis.

Cortical Mastoidectomy

A curved incision is made over the mastoid process, which is exposed freely and the outer layers of bone chiselled or gouged away in order to expose the infected antrum and air cells. The antrum and air cells are opened up to establish efficient and free drainage. The cavity so exposed is mopped out and drained. The skin incision is usually, closed and the dressings applied are left undisturbed for about four days.

Postoperative Care

The child is nursed on bed rest for a few days. The child's vital signs must be taken every two hours and recorded. This is essential to monitor early onset of complications, which may occur. They should be given fluids to prevent dehydration and also to counter toxaemia. The diet should be composed of light, soft and nourishing foods. The operation site should be inspected regularly and on a daily basis. Postoperative analgesics and antibiotics should be administered as ordered.

Radical Mastoidectomy

This is a more extensive procedure than the cortical mastoidectomy because in this case the mastoid antrum, the middle ear and the outer ear are opened up to form one single large cavity. This type of operation is not commonly performed on children.

Complications of Mastoiditis

One or more complications may occur with untreated mastoiditis.
Some of these include:

- Cholesteatoma, which is a collection of epithelial cells, bacteria, pus cells and cholesterin crystals, which form a tumour-like mass. It develops within the temporal bone and erodes the walls of the cavity in which it forms. It is usually a common complication in chronic otitis media.
- Eczema and boils of the outer ear.
- Facial paralysis, which occurs when the facial nerve (the cranial) is accidentally damaged during an operation or there is inflammatory thickening of the wall of the canal.
- Meningitis and brain abscess may also occur. Intradural or extradural abscesses require surgical drainage.

Prognosis of meningitis from mastoiditis is very grave.

- Lateral sinus thrombosis, that is, the lateral sinus collects its blood from the interior of the skull and emerges from the internal jugular vein. It may become thrombosed due to acute or chronic inflammation. Treatment involves the use of antibiotics and anticoagulants.

Common Eye Problems (1 of 8)

Conjunctivitis

This is an inflammation of the conjuctiva of the eye. It is a very common medical problem in children of different age groups. There are several causes of conjunctivitis. These include:

- The newborn infant may become a victim of gonococcal eye infection during its passage through the birth canal if the mother was suffering from the disease.
- Dirty fingers and contaminated items used for the child's hygiene maintenance may infect the eyes resulting
in conjunctivitis.
- It may occur as a secondary infection following other diseases, for example, common cold, measles, sinusitis and other respiratory conditions.
- Foreign bodies in the eyes, for example, chemicals, soil, insects and other eye injuries.

There are several different types of conjunctivitis, which will now be covered in detail.

Ophthalmia Neonatorum

This inflammation is commonly seen in the newborn within the first one week of life after birth. It is commonly due to gonococcal infections through the birth canal of the mother who may have been suffering from gonorrhoea.

Clinical features include swollen and sticky eyelids, purulent discharge from the eye and a reddened conjunctiva.

Preventive Care

During the antenatal clinic attendance, the expectant mother should be thoroughly examined to exclude any unusual discharge from the vagina. Pus swabs should be taken for microscopic examination culture and sensitivity. Appropriate antibiotics should be administered as necessary. It is also good practice to ensure the sex partners are examined and treated to prevent possible reinfection. As a prophylactic measure, all babies born in hospitals and health centres should be given antibiotic eye drops/ointments, for a few days before discharge.

Curative management

Babies confirmed to have gonococcal neonatorum should be treated with penicillin 300,000 i.u. administered intra muscularly daily.

Other Bacterial Conjunctivitis

Clinical features of these categories of conjunctivitis include reddened conjunctiva, purulent discharge and sticky eyelids. Vision usually remains normal, although pain may be present.

Management

Take a pus swab for culture and sensitivity. Start the child on systemic antibiotics and apply tetracycline 1% eye ointment three times a day for one week. If there is no improvement within that period, refer the child to hospital or eye clinic. You should not forget to advise the patient to maintain high standard of hygiene.

Viral Conjunctivitis

Clinical features include increased production of tears (lacrimation) and an inflamed conjunctiva. There is, however, no pus discharge and the eyelids are never sticky.

Management

Management procedures are similar to those used to treat the bacterial type of conjunctivitis. Tetracycline 1% ointment, administered three times a day for one week, is meant to prevent secondary infections.

Allergic Conjunctivitis

This type of conjunctivitis is due to antigen antibody reactions in the body, which are clinically manifested in the eyes. Mostly the conjunctiva and margins of the eyelids are inflamed. The surrounding areas near the cornea may also be inflamed. It is more common in boys of three to fifteen years old than in girls.

Allergens may include dust, pollen from plants, certain types of drugs and cosmetics.

Clinical Features

The infection presents in several ways. This includes:

- Rubbing and scratching of the eyes
- Itching of the eyes
- Lacrimation (tears flow from the eyes)
- On examination, there will be redness of and white spots on the conjunctiva
- The conjunctiva near the margin of the cornea will be brown in colour

Prevention Management

Remove the source of the allergen or avoid it in cases where it
is known.

Treatment Management

This is a self limiting disease, which means that the patient requires constant reassurance. Zinc sulphate 1/4% drops into the eyes three times a day for five days may be effective. If the condition is severe, then the patient should also be given 4 mg piriton tablets three times a day for three days. If no improvement is observed, then the patient should be referred to an eye clinic for further management.

Chemical Conjunctivitis

Various chemicals may accidentally splash into the eyes resulting in this type of conjunctivitis. The chemicals, which may be offending, include concentrated acids, concentrated alkalines and detergents such as soap solutions and bleaches.

Management

Management involves first aid treatment. The eye should be irrigated for 30 minutes using water or milk or normal saline. Apply eye ointment if readily available. Apply an eye pad loosely and refer the patient to an eye clinic for further management.

UNIT FIVE PART ONE: CRITICAL CARE NURSING

In this unit you will cover the care of the critically ill looking at the concept, identification process and management of critically ill patients.
This unit is composed of four sections:
Section One: Critical Care Concepts.
Section Two: Assessment and Admission.
Section Three: Management of Critically Ill Patients.
Section Four: Special Procedures and Investigations.

Unit Objectives

By the end of this unit you will be able to:

- Describe critical care nursing
- Describe the types of patients who need critical care nursing
- Describe the facilities available for providing critical care nursing
- Describe the admission procedure of the critically ill patient

SECTION 1: CRITICAL CARE CONCEPTS

Introduction

In your practice, you might have experienced a situation where the life of a patient was lost but could have been saved had the situation been handled with a different approach. It is, therefore, important for you to learn the approaches that would increase patient survival rates by improving the care you give to support a failing biological system.

Objectives

By the end of this section you will be able to:

- Describe critical care nursing
- Describe the types of patients who need critical care nursing
- Describe the facilities available for providing critical care nursing

Definition of Critical Care Nursing

The Oxford Pocket Dictionary defines the word critical as ‘at a crisis’. The word ‘crisis’ is defined in the Dorland’s Pocket Medical Dictionary as: 'The turning point of a disease for better or worse, especially a sudden change'. It follows, therefore, that critical care nursing can be defined as the nursing care given to a patient whose health is in danger or in a crisis, so as to save their life or prevent complications.
The main purpose of critical care nursing is to maintain accurate continuous observations of the patient's vital functions and to treat or support a failing or failed biological system. It focuses on the whole body system so as to maintain health.
Now move on to look at the types of critically ill patients commonly seen in your health facilities.

Types of Critically Ill Patients

During your practice as a nurse you will have come across a patient whose condition you would have classified as critical. Before you proceed, reflect on why you classified that patient as critical.

It is possible you may have based your judgment on the following observations:

- The magnitude or extent of anatomical structural damage, for example, second degree burns of more than 25%
- Severe injuries to the head or chest
- The effect of the disease/condition on circulation, breathing, and electrolyte balance
- The organs affected by the disease, for example, cardiac arrest, respiratory failure, pulmonary distress, and renal failure

Going by this approach, a critically ill patient is one whose physical condition, physiological and psychological state poses an immediate threat to their life.
By now you must have realised that critically ill patients need total and specialised nursing care. This care is usually provided in special facilities. However, one fact that you as a health worker must bear in mind, is that their survival rate will highly depend on your quick and accurate intervention.

This should be prioritised on the ABC principles of first aid care, which state that:

- **A**irway must be established and maintained
- **B**reathing established
- **C**irculation must be promoted and maintained

Having examined the definition and types of critically ill patients, move on to look at the facilities available for critical care.

Critical Care Facilities

Perhaps, during your experience while working in the nursing profession, you have come across the terms acute room, intensive care room/unit, burns unit, or renal unit.

Acute Room

Have you come across or heard about the acute room?

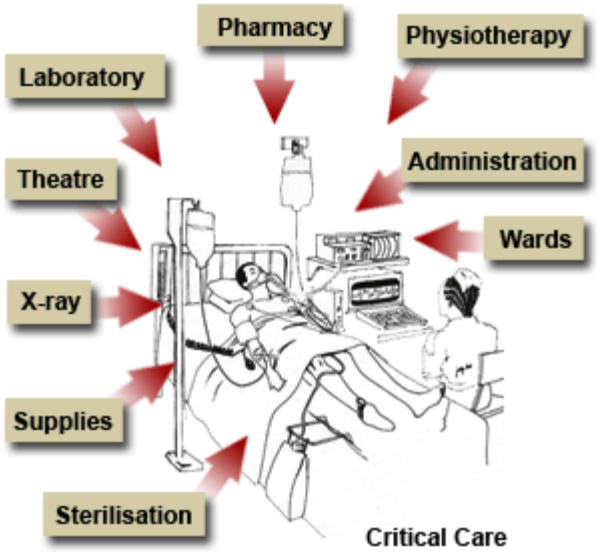
Reflecting on your practice in the nursing profession, have you thought why it is referred to as an 'acute room', is it because of its location, equipment, or condition of patients nursed there?
Actually, all of these factors are important. For example, the location must allow easy access to continuous monitoring of patients by the health team. Patients who are nursed here require life support equipment and continuous monitoring or observation. Hence this room must be located closer to the nursing station than others. These patients do not only need close observation but also full time communication with the nursing team. This ensures continuity of care.
The following equipment should be available and in good working condition in the acute room:

- Suction equipment, should include suction machines and a tray containing sterile suction catheters. These are necessary to help clear the patient's airways.
- Oxygen administration equipment fully assembled, ready for use. This includes full oxygen cylinder, gauge and mask.
- Intravenous administration apparatus, which includes drip stands, intravenous administration sets and a stock of intravenous fluids.
- Adequate stocks of linen as patients nursed in this room often require frequent changing of bed linen.
- Other requirements include observation equipment that is, thermometers, stethoscope, blood pressure machine, a torch, diagnostic sets, etc.

It is recommended that a nurse should always be in the acute room, preferably at a ratio of one nurse to two patients at any given time.
An acute room can, therefore, be set up in a ward where one cubicle/corner can be identified and set aside for patients needing critical care in hospitals without established intensive care units. These include post-operative patients during the first 48 hours, unconscious patients, patients under special procedures, for example, under water seal drainage, patients with severe respiratory distress, etc.

Intensive Care Unit (ICU)

This can be defined as a room/unit in which a critically ill patient is being actively treated as well as monitored. The purpose of intensive care is to maintain life until the precipitating causes of body failure can be identified and successfully treated to allow the system to regain self-control.
Intensive care units are more advanced than acute rooms. Generally, there is no universally ideal plan for an intensive care unit and each unit varies according to the needs of the patients it will take care of.
The ratio of nurse to patient should be 1:1 at any given time. Ideally, no new hospital should be built without an intensive care unit. The size of the unit depends on the size of the hospital; one bed for every 50 beds in the hospital is the most ideal.



The size the hospital and the type of patients receiving care in the hospital are important for several reasons. A small hospital, such as a District Hospital, is normally expected to refer patients requiring specialised care to larger hospitals so it does not require a very large ICU. Most of the time, these hospitals have an acute room with only a few beds to take care of emergency acute cases. Otherwise, they refer the majority of critically ill patients to provincial or regional hospitals where specialist doctors are found. As a result, provincial or regional and national hospitals are bound to have ICUs.

As previously mentioned, the type of patients receiving treatment in the hospital should also be taken into consideration. It has been argued that in hospitals with specialised care such as cardio-thoracic or neuro-surgical units, the proportion of beds allocated to ICU will be higher than in a general hospital.

The minimum number of beds to establish an ICU should be four. This is to merit the staffing and equipping of the unit. A smaller number of beds may not be cost effective. Where possible the unit should be easily accessible to the casualty area, the labour ward and the operating theatre, as a delay in the transfer of a critically ill patient from these areas can be critical.

The unit should provide adequate space for storage of equipment. It should have space for a preparation room, offices and a day room for nurses and doctors. The space allocated to one bed should not be less than two bed spaces in a general ward. This will allow enough space for quick movement and spacious allocation of patient care machine/electronics like bedside monitors, ventilators, drug pumps etc.

In general, cubicles are preferred for surgically clean cases, as there is evidence that they prevent cross infection. One large area can be divided into cubicles of intensive care so as to serve several purposes, for example, isolation room, thoracic surgery room, neuro-surgical room, etc.

Infection prevention measures should include changing of clothing before entering the unit, control of visitors, high standard of ward cleaning, frequent nasal swabs from unit staff, frequent decontamination of unit sinks, drains, sink floors, walls, beds and other equipment with disinfectant.

The unit requires ventilation and heating systems, piped gases (oxygen and nitrous oxide) and piped vacuum for suction with low and high-pressure outlets at every bed space. Adequate lighting with emergency connection to a standby generator is also necessary.

A 24 hour laboratory service is essential for an intensive care unit. Blood gas analysis should be available at all times. Technical assistance for maintenance and operation of electronic equipment should similarly be available on 24 hour basis. Ideally, each bed should have monitoring oscilloscopes. A resuscitation trolley, which is fully equipped and checked daily, must always be available in the unit. A defibrillator and pacemaker must also be available at all times. The beds should be portable and adjustable to the patient's needs and comfort. Ripple mattresses are preferred.

Types of Intensive Care Units

General Intensive Care Unit

This is where one unit admits all types of patients. This is the most common in Kenya. It admits: adults, neonates, paediatrics, cardiac care patients and burns patients, etc.

Coronary Care Unit

This admits only those suffering from coronary and heart related emergencies. Examples are myocardial infarction and heart surgeries.

Paediatric Intensive Care Unit

These admit general paediatric emergencies.

Neonatal Intensive Care Unit

Neonates requiring critical care are admitted and managed here.

High Dependant Unit
These function as a step down to ICU. Patients are nursed in these units after discharge from ICU before getting to the general wards.

Burns Unit
You have looked at an intensive care unit in general but it is important to note that many hospitals do not have separate units for the different types of critical care given. In most cases, they are all carried out in the intensive care unit. However, here you will look at the burns unit as a special section of the critical care areas.
Special burns centres are ideal for the care of the patients with burns, however, in the Kenyan health facilities, most burns patients receive care in the general ward of a hospital (due to lack of space or financial capacity). The burns unit is basically designed to reduce the risk of infection. Infection in burns occurs as a result of the loss of the mechanical barrier provided by the skin cover. It must, therefore, be maintained at a very high level of cleanliness.
Infection control measures such as management of visitors and changing of garments and shoes before entering the unit must be adhered to. The unit must be well ventilated. Medical staff should avoid working in the unit when they have upper respiratory tract infections. In an ideal situation, a burns unit is supposed to meet all the requirements of an intensive care unit.

Renal Dialysis Unit
This room is designed to ensure maintenance and sustenance of the life of patients during the dialysis procedure. The unit is piped with a specially treated water system to ensure an acceptable electrolytes concentration.
In addition to the dialysis equipment, the room must be equipped with resuscitation and monitoring equipment just like an intensive care unit.
This care can be given in a general intensive care unit as long as there is a dialysis machine.

SECTION 2: ASSESSMENT AND ADMISSION

Introduction

This section will focus on the assessment, admission and ethical/legal issues in critical care. The emphasis will be on the application of the nursing process in critical care and the need to consider the legal implications of admitting the patient to a critical care unit.

Objectives

By the end of this section you will be able to:

- Describe the assessment of a critically ill patient and determine their critical pathway
- Describe the criteria for admission to a critical care unit
- State four ethical/legal issues in critical care nursing
- Describe the admittance procedure of a patient in a critical care unit

Assessment of the Critically Ill Patient

It is important to remember the need to assess the patient using a holistic approach. In 1973, Margaret Ann Berry visualised what the future of the nursing care could be like. In her fantasy she presented a situation where patients had been fragmented according to their biological, physiological and sociological needs. There was, however, a puzzling condition still left inside the capsule holding these needs. In her conclusion, she said that it is clear that a patient is more than the sum total of their biological, physiological and sociological needs (Hudak et al 1982).
Use the nursing process to identify the critically ill patient. In step one of the nursing process, the main objective is to assess and interpret presenting clinical signs and assign remedial and nursing interventions. For example, if a patient has respiratory distress, the remedial action could include the administration of oxygen by mask, clearing the airways by suction, propping up patients to ease breathing and putting the patient in a recovery position to facilitate drainage of secretion if the patient is unconscious. A combination of these interventions could be used to achieve the same objective of enabling access to adequate oxygen in the body.

Margaret Ann Berry (1973), and Hudak (1982) explain that assessing and dealing only with the patient's biological, physiological and sociological needs would be inadequate. You need to look at each patient as an individual with unique needs.

History Taking

While taking medical history you should consider both the present and past medical history of the patient.

For the medical history, attention should be focused on:

- The onset of the problem, that is, when it started and how it started
- Main presenting signs, including what makes them worse, for example, headaches, dizziness and vomiting which becomes worse while standing up
- Any current medication being used
- Previous episode relevant and similar to the current problem the patient faces
- Previous medical/surgical treatments the patient may have obtained

Physical Examination

Quick appraisal of the patient's general condition is important to help you to decide where there is need for immediate life saving intervention. If there is no such need, you should proceed to carry out a comprehensive examination. Each body system should be checked for impaired function. Attention should be paid to the respiratory, digestive, circulatory, neural, urinary, endocrine, muscular and skeletal systems. The objectives in physical examinations are to:

- Obtain further evidence to collaborate the history.
- Identify other bio-physiological needs of the patient that might have been left out in the history.
- Determine life saving and life sustaining interventions, such as medical or surgical, and the nursing care subsequently required.

Physical examination is done as a continuous process to serve as a tool for evaluating the patient response to treatment. The findings are documented in the nursing notes and are used to plan the patient's care.

Investigations

Investigations are best viewed as part of patient management, this will be covered later in relation to particular conditions. The purpose of history taking includes looking for:

- Actual evidence to collaborate history and examination findings
- Signs or evidence of improvement of the patient's condition during or after particular therapy
- Evidence of the lack of response to the therapy being provided to the patient and, therefore, providing the basis of changing the therapy
- These are basic requirements in the first step of the nursing process, which deals with assessing individual needs.
- It is important to note, however, that while dealing with the critically ill patient, the evaluation and interpretation of the presenting clinical signs, assignments of life saving techniques (such as cardiopulmonary resuscitation) and life sustaining measures (such as maintaining fluids electrolyte balance), are of paramount importance.

From your clinical experience you must have come across a critically ill patient. What important signs did you note on the patient?

Did you note down any of the following?

- Low blood pressure
- Weak peripheral pulse
- Cold extremities and peripheral cyanosis. Poor cardiac output produces constriction of arterioles and stimulation of sweat glands, resulting in characteristically cold, pale and clammy skin. The most frequent signs of impaired oxygen delivery to the tissues are cerebral function alteration.
- Coma is an obvious sign of severe illness. Drastic changes in mental status may indicate serious haemodynamic or metabolic abnormalities.
- Reduced urinary output
- Dyspnoea
- High temperature
- Unexplained fatigue
- Chest pain
- Tachycardia or palpitation

As a nurse, you must master the fine art of selecting the appropriate critical pathway of patients who enter the emergency department. According to Ayres et al, (2000), ascribing an abnormal clinical sign to an unimportant cause may overlook important changes in the patient's condition. As a nurse in the critical care unit, you would be failing in your role if you noticed an important clinical sign in a patient and failed to take the appropriate action.

As a rule, all critical signs should be considered as very important, while determining the clinical pathway. One or more aetiological agents can cause these signs and symptoms. Differential diagnosis requires consideration of all possible aetiological agents, including infection and sepsis, trauma, physical stressors (for example, hypothermia, hyperthermia, and emotional stress), cardiovascular dysfunction, toxic agents (for example yellow fever), insect bites, etc.

Once the critically ill patient is identified they must be categorised into the appropriate pathophysiological state and admitted to a critical pathway, such as:

- Trauma
- Sepsis
- Coma
- Cardiac abnormalities
- Over-dosage (poisoning)

These critical pathways attempt to establish the diagnosis and the management required. They help to determine the needs of the patient that require to be addressed immediately in order to sustain and save life. Each critical pathway has protocols and guidelines for the care of individuals.

Studies indicate that where protocols are adhered to, the mortality rate for patients tends to be low. The mortality also decreases where high level of educational achievement was present for critical care nurses. Other studies have found a 52% decrease in intensive care unit deaths when a full time critical care specialist was recruited and co-ordinated the care of the patients. So as you can see, being knowledgeable is also very important and it can help to improve the outcome of the critically ill patient.

Admission Procedure for the Critically Ill Patient

In unit one of the General Nursing module you learnt the general procedure for admitting a patient. Whilst dealing with a critically ill patient in your hospital, the admission procedure depends on previously laid down procedures as well as on the physician/clinician's assessment of the resources available for caring for the patient. This implies that only those who are critically ill and whose critical pathway warrants admission to an intensive care unit should be given access.

In critical care nursing, life-saving techniques should be administered first. Other admission protocols follow. The first step in the admission procedure is determined by the individual patient's condition. That is why it is very important for you to be able to evaluate the patient's condition immediately to identify those who deserve admission.

Once a decision for admission is established, the patient's data is collected and entered into the admission records. Relatives, or those who escorted the patient to the hospital, should give the patient's personal details, such as name, address, residence and contact telephone number.

You should remember that the procedure followed in the admission of patients might differ from hospital to hospital, based on the management policy of each hospital. However, the general procedure is to deal with the biological problem of the patient first, so as to save and sustain life, before considering any other protocols such as finances.

The relatives' involvement during admission is crucial and they should be fully informed of the proceedings and what is expected of them, what role are they expected to play, whether they are expected to provide financial support, when they can visit, how they are expected to conduct themselves during the visit, etc.

Though the patient may be unconscious they should always be referred to by their name during the admission procedure and during the care. This builds both the patient's and relatives' confidence in the critical care team and promotes two-way communication (nurse-patient relationship).

As you well know, better understanding of the prognosis by physicians, patients and their families reduces the amount of

futile care. Resources are better spent where results are likely to be achieved!
On the other hand, all parties involved must agree on how best to reduce the cost of hospital care and families must be fully informed of financial implications when their loved ones are admitted into intensive care units.

Criteria for Admission
Intensive care is a service for patients with potentially recoverable diseases who can benefit from a more detailed observation and treatment than is generally available in a general ward. The decision to allow an admission to ICU lies on the doctor empowered with the right of admission by the specific institution. However the patient has to meet any of the following categories:

- Admission for continuous monitoring and observations. A patient who looks stable may have a likelihood of recognisable life threatening complication, for example post myocardial infarction, after pace maker insertion, post cardiac catheterisation, etc.
- Patients who need extensive and specialised nursing care for example, patients for strict fluid input administration like DKA and burns.
- Patients requiring constant physician care where doctors and nurses remain at the bedside to attend to any changes and institute therapy, for example after cardiac (open heart) surgery.

In view of these findings, the admission criterion to intensive care units is selective to avoid stretching the limited resources, while at the same time saving the lives of all those at risk.

Ethical/Legal Issues in Critical Care

Since the 1980's, society has established the primacy of informed consent to medical treatment. You are all familiar with the term 'informed consent', especially in the area of surgical operation and family planning.
Informed consent basically means the right of a patient or a relative to make a choice based on clear understanding of the risks and benefits of the different alternatives available.
In this unit, a broader definition of informed consent which does not only imply the patient's right to chose between alternative treatment, but also their right to refuse to have any treatment at all will be taken. Of course, decisions to refuse treatment are most weighty when the medical interventions being refused are life saving or life prolonging.
You will now move on to the legal implications of these
delicate issues.
It is agreed and well known that sometimes, adult patients may refuse any and all life-sustaining intervention. When a patient takes the choice of refusing treatment, the morally acceptable alternative decision on the part of the clinician is either to transfer care to another clinician, or to follow the patient's wish. That is why a patient who refuses to comply with a physician's advice is requested to sign a declaration to that effect. A good example is the discharge of a patient against medical advice.
Now look at the other side of the issue whereby it has been established that additional or continued life-sustaining measures are futile. You will agree that often there are difficulties in precisely delineating futility. Ordinarily, physicians feel responsible for their patients and always try to endorse the right treatment to save lives. When they are faced with a decision to terminate further treatment, they are faced with a big dilemma.

Case One
Baby K was born in 1992 with anencephaly and contrary to usual custom, her mother (who refused abortion when a diagnosis of anencephaly had been made in the uterus) insisted that Baby K be kept alive by all means possible.
The physicians and hospital took the case to federal court where it was first heard by the US District Court and then the US Court of Appeal. Both courts upheld the mother's right to demand treatment although the diagnosis and prognosis were not in dispute.

Case Two
When Catherine Gilgum, a 17 year old woman at the terminal stage of her illness lapsed into a coma, her physicians at Massachusetts General Hospital suggested that a do-not resuscitate order be written.
A representative of the hospital ethics committee, called in by Catherine's physician, wrote a note in the chart, supporting unilateral action by the physician. The ethics committee representative did not attempt to mediate the dispute. In fact, he did not speak with the patient's family. He went against the expressed

wishes of the patient's family and the patient's previously stated wishes that she wanted everything done. Catherine died after her physician wrote unilateral orders for both do-not resuscitate and discontinuation of mechanical ventilation.

In Case One, religious beliefs were major factors in baby K's case, which is why her mother continued demanding treatment even though she was aware that the baby would eventually die. The courts ruled in her favour. In Catherine's case, Case Two, the ethics standards were not followed since the decision was unilateral. The family was not even informed. From these two cases, it can be concluded that it is difficult to prove medical futility, resolve treatment decision conflicts, and draft policies on medical legal issues without bilateral consensus (Johnson et al, 1997).

There are many times when patients and families demand futile treatment because clinicians focus on specific treatment rather than on the goals they may or may not achieve. Think about it! How well the goals of the operation were explained to the last patient whom you were involved in pre-operative preparation?

Occasionally, people demand futile treatment when they do not understand the facts. Studies that have been carried out indicate that there was a high increase in the number of relatives and patients who consented to termination of cardiac pulmonary resuscitation after being candidly informed of their condition and prognosis.

Another problem area is when health workers give contradicting and inconsistent information to the patient and their relatives. This often leads to a continuation in demand for futile treatment.

A good example here is when patients are operated on or put under certain treatment for research or experimental bases without being given adequate information. Such patients may have problems understanding the difference between surgical treatment for cure and surgical operation for research purposes. Furthermore, they become confused when they are cared for by multiple consultants, each of whom watch the progress of one part of the problem and gives feedback on their area of care only. This fragmentation of the patient leads to one consultant giving a promising feedback, for example, 'The heart is beating stronger today', but failing to convey the overall picture of the patient's deterioration.

What you can conclude from this section is that:

- Informed consent implies the right of the patient to demand, select and even refuse treatment.
- Physicians/clinicians would be ethically failing in their moral duty if they take unilateral decisions in patient care, while failing to inform patients/relatives about the goals of the treatment.
- The patient and relatives must be candidly and completely informed to remove ignorance while seeking medical care. This will ensure scanty resources are used on positive goals rather than futile goals.
- Integration is necessary while providing feedback to patients and relatives to avoid confusing them on the patient's prognosis.

Socio-cultural and economic factors will continue to influence perceptions and attitudes of people and hence their health care. This view is supported by Engelhardt et al (1986) who suggested the use of the ICU treatment entitlement index.

The ICU treatment entitlement index (ICU E.I.) multiplies:
(P) - Potential benefit of treatment (P)
(Q) - The quality of life expected (Q)
(L) - Remaining length of life (L)
And divides them with the cost (C)
The formula looks as follows:

$$\text{ICU E. I.} = \frac{PQL}{C}$$

What this formula does is to guide a person when they have to make a choice between providing intensive care to two equally demanding patients. Engelhardt argues that the use of such a formula would be a better way of endorsing implementible policy regarding the use of scarce resources in general and ICU in particular.

Now move on to look at liability issues and patients who are denied medical care.

Under both the Hypocritical Oath and the Nurses' Pledge, no patient should be denied medical/nursing care. At the same time, news media occasionally highlight cases where patients were either denied treatment or detained in hospital for inability to meet the cost of treatment. Indeed, hospital institutions and individual clinicians have been sued for liability after denying medical care to patients. Insurance companies offering medical cover are also at times accused of refusing to give medical cover

to certain categories of people, for example, those suffering from Acquired Immune Deficiency Syndrome (AIDS). In general, courts look at these cases as a contract dispute between parties.
The discussion of terminating life-sustaining therapy in hopelessly ill patients is always an emotional one. This is because many believe that doing so makes one an agent of death. Thus, there are those who prefer to withhold support right from the beginning rather than withdrawing this support later. You can see that the two are ethically equivalent since they both lead to unimpeded progression of the disease, thus leading to the same end-result. Therefore, neither can be said to be wholly ethically acceptable.

What do you understand by the term 'informed consent'?
Informed consent basically means the right of a patient or a relative to make a choice based on clear understanding of the risks and benefits of the different alternatives available.
In this unit, a broader definition of informed consent is taken which does not only imply the patient's right to chose between alternative treatment, but also their right to refuse to have any treatment at all.

SECTION 3: MANAGEMENT OF CRITICALLY ILL PATIENTS

Introduction

In the management of critically ill patients, your emphasis will be on those actions that aim at sustaining life through assisting the failing body systems/organs to regain their functions. The general physical and psychological comfort of patients and social aspects of care including rehabilitation and counselling of patients, families and community will also be covered.

Objectives

By the end of this section you will be able to:

- Describe the needs of the critically ill patient
- Describe the management of the unconscious patient
- Describe the management of the patient suffering from burns
- Describe the management of the patient suffering from acute poisoning
- Describe the management of the patient suffering from respiratory failure
- Describe the management of the patient suffering from cardiac arrest
- Describe the management of the patient suffering from renal failure

Needs of the Critically Ill

While considering the management of the critically ill patient, you need to remember the following:

- A physical need in an individual leads to psychological needs and finally to socio-economic needs.
- Individual needs create family needs and family needs lead to community needs, thus an individual is an integral part of a family and the community.
- The health care system is part of that community and, therefore, the care provided must be within the accepted cultural and legal framework of that society.

Although variations may exist in the care given, depending on the type of institution it is being provided in, generally the principles that you will follow remain the same.
Now move on to look at the management of critically ill patients based on the critical care pathways that were mentioned earlier. You will start with the care of the unconscious patient.

Care of the Unconscious Patient

While discussing the assessment and admission of a critically ill patient, there are several critical care pathways that are used to guide the type of management. Unconsciousness is one such pathway. The needs of the unconscious patient are highly related to the cause of the unconsciousness.
These needs can be grouped as those related to:

- Interference of oxygen intake and hence require basic life support in their management.
- Nutrition, for example, those that require artificial feeding such as nasal gastric tube feeding.

- Fluid and electrolyte balance, for example, dehydration.
- Skin integrity, for example, risk of developing bedsores.
- Mobility, for example, lack of movement of joints and muscles.
- The affective domain, for example, feelings, lack of verbal communication.
- Social or cultural issues, for example, family and relatives' anxiety.

In general the unconscious patient is highly dependent. The outcome depends on the care you give, supporting the body to function until the patient regains consciousness and becomes less dependent.
The management pathway is divided as follows:

Basic ventilatory support/airway care - that is, airway control through positioning. The recovery position is best as it encourages drainage of secretions from the oral cavity. Suction of the airways to remove secretion and administration of oxygen, intubation of the trachea and artificial ventilation may be required.

Monitoring of respiration - to detect any changes that may indicate complication, for example, increase in respiration rate, abnormal respiration sounds, etc.

Ensuring adequate circulation - this is achieved through maintaining adequate blood volume by administering enough fluids through the intravenous route to supplement the nasal gastric tube feeding. A meticulous input/output chart must be maintained. The use of physiotherapy to exercise the joints and muscles also helps to improve circulation. Monitoring of circulation functions by taking and recording blood pressure and pulse rates, ECG, and oxygen saturation are important.

Nutritional management - can be achieved through insertion of a nasal gastric tube and using it for feeding. The intravenous route is also used to give parenteral feeds if the patient is not digesting, and to maintain fluid and electrolyte balances. Intravenous fluids are selected and administered to meet the electrolyte need in the body.

Skin integrity - is maintained through proper skin hygiene, which includes daily bathing, two-hourly turning of the patient and keeping the patient's bed linen clean and dry.

Elimination - adequate fluid intake ensures that kidney function is maintained. Some patients may require catheterisation to keep them dry and for proper monitoring of urine production. Adequate fluids and feeding help to maintain bowel motion.

Psychosocial needs - which includes addressing the patient by their name at all times, while providing care. It is important to assume that the patient can hear and, therefore, you should inform the patient of any intended action that you intend to perform on them. Relatives should be informed of patient's progress and encouraged to provide the social support necessary to reassure the patient that they are not abandoned.

General monitoring of the vital signs - this must be done to evaluate the patient's progress and identify early any impending complication.
You have addressed unconsciousness as a condition, however, it is important to note that it is a symptom to an underlying pathophysiological problem. This problem has to be identified and treated for the patient to recover completely.
Now move on to look at the management of burns.

Management of Burns

Accurate evaluation of the burns victim must include an assessment of severity factors, which include:

- Age
- Burn extent and depth
- Presence of inhalation injury
- Influence of associated illness
- Elapsed time to treatment

There is usually a clear history of the burn injury, including the cause, which may be any one of the following:

- Dry heat (flames, explosions, sunshine)
- Scalds (boiling water or other liquids)
- Chemicals (acids, corrosive)
- Tar and Bitumen
- Molten metal
- Electricity
- Friction (for example, 'road burns')
- Lightning, radiation (rare)

Never forget the possibility of non-accidental injury in children with scalds, especially of the feet and buttocks, or cigarette burns.

Assessment

The chances of a patient dying from a burn depends on the area of the burn, the patient's age (extremes of age are more vulnerable), and the depth of the burn (full thickness burns are twice as likely to cause death as partial thickness burns of the same area).

The burned patient often looks deceptively well on arrival. The effects of fluid loss (depletion of water, sodium and protein) take several hours to appear. Priority action must be taken. This means that you should:

- When there are burns on the face or neck, ensure a secure airway (intubation or tracheostomy may be necessary). Wash off any chemical or corrosive from the skin with generous amounts of cold water (irrigation).
- Remove clothing except where adherent to burnt area.
- Cover burn with wet sterile pads, for comfort and to prevent infection.
- Administer IV fluids for burns of over 10% in children or 15% in adults (this guideline may vary in different hospitals). In major burns (over 30%) two IV infusions may be required. Haemaccel and plasma are given to replace fluid loss from burned surface.

The process of assessment involves the following procedures:

- Check the airway, which is at risk in burns of the face and neck due to oedema, which can develop very rapidly.
- Note the time of burn, to estimate amount of fluid lost by the time the patient
  reaches A&E.
- Note the cause of burn, for example, is any chemical or corrosive still on the skin.
  If so, flood immediately with cold tap water.
- Note pulse, blood pressure, respirations.
- Note any special area involved, for instance the hands, eyelids, ears and circumferential burns of limbs.
- Check for inhalation of smoke, hot air or chemical fumes.
- Examine for other injuries including the head, spine, etc.
- Estimate the area of the burn. This will help to assess the volume of fluid lost, which requires replacement.
- Estimate the depth of the burn, that is, 'partial thickness' which is where the growing layer of skin (dermis) is intact and burn will heal or 'full thickness' which is where the dermis is destroyed and skin-graft will be required to avoid contracture and deformity.
- Note the patient's age.
- Ask the patient their weight, or estimate it.

A quick guide on how to estimate the extent of a burn is to follow the 'Wallace's Rule of Nines', where each body area is given as a multiple of nine.

This is included in t

Remember:

In babies, the head is relatively large (15%) and lower limbs smaller than in adults.

he table opposite for your ease of reference.

Body Area	Percent %
Head and neck	9%
Front of lower limb	9%
Each upper limb	9%
Back of lower limb	9%
Front of trunk	2 x 9% (18%)
Back of trunk	2 x 9% (18%
Perineum	1%

For full thickness burns blood is required to replace destroyed red cells. The fluid volumes given and the rate of infusion are calculated from the area burned, the length of time since the burn and the patient's weight. Fluid loss is the main early cause of death in patients with major burns.

In burns of over 10% blood is taken for:

- Haematocrit (packed cell volume, measure of the 'concentration' of the blood, and the most accurate estimate of fluid lost)
- Haemoglobin
- Urea and electrolytes

- Grouping and cross-match (for full-thickness burns over 10%)

Pain relief can be achieved through small frequent doses of intravenous (IV) morphine for severe burns, and intramuscular (IM) pethidine for less extensive burns. An anti-emetic to control nausea is also recommended. A naso-gastric tube may be used if the face or the neck is burned.
Unless immediate surgery is planned, or the burn affects the face or the throat, encourage the patient to drink liquids, especially if IV fluids are not being given.
Oxygen by mask should be administered if smoke has been inhaled. These patients will also require a chest x-ray and arterial blood gas estimation.
You should also check their tetanus immunity.
You should also take swabs from the burned area and adjacent skin, nose, throat and perineum (most infections which develop in burns come from the patient's own body).
A urinary catheter should be used in major burns, to measure urine output and for Culture and Sensitivity Urine (CSU). Aspirate large blisters under sterile conditions and elevate burned limbs to reduce swelling.
You should also carefully clean and dress burns. The practice of burn dressing varies from one hospital to another. The exposure method is normally used for the face, buttocks and perineum. Antibacterial cream or iodine spray applied and isolation is required if the patient is hospitalised.
Dressings include a transparent adhesive occlusive dressing that remains in place until the burn heals. A simple paraffin gauze and dry dressing bandaged in place can be left in situ for up to a week if they remain dry and odourless.
Anti-bacterial burn cream (check for allergy to sulphonamides) is also recommended. This should be applied to the wound with a sterile spatula or gloved hand, or spread on to non-adherent dressing which will cover the wound.

Remember:
Rigorous adherence to aseptic technique is vital in dressing burns, preferably in a separate room or theatre area.

Transfer/Discharge from A&E

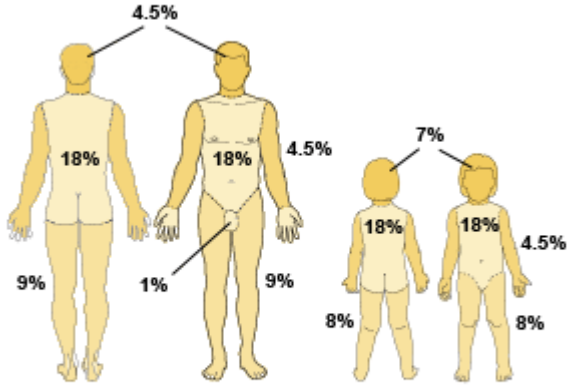
Regional Centre	For most burns over 30% area or requiring urgent burns plastic surgery.
Theatre	Burns to the eyelids. To prevent contractures head and neck burns, for tracheotomy. Small electrical burns of the hand often need immediate excision and skin grafting. Circumferential burns of limbs makes scar, which acts as a tourniquet. Burns of the ears may need excision and grafting to prevent deformity.
Ward	Most burns of over 5% in children or 10% in adults Any burn in a child suspected of being non-accidental Burns of both hands Burns of the perineum Extensive burns of the face or neck Smoke inhalation
Home	Small partial-thickness burns

When transferring a patient from A&E the following guidelines are recommended:
Once the patient is ready to be discharged you should provide the following advice:

- Elevate limb burns to reduce swelling
- Drink plenty of fluids
- Take adequate pain-killing tablets
- Do not get dressing wet or dirty
- Return to A&E (or GP) when instructed for dressings to be checked
- Take full course of antibiotics if prescribed

The nurse has a role in educating patients and their relatives in prevention. You should give advice regarding adequate preventive measures to ensure that the circumstances leading to the present injury are not repeated.
In many cases, health personnel lack the knowledge needed to accurately assess and quantify the burns size.
In the Wallace Rule of Nine it states that all body areas are taken to be multiples of 9% except the perineum, which is allocated 1%. This rule applies only to adults. An alternative method is

to take any area equivalent to the palm area of the burned patient to be 1%.



You will agree that the greater the surface area of the burn, the more critical the patient's condition. Methodical resuscitative management of burns includes:

- Attention to the airways
- Adequate ventilation
- Aggressive fluid resuscitation based on body weight and burns extent

A multi-disciplinary burns team is needed to povide the critical care necessary to optimise the chances of survival for the burnt patient.

Management of Burns for the First 48 Hours

During this phase, the resuscitative measures aim at combating shock due to pain and fluid loss through leaking capillaries and bleeding into the extra cellular space.

Larger burns tend to produce oedema involving the whole body including uninjured areas. There are direct effects on the microcirculation, including increased hydrostatic pressure, venous outflow compromise, and changes in the extra cellular space. Increased capillary permeability is due to the production of histamine and bradykinin.

Fluid Replacement

The first important resuscitation measure during this period includes fluid replacement. The most extensively used guideline for fluid replacement is the Parkland formula, which prescribes 4ml of lactated ringers solution per percentage burn per kilogram body weight in 24 hours. For example, if the patient has 30% burns and weighs 60kg they require:

7200 mls x 15 divided by [24 x 60]

You can go further to calculate the rate of flow in drops per minute when using an adult infusion set as follows:

Amount of fluid in 24 hours x 15 [drops in one ml] divided by number of minutes in 24 hours = rate of flow in drops per minutes.

4 x 30 x 60 = 7200 mls in 24 hours

It is important to note that this formula is only a guide from which deviation may be indicated to normalise blood pressure (Schiller: 2000). Other techniques such as the hypertonic saline solutions have been used with success. The goal of fluid therapy is to raise blood pressure and increase renal perfusion. Success is measured by increase in urine production and improvement in the pulse rate and blood pressure, both of which should be meticulously monitored.

Pain Control and Warmth Provision

Pain in burns patients is both physical and psychological.

Though full thickness burns produce no pain, it rarely occurs alone. Strong analgesics and opioids are recommended. Morphine is usually the drug of choice, respiratory function must be evaluated continuously. At the same time, there is poor body insulation due to the destroyed cover (skin). Electrical body warmers may be used.

Prevention of Infection

The second important line of management is prevention of infection. This is achieved through environmental control. The room where burns victims are managed must be kept at a high level of cleanliness. Barrier nursing should be practised and visitors controlled. The linen used must be sterile. Antibacterial topical agents, such as silver sulphurdiazine cream, provide protection from bacterial invasion of burns, while penicillin provides early protection from streptococcal infections.

Several studies indicate that prophylactic antibiotics provide no advantage in burns care. The open method of dressing is preferable, in extensive superficial (first-degree) burns, to the

closed method, since this method allows the burnt area to dry quickly. It also has the advantage of removing the problem of the dressing adhering to the burnt area.

Providing Nutrition

Providing nutrition is another important measure. Wherever possible, the gastrointestinal tract should be the primary route of nutrients. This is because this route enhances nutritional effects of prescribed feedings, while at the same time limiting the translocation of bacteria that is likely to occur with parenteral feedings through a central vein. Enteral feeding techniques (oral and nasal gastric tube feeding) allow for a more variable diet to be administered than parenteral (IV) feeding.

Rehabilitation and Counselling

Rehabilitation and counselling should be given in order to restore the burned individual to functional status. This requires dedicated expertise to coax and retrain often reluctant burn victims back to a meaningful life. Physical, occupational and speech therapy may be required. The patient will also need to be weaned from life support machines, for example, ventilators.

Some common complications of burns include deep venous thrombosis. The burn team must be alert to its development. Administering a low dose of heparin and using lower extremity compression garments can prevent this. The development of heterotropic ossification (contractures and peripheral nerve palsies) must be prevented by applying daily passive exercises that put the joints through the full range of movement in as far as the patient's condition allows it.

The family should be fully involved in the patient's care. A positive interaction between the patient, family and burns team helps smooth out the serious and predictable life-threatening crisis in the care of the burned individual. Where the surface area burnt is large and burns are severe, survival rate is low. A strong bond of cooperation between the family and the burns team helps to reduce the impact of the patient's demise.

Poisoning

The word poison describes a toxic substance. A poison typically causes injury when ingested, although some poisons may be administered in other ways, for example, skin absorption or animal, insect or reptile bites. Poisons from animals, insects or reptile bite are referred to as venoms, however, as you will find out in subsequent sections, not all poisons are venoms.

Poisons usually consist of a single or several toxic components. The main routes of entry into the body are:

- Through ingestion
- Inhalation of atmospheric particulates, for example, while spraying chemicals
- Through skin contact with the toxic chemicals

Poisons are classified into groups depending on their source.

Did your list include the following groups?

- Agricultural poisons
- Industrial poisons
- Household hazards/poisons
- Medicinal poisons

These groupings are based on sources of poisoning rather than type of toxic substance. For example, under agricultural poisons you have hallogenated insecticides, cholinesterase inhibitors consisting of two distinct chemical groups of compounds, that is, organophosphorus derivative and carbonates. In both groups the chemical differences are of interest, since antidotes useful in treating the arganophosphorus type may not work, or may be contradicted in, the treatment of poisoning of the carbonate type.

For these reasons, industries manufacturing insecticides and other pesticides are required by law to provide written literature with each container of the product detailing the first aid treatment and antidotes of the substance they manufacture.

Your role as a health worker is to educate the community so as to create awareness about the methods they can use to prevent poisoning, especially through safe handling and storage of toxic substances. In your previous experience and practice in environmental health you will have experienced various techniues for the prevention and control of poisoning.

Diagnosis and Evaluation of Poisoning

Your first responsibility is to retard absorption or otherwise limit the effects of poison. This forms the basis of first aid in poisoning. After this, you

must diagnose the types of poison through history taking and observations and determine whether further treatment is required. In many cases of poisoning, the agent responsible is known. However, the degree or seriousness of the poisoning may need to be verified since, in many instances, the history is inaccurate.

The exact quantity of poison absorbed by the patient will probably be unknown but the clinician may be able to estimate this by examining the container from which the poison was obtained and questioning relatives or co-workers to determine the amount present in the container previously. The missing balance is then assumed as the amount ingested. This is compared with the known lethal dose as per the manufacturer's literature on the container. Where this is not possible, the best thing to do is to assume that a lethal dose has entered the body and plan the management based on that assumption.

Diagnosis and Evaluation of Poisoning

In acute poisoning, where a large lethal dose has been ingested, inhaled or come in contact with skin, speed is essential to save life. Acute poisoning should be suspected if:

- Patient develops symptoms shortly after exposure to a known poison
- Patient's history indicates they have been exposed to substance known to have high fatalities
- Patient has been exposed to unknown toxic substance

History and Physical Findings of Various Poisons in Children

History and physical findings	**Most likely poison**
Drug ingestion	Aspirin, antihistamines, iron tablets, barbiturates
Alcohol ingestion	Alcohols
Dry cleaning	Chlorinated compounds, petroleum hydrocarbons
Insecticide use	Cholinesterase inhibitor pesticides
Epilepsy	Anticonvulsants
Odour of breath:	
Alcohol	Phenols, cyanide, chloralydrate alcohols
Acetone	Lacquer, alcohol
Coal gas	Carbon monoxide
Acrid	Paraldehyde
Colour of skin	
Hyperemia	Cyanide alcohol
Cherry red	Carbon monoxide
Cyanosis	Aniline, nitrobenzene, nitrate, marking ink
Pallor	Benzene, carbon monoxide
Jaundice	Mushrooms, quinacrine, nitro compound, phosphorous, carbon tetrachloride
Temperature	
Increase	Dinitrophenol
Decreased	Chloral hydrates, morphine, barbiturates
Pulse	
Rapid	Barbiturates
Irregular	Insecticides
Slow	Morphine
Respiration	
Kussmaul	Salicylates, acetanilid, cinchophen
Increased	Dinitrophenol, carbon monoxide, cyanide
Wheezing	Cholinesterase inhibitor pesticides
Convulsions	Alcohol, insecticides, strychnine
Vomiting	Any poison
Neck stiffness	Strychnine, cocaine

History and physical findings	Most likely poison
Distention and spasticity of the abdomen	Corrosives Cholinesterase inhibitor
Muscular twitching	Pesticides

You will now look at the system examination findings and the poison likely to be responsible.

General Findings

General findings may include the following:

Weight Loss - Chronic poisoning of lead, arsenic, diritrophenol, mercury and chlorinated hydrocarbons.

Lethargy, Weakness - Lead, arsenic mercury, chlorinated organic compounds, thiacide diuretics, organophosphates, nicotine, thallium, nitrites, fluorides, botulism.

Fall in Blood Pressure - Nitrates, nitroglycerin, chlorpromazine, quinine, volatile oils, disulfiran (antabuse) iron salt, methyl bromide, arsine arsenic, fluorides, phosphine, nickel carbonyl, stabine, food poisoning, boric acid, phosphorous.

Rise in Blood Pressure - Epinephrine, veratrium, ergot, cortisone, vanadium, lead, nicotine.

Pulse Rate - Fast pulse may indicate potassium, bromate, iron salts, atropine. Slow pulse or irregular pulse may indicate Veratrum, zygademus, digitalis, mushrooms, oleander, nitrite.

Hypothermia - Dinitrophenol, atropine, boric acid, salicylates, food poisoning, antihistamines, tranquilizers, camphor.

Breath - Bitter almonds odour may indicate cyanide. A garlic odour may indicate arsine, arsenic, phosphorus.

The Skin

The skin should be examined for the following indicators:

distress or shock is usually due to methaemoglobinaemiafrom from aniline, nitrobenzene, phenactin, nitrate, bismuth subnitrate, chlorates.

Dry skin - which is normally due to atropine poisoning.

Jaundice - caused by liver injury due to carbon tetrachloride, arsenic or other heavy metals, chromates, mushrooms, phenothiazines, sulfanilamides, chlorpromazine, triumtrotolene, aniline, thiazide diuretics, phosphorus jaundice from haemolysis due to: aniline, nitrobenzene, pamaquine, pentaquine, primaquine, benzene, caster beans, jaquirity beans, fava beans, phosphine, arsine nickel carbonyl.

Sweating - which is a result of organic phosphate, insecticides, muscadine and other mushroom poisonings, nicotine.

The Central Nervous System

The central nervous system may be affected, leading to the following manifestations:

Psychosis - due to Thiazide diuretics, adrenal glucocorticoids, ganglionic blocking agents.

Delirium or Hallucinations - as a result of alcohol, antihistamines, atropine, lead, cannabis sativa, cocaine, amphetamine, bromides, quinacrine, ergot, sarotonin, ranwolfia, salicylates, phenylbutazone, methyl bromide, DDT, chlordane, barbiturates, boric acid aminopylline.

Depression, Drowsiness or Coma - may indicate presence of barbiturates, alcohol, solvents, kerosene, cationic detergents, arsenic, mercury, lead, opium paraldehyde, cyanides, carbon monoxide, phenol, salicylates, chloropromazine digitalis, mushrooms.

Muscular Twitching and Convulsions - may result from insecticides, atropine cyanides, nicotine salicylates, amphetamine, lead, mercury, phenothiazines arsenic, kerosene, barbiturates, digitalis.

Parethesias - from lead, thallium, DDT.

Ataxia - as a result of lead, organophosphate, antiinstamines, thallium, barbiturate,

Headache - may point to nitroglycerin, nitrates, hydralazine, trinitrotohiene, indomethacin

(indocin) carbon monoxide, organic phosphoate insecticides, atropine, lead, carbon tetrachloride.

The Eyes, Ears and Mouth
The eyes may present with:

Blurred Vision - indicating atropine, phosphates ester insecticide, cocaine, nicotine methyl alcohol, indomethacin, botulism.

Coloured Vision - indicating digitalis.

Double Vision - suggesting alcohol, barbiturate nicotine, phophate ester insecticides.

Dilated Pupil - suggesting atropine, cocaine, nicotine, solvents, depressants, antihistamines phenylephrine mushrooms, thallium oleander.

Constricted Pupil - indicating morphine phenothiazines, phosphate ester insecticides, mushrooms.

Papilledema - suggesting lead.

Ptosis and Strabismus - indicating botulism, thallium.

Lacrimation - indicating organic phosphate insecticides, nicotine, mushrooms.
The patient may also present with the following symptoms affecting the ears:

Tinnitus - which indicates quinine salicylates, quinidine, indomethacin.
Deafness or disturbances of equilibrium - due to streptomycin quinine.
The mouth may be affected in the following ways:

Loosening of Teeth - as a result of mercury, lead, phosphorus.

Salivation - due to lead, mercury, bismuth, thallium, mushrooms, phosphate ester insecticides.

The Cardio Respiratory System
The patient's cardio respiratory system may be affected which may exhibit as:

Respiratory Difficulty - due to phosphate ester insecticides, salicylates, botulism, cyanide, carbon monoxide atropine, alcohol, etc.

Pulmonary Edema - due to metal fumes, hydrogen sulfide, morphine, methyl bromide, methyl chloride.

Rapid Respiration - is due to cyanide, atropine, cocaine, carbon dioxide, salicylates, alcohol, amphetamine, mushrooms.

Slow Respiration - due to carbon monoxide barbiturates, morphine, botulism, magnesium, antihistamines, thallium fluorides.

Palpitation - due to nitrites, nitroglycerine, organic nitrates, potassium bromate.

Aspiration Pneumonia - due to kerosene.

The Gastrointestinal System

The gastrointestinal system may also be affected and the patient may exhibit the following characteristics:

Vomiting, diarrhoea, abdominal pain - due to almost all poisons.

Bleeding - as a result of salicylates, warfarin, thallium, iron, fluorides, amnophylline, corrosive agents.

The Genitourinary System

The genitourinary system can be affected in the following ways:

Anuria - from mercurials, bismuth, sulfonamides, carbon tetrachloride, turpentine, oxalic acid, formaldehyde, phosphorus, ethylenechlorolydrin, castor bean, trinitotothiene.

Hematuria - due to heavy metals, for example, lead and mercury nitrates solamine and other plant poisons.

Oliguria - as a result of lead poisoning.

Proteinuria - from arsenic, mercury, phosphorus.

Menstrual Irregularities - as a result of lead, bismuth, mercurials, estrogens.

Colour of Urine - manifests as red urine (especially in warfarin and castor bean poisoning) and orange urine in hepatotoxines.

The Neuromuscular System

The neuromuscular system may be affected leading to:

Muscular Weakness or Paralysis - from lead, arsenic, botulism poison, hemlock, organic mercurials, thallium, DDT, shellfish, carbon disulfide.

Muscle Fasciculation's - due to phosphate ester and other insecticides, nicotine, black widow spider, scorpions, manganese, shellfish.

Muscle Cramps - due to thiazide diuretics, lead.

The Endocrine System
The endocrine system may also be affected, which usually manifests as decreased libido. This is often a result of lead, mercury or other heavy metals which act as sympathetic blocking agents.

As you will have seen, one poison causes many changes in different body systems. The next topic, the management of poisoning looks at measures aimed at preventing/minimising these effects, while providing supportive measures to keep systems working, thereby giving the body a chance of recovery.

Management of Poisoning

General Plan for the Management of Acute Poisoning
The following steps should be implemented depending on the patient's condition:

- Ensure that the airway, ventilation and blood pressure
  are adequate
- Assess the level of consciousness
- Obtain information about the poison if there is uncertainty about its toxicity or appropriate treatment
- Consider whether an antidote is available, appropriate
  or necessary
- Consider the need for measures to prevent the absorption of the poison
- Consider whether an emergency analysis should
  be requested
- Institute a programme of continuing care
- Consider whether it is possible or desirable to attempt to increase the elimination of the poison

In acute poisoning, the first priority is to ensure that the airway is patent and that alveolar ventilation and circulation are adequate to maintain life, while decisions are made about further treatment.

Maintaining the Patent Airway
Obstruction of the upper airway is one of the main causes of death in patients dying from poisoning outside hospital. Maintaining a clear airway for the patient automatically improves alveolar ventilation and often restores blood pressure if breathing has not stopped. It is important to do the following:

- Remove dental plates if the patient has them and keep aside for labelling and storing until the patient is conscious
- Pull the tongue forward
- Remove saliva or vomitus from the mouth and pharynx by use of a suction catheter
- In an emergency a swab or handkerchief wrapped round a finger is also effective

If the patient is deeply unconscious, insert an oral airway device or nasal airway device or intubate
the patient.

Ventilation
Establishing a patent airway improves ventilation. However, if the rate or depth of respiration is inadequate, do not wait for the result of an arterial blood gas analysis. Instead, use an ambu bag and administer oxygen. In less urgent circumstances, the adequacy of ventilation is best assessed by arterial blood gas analysis.

Blood Pressure
In hypotension, the minimum systolic blood pressure reading is 80mm Hg in young adults and 90mm Hg in those above 40 years. However, these values are arbitrary and more reliance should be placed on organ perfusion as assessed by the patient's mental state (if conscious), skin temperature or hourly urine output.

When hypotension is a problem:

1. Clear the airway, improve ventilation and administer oxygen as this will abolish hypotension.
2. Elevate the lower limbs to increase the venous return to the heart.
3. In those who fail to respond to steps one and two, administer intravascular volume expanders intravenously, for example, plasma or dextran.

Assessment of Level of Consciousness

The Edinburgh method of assessment is recommended. This is based on the patient's response to commands and pain. The following grading scheme is applied:

- Grade 0 the patient is fully conscious.
- Grade 1 the patient is drowsy but obeys commands.
- Grade 2 is unresponsive to commands but responds well to pain.
- Grade 3 the patient is unresponsive to commands and exhibits minimal response to pain.
- Grade 4 the patient is completely unresponsive.

By definition, patients in Grades 2 - 4 are unconscious.

Identifying the Type of Poison

In order to ensure that you are able to identify the poison, you should ensure that:

- You have no doubt about the correct spelling of the poison.
- Give the brand name of the drug or commercial product whenever possible.
- If you do not know the precise name of the poison, state its purpose, for example, dry cleaning agent.
- Do not be dismayed if information about poison is sketchy or not available. The lack of information simply reflects the rarity of poisoning by the substance.
- Do not expect poison information services to identify plants and mushrooms from descriptions given over the telephone. This must be identified by a sample.

Antidotes

The administration of antidotes to certain poisons can occasionally produce dramatic and life saving improvement in a patient's condition. However, contrary to popular belief, antidotes are available for a very small number of poisons, most of which are uncommon in everyday clinical practice.

Poison	Antidotes	Mode of Action
Anticholinergic compounds	Neostigmine salicylates	Cholinesterase inhibitor
Anticoagulant	Vitamin K, fresh frozen plasma clotting factors	Pharmacological antagonist - replace missing clotting factors
Adrenergic blockers	Isoprenaline	Pharmacological antagonist - stimulates myocardial adenocyclase
Cyanide ethylene glycol	Dicobalt edotate Ethanol	Chelating agents - competitive substrate for alcohol
Heavy metals	Demercapol penicillamine	Dehydrogenase celating agents
Iron salts	Desferoximine	Chelating agent
Methanol	Ethanol	Competitive substance for alcohol dehydrogenase
Narcotic analgesics	Naloxone	Charmacological antagonist
Organophosphate	Atropine, Palidoxine,	Acetycholine antagonist
Paracetamol	N-acetylaystein e methionine cysteamine	PSH donors or glutathione
Pentazoline	Naloxone	Pharmacological antagonist
Sympathomietics	B - adrenergic blockers	Pharmacological antagonist
Thallium	Prussian blue	Chelating agent

Respiratory Failure

Respiration refers to a process by which oxygen is taken in through the airway to the alveoli, diffuses into the blood, is transported through the red blood cell, released and utilised by the

tissues and the waste products carried away from the cells and excreted.
Respiratory failure occurs when the above chain of events are broken. It is broadly defined as the inability of the body to maintain acceptable arterial values of oxygen, carbon dioxide and the blood pH. Respiratory failure may be due to a single factor or many. It may be caused by:

- The inability of air to enter the airway due to obstruction, whatever the cause.
- Poor respiratory muscle tone. Examples include congenital muscle atrophy, Guillen Barre syndrome, tetanus etc.
- Impaired gaseous exchange at the alveolar capillary junction like in pulmonary oedema.
- The inability of the blood to transport oxygen and waste products of respiration.

Management of Respiratory Failure

The first step in treating any patient with airway obstruction is to open it. This is always done by the head-tilt, chin-lift or jaw thrush method initially. It may then be desirable to use an artificial airway to keep the victim's airway unobstructed. An artificial airway is particularly useful if the victim is breathing spontaneously or if rescue breathing is applied by a bag mask device rather than mouth-to-mouth or mouth-to-nose.
Two types of basic artificial airway devices commonly used in critical care settings are the oro-pharyngeal airway and the naso-pharyngeal airway.
As the name implies, the oro-pharyngeal airway extends from the mouth (oro) into the back of the throat (pharyngeal). It is a curved plastic or hard rubber device designed to fit over the back of the tongue and hence hold the tongue away from the posterior part of the throat.
The oro-pharyngeal airway is useful in deeply unconscious patients who are breathing spontaneously or who are being ventilated by mask. It should not be used on conscious or semi-conscious patients because their reflexes are still intact. The presence of the oro-pharyngeal airway against the back of the throat causes gagging and sometimes vomiting and laryngospasms.
Oro-pharyngeal airway devices come in different sizes, that is, infant, child and adult. You need to choose the one that conforms best to the patient's dimensions. Hold the airway against the patient's face. If it is the right size, it will extend from the mouth to the angle of the jaw.
The naso-pharyngeal airway is a soft rubber tube that is inserted through the nose (naso) and extends down into the back of the pharynx, behind the tongue thereby allowing free passage of air from the nose to the lower airway. This airway is better tolerated by a semi-conscious patient than is the oro-pharyngeal airway.
The naso-pharyngeal airway is useful in situations where:

- The patient's mouth cannot be opened
- There is trauma in the patient's mouth or the lower jaw
- The patient will not tolerate oro-pharyngeal airway but is not sufficiently conscious to maintain an open airway by themself

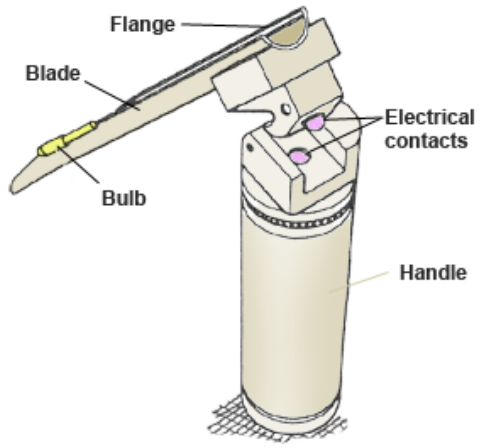
The naso-pharyngeal airway comes in only one size and it can only be used by adults.

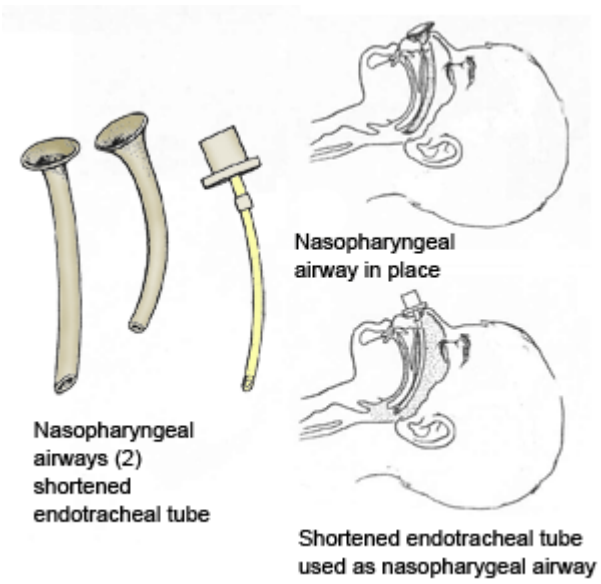
Remember:

- ***The naso-pharyngeal airway is better tolerated than the oro-pharyngeal airway in the semi-conscious patient.***
- ***Do not use the naso-pharyngeal when there is trauma to the nose or suspected skull fracture.***
- ***Lubricate the naso-pharyngeal airway well before inserting.***

Advanced Airway Control
Endo-tracheal intubation provides the most definitive control over the patient's airway.
The curved endo-tracheal tube also seals off the airway from foreign material. When placed within the trachea it is possible to give 100% oxygen without the danger of causing gastric distension or aspiration.
Endo-tracheal intubation requires skills and constant practice.

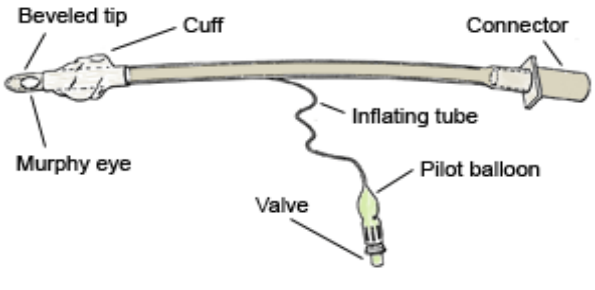
Rigid Laryngoscope





Naso-pharyngeal Airway and Shortened Endotracheal Tube

Murphy Endo-tracheal Tube



The following equipment is required for endo-tracheal intubation:

- Two to three endo-tracheal tubes of different sizes
- 20ml syringes
- Itemostal
- Bandages
- Scissors
- Plastic connection for endo-tracheal tubes
- Malleable stylet
- Water soluble lubricating jell
- Laryngoscope handle
- One to two curved (Macintosh) blades
- One to two straight (Miller) blades
- Spare batteries for laryngoscope
- Magill forceps
- Guition unit
- Regid (tonsil tip)
- Gultion catheter
- Several flexible suture catheters (Sterile)
- Bite unlock or oro-pharyngeal airway
- Adhesive tapes or umbilical tape (preferred)

Mechanical Ventilation Support

Mechanical ventilation support refers to provision of breathing, when one is not able to do so spontaneously on their own. Ventilation may be achieved through use of exhaled air as in mouth-to-mouth or nose, or giving air/oxygen either manually or mechanically using a ventilator.

Mechanical ventilation is used in an ICU set-up because it can support breathing for a long period of time and can be manipulated to suit the
patient needs.

Though mechanical ventilation is excellent in maintaining ventilation, it must be avoided when unnecessary because it is not a cure in itself but a temporary measure and must be initiated early when indicated for good outcome.

The rationale for using mechanical ventilation on a patient include:

- To provide the pulmonary system with mechanical power to maintain physiological ventilation.
- Manipulate the ventilatory pattern and airway pressures for the purpose of improving the efficiency of respiration.
- To decrease myocardial work by decreasing work of breathing and improving efficiency.

Mode of Ventilation
When your patient is not able to maintain breathing and is being supported by a ventilator, it's important to have an idea of the mode that the patient is using.
A mode is a mechanism that initiates inspiration in mechanical ventilation. In normal body function, the respiratory centre responds to increased carbon dioxide levels in the blood and initiates an inspiration. Likewise the ventilator has settings that initiates and maintains breathing.

Controlled Mode
The ventilator is set to deliver a specific number of breaths per minute. It therefore ventilates the patient at a preset frequency. This mode is used when the patient has no respiratory effort.

Assisted Ventilation
This is used when the patient is making inadequate number of breaths. The ventilator only supplements the patient's effort. There are two types of assisted modes. It can either be mandatory or synchronised with the patient's respiratory function.

Other Airway Manipulation
For example with Positive End Expiratory Pressure (PEEP) or Continuous Positive Airway Pressure (CPAP) reduces the intrapulmonary shunting and increases the arterial oxygen tension.

Cardiac Arrest

Cardiac arrest results in death, which occurs when the heart stops pumping blood. This may be expected in old age or as a result of certain illnesses. It may also occur suddenly and unexpectedly in younger people as a result of electric shock, drowning, anaphylactic reactions, trauma or heart attack.
A person is judged to be clinically dead when they stop breathing, when there is no cardiac activity and the usual signs of life are absent. Feeling the carotid pulse is the most definite way of checking for effective cardiac activity.
There are three general types of fatal cardiac arrhythmias:

- Ventricular standstill or a systole (no heartbeat).
- Ventricular fibrillation, where the heart muscles are quivering, which indicates no contraction and no blood flow.
- Pulseless electrical activity, which has no perceptible pulse or blood pressure.

How can you know if a person is in a state of cardiac arrest?
The following four diagnostic signs would indicate that cardiac arrest has occurred:

- Breathing stops
- No palpable pulse
- No heartbeat
- Pupils fixed and dilated

Management of a Patient with Cardiac Arrest

Emergency artificial circulation is restored by intermittent external chest compressions. In adults, a rate of about 80 compressions per minute is recommended. However, this cardiac compression must be accompanied by artificial mechanical lungs inflation at a rate of 20 breaths per minute. This means the ratio of 15:2 compressions to ventilations should be used during CPR.
In children and neonates, ratio of 5:1, cardiac compression to ventilation is used. If this does not achieve the required result, Advanced Cardiac Life Support (ACLS) has to be applied. The present ACLS protocol is based on four components:

- Early assessment of the victim
- Early CPR
- Early defibrillation
- Early access to ACLS

As you have just learnt, the present ACLS protocol is based on four components.
Early Assessment of the Victim
This refers to identifying the need for resuscitation and the activation of emergency response system like shouting for help.

Early CPR
Chest compressions and ventilations are started early in order to get better results. Early CPR determines the quality of resuscitation. Establish locations for chest compressions. As you can see from the illustration opposite, this should be two fingers above xiphisternum in adults.

Early Defibrillation
In defibrillation, electrodes/pads are placed on the patient's chest and a measured electrical energy is passed through the body to create external electrical counter shocks that may restart the heartbeat. 200, 300, 360 or 400

joules may be used to defibrillate ventricular fibrillation. The outcome depends on how early this arrhythmia is identified and defibrillated.

Early Access to ACLS

The nurse must be able to identify victims requiring advanced cardiac life support promptly. Advanced methods of restoring/maintaining patient's life like intubation, cardiac arrhythmia monitoring, use of drugs etc. are taken.

Epinephrine (adrenaline), amiaderone, lignocain, deltezan atropine and vassopressin have been accepted as the drug of choice in ACLS protocols among other drugs.

To conclude, cardiac arrest is managed by primarily making attempts to restart the heartbeat mechanically while at the same time maintaining lung ventilation.

Advanced methods of cardiac management may be used. Cardio version or pace maker therapy, and sometimes open cardiac massage/defibrillation may be used.

Now move on from cardiac arrest to focus on the management of multiple injuries.

Multiple Injury

The following are general principles and concepts in the management of multiple injuries:

- The presence of signs of hypotension requires immediate resuscitation and surgical exploration.
- When the Mean Arterial Pressure (MAP) fails to respond to intravenous fluid volume of >5 litres, urgent surgical exploration is mandatory to control the bleeding. Fluid resuscitation is continued during surgery.
- Cardiac tamponade must be considered in stab wounds and gunshot wounds of the chest and upper abdomen. Elevated Central Venous Pressure (CVP) is usually the first sign of tamponade.
- Computed Topographic Scans (CTS) of the head, chest and abdomen may be done to elicit extent of damage.
- Repeated physical examination provides important information that helps in diagnosis and management.
- Suspected fracture of the spine has to be immobilised before attempting to move the victim, as failure to do so may lead to irreversible damage to neuro-functions.

In conclusion, the choice of management measures will be guided by ensuring an accurate diagnosis of the extent of body damage. After this, corrective and life sustaining measures are to be taken to allow the body time to recover.

Acute, Chronic and End Stage Renal Failure

Acute renal failure describes an abrupt and almost complete cessation of renal function. Chronic renal failure, on the other hand, describes an irreversible reduction in renal functions of a progressive nature. While acute renal failure may be reversed and the patient restored back to normal health, chronic renal failure and end stage renal disease are only treatable by either dialysis or renal transplant.

There are several identifiable causes of renal failure. These include:

- Glomerulopathy, especially necrotising proliferative and membranoproliferative. The latter is rapidly progressive due to streptococcal and urinal infections, lupus erythematosus, eclampsia and mixed cryoglobulinaemia.
- Vascular and thrombotic disease, for example, malignant hypertension, scherodema, hypersensitivity, angiitis, etc.
- Interstitial disease, for example, allergic, papillary necrosis.
- Functional (pre) renal failure such as severe volume depletion, shock, trauma and/or heart failure.
- Acute renal failure/parenchyma failure (acute tubular necrosis, vasomotor nephropathy).

Acute Renal Failure

Acute renal failure can present itself in several ways. These are some of the signs to look for in a patient:

- Abrupt decrease in the Glomerular Filtration
  Rate (GFR)
- Oliguria (urine outlet below 400ml/day (Swan et al 1953)
- As a result of low level glomerular filtration rate, the serum creatinine concentrate rises steadily by 1 to 4 mg dl per day
- Total anuria (cessation of urine production) is common in uncomplicated acute renal failure due to urinary outflow obstruction.

Prevention and Management

When a patient is at risk of developing Acute Renal Failure (ARF) because of disordered haemodynamic disorder, rather than nephrotoxins, you can manage it by prompt and full restoration of blood volume and adequate cardiovascular tools. This is achieved by administering fluids in conditions characterised by severe decrease in blood volume, for example, severe burns, haemorrhages, and dehydration.

While the use of diuretics, for example, furosemide (lasix) increases urine volume it has no effect on clinical outcome. When the underlying cause is not addressed, the side effects of furosemide, such as permanent deafness and volume depletion or hypokalaemia should be weighed against the somewhat minimal benefits of their use.

Management should be directed at preventing complications. This should include meticulous attention to fluid and electrolyte balance, drug use and nutritional support.

Unfortunately, patients with sepsis, multi-organ failure, or trauma, often have life threatening complications such as hyperkalemia, acidosis or volume overload. In such cases, dialysis therapy should be commenced early and aggressively to prevent complications. Intermittent haemodialysis is the most widely used.

Chronic Renal Failure and End Stage Renal Disease

Chronic Renal Failure (CRF) and End Stage Renal Disease are functional diagnosis caused by a number of diseases and present themselves with a progressive and generally irreversible decline in Glomerular Filtration Rate (GFR). At the initial phase of advancing renal failure, the patient is unaware of the problem so does not seek help until it presents with uremic syndrome when most organs are no longer functioning normally. End stage renal disease is present when the nephrones are destroyed and cannot make urine. The patient is therefore having renal failure.

Management

The first management consideration is the preservation of renal function. To this end, the maintenance of extra-cellular volume status is of primary importance to ensure adequate renal perfusion. However, because of the kidney's reduced ability to excrete salt and water, care must be exercised in administering fluid to the patient.

In chronic renal failure the patient is able to make little urine, while in end stage renal disease most of the nephrones are completely destroyed.

Hypertension, which is common in both renal failures, should be treated with anti-hypertensive, such as sodium nitroprusside, which is often used because it has the advantage of rapid action at the onset with a short half-life. However, its metabolic by-products, that is, cyanide and thiocyanate, have long half-lives and accumulate in renal insufficiency. Toxicity may occur within 48 hours, signs of which will include metabolic acidosis, confusion, hyperreflexia and seizures. Because of this risk, other alternatives are used which include methyldopa, hydrazine, esmolo, etc.

Radio-contrast agents must be avoided. Since drugs or metabolites often accumulate in renal failure, the administration of drugs should be avoided as much as possible.

SECTION 4: SPECIAL PROCEDURES AND INVESTIGATIONS

Introduction

In this section you will look at special investigations carried out in critical care patients to include blood analysis, urinalysis and radiological examination. The procedures relating to dialysis, central venous pressure and tracheotomy will also be covered.

Objectives

By the end of this section you will be able to:

- List the rationale for carrying out blood and urine analysis in a critically ill patient
- Describe the investigations performed on the blood and urine of a critically ill patient
- Describe the specific radiological examinations performed on a critically ill patient
- Describe dialysis, central venous pressure monitoring, and tracheotomy
- Describe the management of patients during and after dialysis and tracheotomy

Rationale for Blood and Urine Analysis

Blood analysis in a critically ill patient is performed for the following reasons:

- To establish the cause of coma/unconsciousness that could not otherwise be explained.
- To establish the values of various constituents in blood so as to compare with the normal values, for example, the normal potassium value range is 3.4 - 5.0 ml/litre. A blood value of below 3 mmol/litre indicates hypokalaemia.
- To monitor patient improvement following therapy, for instance, after administering insulin in the management of diabetes mellitus. Blood sugar testing is done to monitor the effectiveness of therapy. The blood sugar is expected to fall after insulin therapy.
- To compare the various constituent values with normal values in the process of reaching a differential diagnosis, for example, raised blood sugar above the normal value may be the only indicator of latent diabetes.
- To establish alkalosis or acidosis and take corrective measures before complication sets in.
- To establish facts that will be used to determine the management of the patient so as to bring the values back to normal.

When analysing urine, the main aim is to detect abnormalities like protenuria and glucosuria, which may indicate endocrine failure and other metabolic problems in the patient.
You will now focus on investigations that should be carried out on the blood and urine.

Blood Analysis
There are several types of blood analysis.

- **Blood for urea and electrolytes**

  Normal values:

  Potassium 3.4 - 5.0 mmol/L
  Calcium 2.12 - 2.6 mmol/L
  Magnesium 0.7 - 1.0 mmol/L
  Sodium 135 - 143 mmol/L
  Chloride 97 - 106 mmol/L
  Urea (BUN) 2.4 - 6.4 mmol/L

- **Haemoglobinlevels**

  Normallevels:

  Male 13 - 18 g/dl
  Female 11.5 - 16.5 g/dl

- **Erythrocyte count:**

  Male 4.5 - 6.5 millions/mm3
  Female 4.5 - 5 millions/mm3

Blood Gas Analysis
This gives information about carbon dioxide excretion, oxygenation and acid base balance of the body. The state of these three indicates the metabolic condition of the body.

The normal values of blood gas pressure to be expected are as follows:

- Partial pressure of oxygen pa02 = 11 - 13kpa
  (83 - 98mmhg)
- Partial pressure of carbon dioxide $paCO_2$ = 4.8 - 6.0kpa
  (36 - 45mmhg)
- Blood pH 7.36 - 7.44
- Haemoglobin oxygen saturation $\geq$ 95%
- Bicarbonate levels 22 - 26 mmol/L
- Base excess -3 to +3.

Urine Analysis
The main investigations here include total urinalysis, culture and sensitivity.
The graphic opposite indicates the normal constituent values of urine.

Normal Urine Constituent	Normal values
Constituent	96%
Water	2%
Urea	
Uric acid	
Creatinine	
Ammonia	
Sodium	2%
Potassium	
Chlorides	
Phosphates	
Sulphates	
Oxalates	
Specific gravity	1020 - 1030
Amount healthy adult	1500 - 2500ml/day
Reaction	Acid

Radiological Examinations

This is an x-ray examination of a body part or organ. It can be a plain x-ray or special, which requires the introduction of a contrast media - a substance that will allow a structure to be outlined clearly in an x-ray image.
Plain x-rays are useful in suspected fractures of bones and in chest diseases/conditions, because they can help to confirm the suspected diagnosis. Special x-rays such as bronchography (x-ray of the bronchous after instillation of radiopaque substance), pulmonary angiography (x-ray taken after injecting contrast media into pulmonary artery) etc, outline the cavities so that their structures can be seen clearly in the x-ray.
Others such as tomography, magnetic resonance imaging and ultrasonography, will illustrate tissues in order of their differences in mass (density), so that it is possible to distinguish tumours from normal organs as tumour cells have different density from normal structures.
Your role is to take into consideration the psychological and physical care of the patient before, during and after the x-rays. For example, in a female patient who is scheduled for an x-ray, it is necessary to inquire about the possibility of pregnancy. Unless absolutely necessary, an x-ray should not be performed on a pregnant woman because the x-ray has adverse effect on the growing foetus.
Magnetic Resonance Imaging (MRI) is contraindicated for patients with pacemakers or implanted metallic devices due to the effect of magnetic energy on the metals. The patient needs to be well informed of the type of x-ray as well as their expected role in the pre-procedure preparation, intra-procedure expectation and post-procedure care.
You should be on the look out for reaction to contrast media used while at the same time observing the general condition of the patient during and after the procedure.

Dialysis

Dialysis is the process of removing excess fluids, urea and other wastes from the body artificially. Dialysis is indicated in those patients with:

- Rising creatinine levels of 100 micrommo/litre in 24 hours.
- Creatinine clearance of below 0.1 - 0.15mls/min/body kilogram weight.
- Hyperkalaemia greater than 7mmol/L with signs of intravascular and extra vascular
  fluid overload.
- Symptoms of uraemia in a patient with acute renal failure such as pericarditis (inflammation of membrane covering the heart), gastric intestinal bleeding and mental changes.
- Acute poisoning with mental changes.

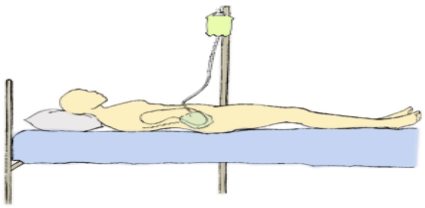
There are two methods of dialysis; peritoneal dialysis and haemodialysis. In peritoneal dialysis contraindication includes abdominal sepsis or abdominal surgery less than three days previously. In haemodialysis, contraindications include increased blood coagulation, haemodynamic instability and lack of circulation.

Peritoneal Dialysis (PD)

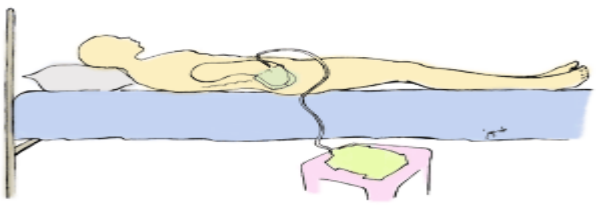
This involves the introduction of sterile dialysing fluid (dialysate) through a catheter into the abdominal peritoneal cavity.
Through the process of diffusion, osmosis and active transport, excess fluid and solutes move from intravascular (blood) vessels, through the semi-permeable peritorial membrane, into the dialysing fluid. The fluid is then drained from the abdominal cavity by gravity.
This process is repeated over a number of cycles. Urden and Stacy (2000) argue that the introduction of 3.5 litres of dialysate per hour will clear the urea at the rate of 26ml/minute during acute phase of renal failure.

As a nurse, during PD, you must ensure that the dialysate is at the body temparature (37 degrees Celsius) before introduction. This ensures the patient's comfort and provides vasodilation of blood vessels hence increasing solute transport in the peritoneum.
The fluid should not be left in the peritoneal cavity longer than required and the amount introduced must be measured so as to compare with the amount drained during each cycle. This helps to assess if any of the fluid is being retained. Ideally, the amount drained should be more than that introduced due to the added waste (for example, urea, excess intravascular and extra-vascular fluid) being removed.
You must also monitor urine output in acute renal failure. This is expected to increase with the effect of dialysis. The drainage bag for the dialysate should always be at a lower level than the patient's bed because it flows by gravity. It has been noted that sitting the patient at 45° or more, if conscious, will assist the outflow (Gutch et al:1993).
After the expected cycles are over, remove the catheter by cutting the sutures, pull the catheter out and dress the wound under aseptic technique.

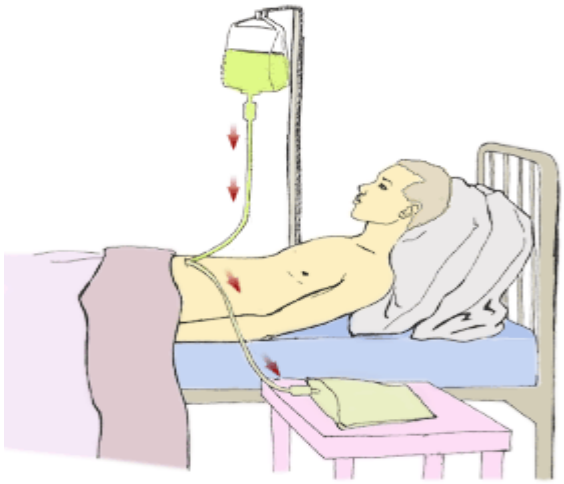
Dialysate infused into peritoneal cavity



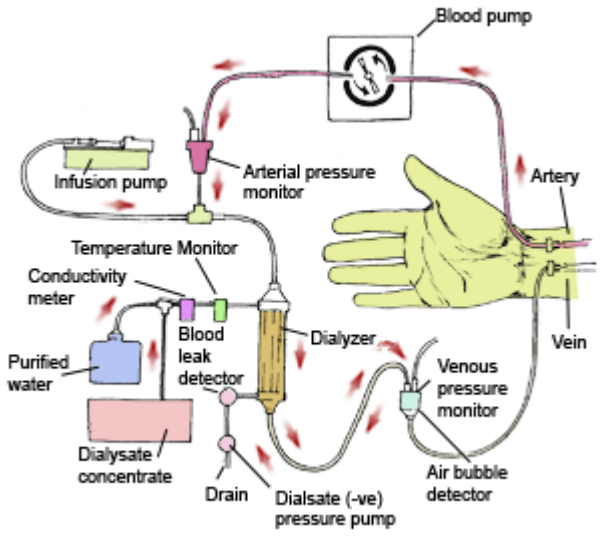
Dialysate draining out



A patient receiving two-way peritoneal dialysis



Haemodialysis
Haemodialysis has been defined as a technique of separating/removing particles/fluids from the blood by differences in their ability to pass through a semi-permeable membrane. It is therefore a process of purifying blood. In other words, this implies the separation and removal of electrolytes, fluids and toxins mechanically.
The equipment used is referred to as a haemodialysis machine. Blood is circulated outside the body through synthetic tubing to a dialyser. The components of a haemodialysis are shown in the graphic opposite.



As blood flows through the haemodialysis, the dialysis, by the process of ultra filtration osmosis and diffusion, removes excess fluid, electrolytes

and toxins from the blood. Your role as a nurse during haemodialysis is to:

- Prevent infection
- Observe vital signs for the patient and the machine
- Monitor for changes in arterial or venous pressure
- Ensure the patient lies in comfortable position
- Ensure adherence to aseptic technique throughout
- Provide comfort by reassuring the patient and relatives
- Teach/counsel on renal diet and alternative therapy like transplant

Central Venous Pressure (CVP) Measurement

You may have during your practice in the nursing career been involved in taking a patient's blood pressure as a basic routine monitoring of the patient's vital signs (pulse, blood pressure, respiration, temperature). You will now extend this to central venous pressure monitoring. The word pressure refers to a force being exerted in a place.

CVP, therefore, implies the force being exerted by the circulating blood volume in a large central vein, for example, the jugular, sub-clavian and femoral veins. This force is measured in millimetre of mercury or centimetre of water using a manometer.

CVP monitoring is indicated in a critically ill patient who has significant alterations in fluid volume. It is used as a guide in the effectiveness of fluid replacement therapy in hypovolaemic. It is also used to monitor the effectiveness of diuresis in a patient suffering from fluid overload and retention that is on diuretic therapy (Stacy: 2000).

The CVP is measured by inserting a catheter into the internal angular veins, subclavian, vena cava or right atrium. You should connect a saline manometer between the cannula and drip set.

The pressure should always be measured with the patient in the same position. You should ensure that the patient is lying flat each time as posture has an effect on the reading. The following steps should be followed when undertaking this procedure:

1. Ensure that the drip runs freely.
2. Set the zero position of the scale of the manometer at the inter-space between the sternum and the back, that is, at the level of the right atrium of the heart.
3. Open the drip while the clip connecting the manometer to the patient is closed so that the manometer fills up with saline, then close the drip.
4. Turn the clip connecting the manometer to the line going to the patient.

The saline in the manometer should fall until it stabilises. The reading on the scale at this level indicates the CVP. The reading is in terms of centimetres of saline. If it is above the zero point, that means the pressure is positive, if it is below the zero point, then the pressure is negative. The saline in the manometer should swing with each respiration. The normal CVP is 3 - 8cm of water or 2 - 5mm of mercury (Stacy: 2000).

How do you interpret CVP monitoring findings?

A low CVP usually occurs in the hypovolemic patient. To compensate for normal cardiac output, the heart rate increase. This increase produces the tachycardia observed in a patient in hypovolemic shock. An elevated CVP above normal occurs in cases of fluid overload. This causes the heart to increase its contractile force in an attempt to move the fluid volume in the intravascular space, hence raising the blood pressure.

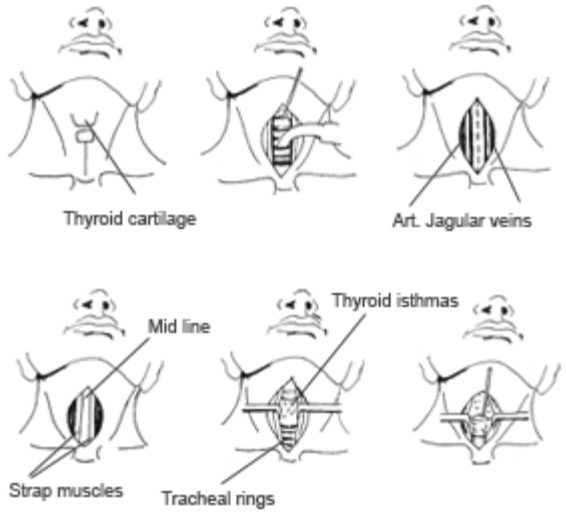
As a critical care nurse, you should monitor the CVP trends to determine subsequent interventions for fluid volume management in the patient.

Tracheotomy

A tracheotomy is an artificial opening in the trachea that provides access to the airway below the larynx.

Tracheotomy is mainly indicated for an obstruction of the upper airways as may occur in patients with bulbar palsy, prolonged retention of bronchial secretions or carcinoma of the larynx.

The graphic opposite illustrates the method of performing a tracheotomy on a critically ill patient.



Management of a Patient with a Tracheotomy Tube

Since the tracheotomy tube bypasses the humidification process of the air, which normally occurs in the nasopharynx, you should artificially humidify the air passing through the tube by a condenser humidifier such as humidivent (portex) or first place a moist gauze swab over the tracheotomy.

You should ensure regular suction of the tube to remove secretion. The patient requires chest physiotherapy by an experienced physiotherapist during the period the tube is in place, especially if they are unconscious. You should always have a tracheotomy tray containing curved artery forceps to be used in an emergency to be inserted in the tracheotomy site should the tube come out by accident. Other items needed in the tray are sterile suction catheters and spare sterile tracheotomy tubes of different sizes.

Management of a Patient with a Tracheotomy Tube

The tracheotomy tube can be changed if it becomes blocked. Change the tubes as follows:

- Inform the patient that you intend to change the tube
- Put on sterile gloves
- Ask assistant to cut the tapes of the tube already in place
- Suction the patient
- Remove the tube with the left hand and insert the new one with your right hand, curving it in and down the trachea
- Secure the new tube in position
- Ask the patient to cough if they are conscious
- Reassure the patient

If the tracheotomy was performed as a temporary emergency measure, it is usually left in use for five to seven days. Before removing, check that the patient can breathe normally by occluding the tube with a sterile gloved palm of the hand. The tracheotomy site is then dressed. Any skin sutures can be removed after seven days.

Rehabilitation and Counselling

Although counselling will be covered as a subject in module four, the role of rehabilitation and counselling in critical care nursing will be briefly covered here.

You may agree that if a patient is either unconscious, on ventilation or dialysis machine, relatives experience some concern. The patient is also likely to have problems coping and adjusting after gaining full recovery. At the same time, the patient may need to be weaned from the machines. All this calls for rehabilitation and counselling of both the relatives and the patient. To achieve this, you should be able to:

1. Have an open, honest discussion of the expected outcome of each patient with the patient and relatives throughout the period of therapy.
2. Advise each patient and relative on alternatives available in their situation, for example, change of occupation.
3. Inform them of others who have coped in similar situation.
4. Refer the patient to relevant rehabilitation and counselling services available.
5. Continue giving support through the established health care system during the post-therapy period.

UNIT FIVE PART TWO: THEATRE NURSING

This unit focuses on issues such as the historical background of theatre nursing, legal aspects in theatre and the general layout of the operating theatre. It also covers the preparation of the operating room, the equipment and the roles and functions of the nurses.
This unit is composed of three sections:
Section One: Introduction to the Operating Theatre.
Section Two: Safety and Infection Prevention in Theatre.
Section Three: Care of Patients Before, During and After Operation in the Theatre.

Unit Objectives

By the end of this unit you will be able to:

- Describe the historical background of theatre nursing
- Explain the legal requirements to be met by an operating theatre
- Describe the general layout of the operating theatre
- Describe the instruments used in a theatre
- Describe the methods of ensuring safety and infection prevention in the theatre
- Explain the roles and functions of the theatre nurse in the care of a patient while in theatre

SECTION 1: INTRODUCTION TO THE OPERATING THEATRE

Introduction

In this section you will briefly look at the development of operating theatre nursing, the legal aspects of operating theatre nursing and the physical layout of the theatre.

Objectives

By the end of this section you will be able to:

- Describe the development of operating theatre nursing
- Explain the legal aspects of operating theatre nursing
- Describe the operating theatre layout, the equipment and supplies required

History of Theatre Nursing

Theatre nursing has developed alongside the history of surgery. Surgery is an old form of treatment that can be traced back through the history of man. In the past, there were no theatres, no trained personnel, no anaesthesia and no equipment. Operations were performed at home. Problems during this time included infection, bleeding and pain.
However, with time, efforts were made to solve these problems. For example, in 17 BC, alcohol and opium were used to relieve pain by Napoleon who performed an amputation while the patient slept for 24 hours. By 1772, Joseph Priestly discovered the use of nitrous oxide as anaesthesia, and in 1842, Dr Crawford discovered the use of ether. In 1847 James Young began to use chloroform. In the 18th century a great breakthrough was made with the use of trilene thiopentone, clytopopaine and curare, which are muscle relaxants. By the end of 19th century, pain relief was an integral part of surgery.
In order to control haemorrhaging, the ancient Greeks and Romans as far back as the 16th century BC, used strings as ligatures. Later on, during the Middle Ages, they came up with the use of hot iron. This idea has been developed into the use of cautery to control bleeding. By the beginning of the 20th century, many types of ligatures were available, prepared from metal, nylon and cotton.
The control of infection dates back to the efforts of Louis Pasteur, who proved that bacteria caused infections. In 1865, Joseph Lister used carbonic acid to reduce the growth of bacteria in wounds. In 1886 Von Bergemen introduced sterilisation of dressings.
You have at one time or another, used gloves while providing care. They were introduced in surgery in 1890. You are now probably thinking back and asking where theatre nursing started? This question is answered when you look back at the history of nursing. You will recall that in unit one on general nursing the history of nursing was discussed. The history of nursing is very much related to the history of theatre nursing.

Operating theatre nursing is a special branch of nursing. The theatre nurse has evolved together with the development of the theatre. They are a member of a bigger team, all of whom work together to provide a safe passage through the operating theatre for every patient. However small or insignificant the task to be performed, the theatre nurse is responsible for the success of the procedure. They must, therefore, be highly skilled and trained, in order to be able to ensure a successful outcome for the patient.

What do you think are the aims of a theatre nurse?

Some of the aims of the theatre nurse are:

- To prepare conscientiously by study to adapt to the changing world of medicine
- To allay the fears of the patient
- To integrate the patient care during their period in theatre
- To become highly skilled in theatre techniques
- To be able to impart knowledge to others

Legal Aspects in Theatre Nursing

You will start by looking at the term 'legal'. The dictionary defines the word legal as 'required' or 'permitted by law'. Therefore, when we talk of legal aspects in theatre nursing, we are referring to what the law requires us to do in the theatre before, during and after the operation. In your clinical practice as a nurse, you may have participated in nursing a patient who was to undergo an operation. Can you remember what preoperative care was required before the patient could go for the operation?

Preoperative Care

The preoperative care requirements are:

1. You should make sure that the surgeon explains clearly to the patient what will happen to them.
2. The surgeon should obtain an informed consent from the patient or parent/guardian/ next of kin for those under age or not in a position to sign (e.g. unconscious person).
3. The nurse ensures that the patient has signed an informed consent, after the surgeon has explained the advantages and outcomes of the operation.
4. Make sure that the patient observes a 'Nil by oral' rule. The fasting should usually start six hours before the operation.
5. Blood works: All should be within the acceptable ranges e.g. full Haemogram including HB, urea, electrolytes and creatinine.
6. The patient should be counselled and reassured especially those receiving operations such as amputation, ormastectomy.
7. The site to be operated on should be shaved of hair and cleaned with warm soapy water, to reduce the bacteria on the patient's skin. The area shaved should be larger than the incision site.
8. Catheterisation and IV branula insertion may be necessary depending on the surgery.
9. Observations of vital signs, urine testing for sugars, proteins and acetone should be done.
10. The receiving area nurse should confirm that the above preoperative measures have been taken by the ward nurse in order to allow the patient in theatre.

Some of the preparations form part of the legal requirements
before surgery.

In unit one of this module you covered nursing ethics where the importance of confidentiality in nursing practice was stressed. This is another legal requirement. In the definition of legal, the term 'permitted by law' implies that you can only carry out patient care within what the law permits you to do. Therefore, the law gives the patient seeking medical, surgical and nursing care, rights under which they are to be managed.

The dictionary defines rights as any claim that is morally just or legally granted as allowable or due to a person. This brings you to the term 'legal rights of an individual during theatre nursing'.

When it is said that a person has the legal right to informed consent, what is meant is that they must be given information regarding the type of operation to be performed, why it is necessary, and its effects both bad and good, before being requested to sign the consent form for the operation.

However, you must also be aware of the fact that not all patients are given all the information regarding the type of operation they are to undergo. Before you give such information, you

need to take factors such as age and level of education into consideration.
No matter how impossible it is to communicate this information to a patient, it would be against the law and their individual rights to ask them to sign the consent form for an operation when they have not fully understood the implications.
It is on this basis that those below the legal age of adulthood (18 years in Kenya) are not legally bound to sign the consent form. It is signed by the parents/guardians on their behalf. In the same way, consent for the mentally ill is sought from their parents/guardians/relatives. It is also important to note that consent for an operation should be obtained from the patient before they are pre-medicated, as pre-medication drugs have the potential of affecting their reasoning capacity, hence making consent signed not legally binding.
Having looked at confidentiality and informed consent, it is important to mention that the custody and security of the patient before, during and after operation is vested in the theatre team. It has already been implied earlier that by signing the consent form, the patient takes some responsibility for the whole loss of life or part of their body. However, this does not take away the responsibility of the theatre team to ensure the security of the patient's life during the operation.
The legal aspect in theatre nursing involves the care of the patient from the time the patient is accepted in theatre, until they are handed over back to the ward.
For these reasons, the following procedure should be adhered to:

1. Any patient going to theatre must be properly prepared preoperatively.
2. The patient must sign an informed consent, obtained by the surgeon.
3. The patient must be protected from any harm, falls or eventuality, during the stay in theatre.
4. Confidentiality must be observed regarding the patient.
5. Measures must be taken to ensure that the patient taken to theatre is the right one for the intended operation.
6. The items to be used for the operation must be counted and recorded before and after operation to prevent loss of swabs, tubes, blades, forceps, abdominal pacts and any instrument used.
7. Theatre nurses must know where the exits are, for use in case of an emergency.
8. Sockets in theatre should be covered during scrubbing to prevent risk of conducting currents. They should also be one meter or more above the floor level.
9. All electrical machines must be checked to ascertain optimum function before use on the patient.

Layout of an Operating Theatre

The theatre unit is a block of buildings with a series of rooms leading off a corridor with closed doors, which separate it from the main hospital.
The doors reduce unnecessary movement to and from theatre. A theatre should be built in a central place possibly near an intensive care unit, the surgical wards and other special wards, for example, renal unit and burns unit.
All these units should be in relation to each other, but construction should be separate and independent from all traffic and air movement within the hospital.
A theatre unit is self contained with changing rooms, shower rooms, toilets, anaesthetic room, operating room, cleaning room,at least four beds, sluice room, linen room and sterilising room.

Inside the theatre, the walls, floor and roof are built with labour saving materials for hygiene purposes. It has artificial ventilators, efficient artificial lights and emergency systems for use during power failure. The theatre furnishings and fittings are made of stainless materials for quick and
thorough cleaning.
All the trolleys are fitted with non-electricity conducting rubbers to minimise the risk of electric conduction. The doors and corridors are wide and high for easy movement. The ceilings are high enough for proper theatre ventilation.

SECTION 2: SAFETY AND INFECTION PREVENTION IN THEATRE

Introduction

Safety and infection prevention are of utmost importance in the operating theatre. To ensure this, in this section you will consider the preparation of the operating theatre, theatre nurse, patient and equipment. You will also cover the equipment used in theatre and types of anaesthesia.

Objectives

By the end of this section you will be able to:

- Explain the principles of infection prevention in the operating room
- Describe the equipment used in the operating room
- State the different types of anaesthesia
- Explain the use and mode of action of local and general anaesthesia

Principles of Infection Prevention in the Operation Theatre

Before you read on, try to reflect back on the rationale for safety and infection prevention in the wards.
To ensure safety and prevent infection in the theatre, you must consider the following points:

- Preparation of the operation room
- Preparation of a theatre nurse
- Preparation of the equipment

You will now look at each of these in turn.

Preparation of the Operating Room

The theatre and equipment must be cleaned thoroughly every morning to minimise the number of micro-organisms. Ensure high dusting of walls and clean trolleys, drip stand, operating tables and all equipment therein. You should also ensure that the floor is scrubbed with soapy water and then mopped with a disinfectant recommended by the hospital. After cleaning and drying the theatre floor, all the equipment must be returned to its proper place.
Prepare the operating table by drying it after cleaning and placing it in the right position directly below the overhead operating lights. It should then be draped with a clean sheet ready to receive the patient. You should then set the anaesthetic tray ready and check the anaesthetic machine to ensure it is in working order for use to cauterise any bleeding vessel during operation.
The operating lights should be checked to ensure they are in good working order. The required operating set of equipment should be ordered from the theatre sterilising room/unit.
After the operation has been completed you should:

- Clean all fitments and equipment thoroughly
- Do high and low level dusting using the disinfectant
- Clean the floor and drains with the disinfectant
- Wipe the operating lights with a clean damp towel

Preparation of the Nurse

After entering the theatre unit, you should go straight to the changing rooms. Take a shower and change into your theatre suit and boots. Personal clothes should be locked in a locker within the changing room. Your head should be covered with a clean, sterile theatre cap. If you have any respiratory infection you are advised not to enter the operating room. A very high standard of personal hygiene should be maintained. You should avoid movement in and out of the theatre and any time that happens you should change into another clean theatre suit before re-entering the operating room.
It is advisable for you to visit the toilet to empty your bowels and bladder before taking a shower and putting on the sterile theatre suit to minimise the need of using this facility later during the theatre activities. However, this is just a precautionary measure and you should change your theatre suit any time the toilet facilities are used if you are to go back to the operating room.
You are now going to look at the procedure of scrubbing, gowning and gloving for the operation.

Scrubbing

This is done to remove micro-organisms from the forearm and arms by mechanical washing and chemical disinfections before taking part in surgical procedure. This helps prevent the possibility of the patient being contaminated by bacteria from the hands and arms.
Preparation for this procedure involves the following:

- The theatre suit should have the top/shirt tidily tucked in. Roll the sleeves up to at least three inches above the elbow.
- A cap should be worn to cover all the hair, tie the tape at the back.
- A mask should be worn with the short side above the nose and the long side under the chin.
- Remove all jewellery, wide wedding rings, dress rings, watches, earrings and necklaces.
- Finger nails must be short and clean without nail varnish.
- No cut wounds or septic wound on fingers.
- No upper respiratory tract infection.
- No gastroenteritis.
- Wear a mackintosh apron to protect your scrub suit.
- Regulate temperature and flow of water to suit you.
- Scrubbing time varies according to the type of soap or chemical used. For example, if using gamophen soap, which contains hexachlorophene disinfectants, you should scrub for five minutes; if using hibiscrub, two minutes; ordinary soap, ten to fifteen minutes.

The following procedure should be followed for a complete scrub:

1. Use the wall clock to time yourself.
2. Wet the hands and arms to the elbow.
3. Pick the soap and make a lot of lather on the hands and arms (the soap remains in hands until the point of drop off later).
4. Wash hands and arms for one minute. This is called a social wash.
5. Keeping the fingertips uppermost all the time, rinse hands to the elbow.
6. Using the elbow, press the hutch of the dispenser and pick one sterile brush. Lather the brush and keep tablet of soap at back of the brush between your palm and brush in your right hand.
7. Starting with the left hand put your fingers together and scrub the fingernails. Move to the fingers, and then wipe off the hand and palm. Use a circular movement inside the palm. Spend extra time at the folds of the wrist. Do this for 1½ minutes, rinsing often and starting again.
8. Rinse the hands from fingertips to wrists after the 1½ minutes. Rinse the brush and soap as well.
9. Change over to the right hand and repeat the procedures (7) – (8). Spend another 1½ minutes. Drop the bush into the correct receptacle provided. Keep the soap still in hands.
10. Lather hands and wash up to the wrist for another minute. Rinse the soap and drop it back into the soap dish.
11. Take all necessary precautions to avoid touching the tap handles during this exercise as this contaminates the hands.
12. Rinse the hands and arms thoroughly in one direction only starting from fingertips working down systematically to elbows.
13. Close the taps using elbows. Keep hands together upright, fingers higher than elbows. A total of five to ten minutes have been observed during the procedure.
14. The circulating nurse will remove the mackintosh apron.

There are set procedures for drying, gowning and gloving.

Drying

Pick up the towel and step back. Start with the left hand and blot dry the fingers, the webs of the hand and the palm well. and then move to the back of the hand, and the forearm, using a circular movement to the elbows. Change the towel to the left hand with the wet part against the left palm. Using the dry part of the towel, repeat the same procedure on the other arm. When you get to the elbow, discard the used towel in the dispenser provided.

Gowning

The following procedure should be followed when gowning:

1. Pick a gown and step back.
2. Hold the neck-band and let the bottom hem drop.

3. Open the gown and slide both hands in through the arm holes.
4. Do not touch the outside of the gown with your bare hands.
5. The Runner Nurse will first tie the neck and shoulder bands then wristbands without touching the gown.

Gloving

The following procedure should be adhered to:

1. Arrange gloves on the trolley with glove finger portion away from you.
2. Pick the glove with left hand holding at the folded part and slip in your right hand. Fold the tip of the sleeve on right hand and pass the glove over.
3. Using the gloved hand slip your fingers beneath the folded area of the remaining glove and slip in the left hand into the glove.
4. Unroll the cuff of the glove covering the cuff of the sleeve.
5. Do the same for the opposite hand using the same technique.
6. Ensure you do not contaminate any area that will come in contact with the sterile field.

Patient's Skin Preparation

Skin preparation depends on the area being operated.

Preparation of the skin includes vigorous sponging of the skin with a sponge soaked in strong disinfectant held in a sponge holding forceps.

Disinfectants used include centrimide and hibitine in spirit. After sponging, the area is swabbed once with iodine in spirit or hibitine 5% in 70% alcohol.

Draping of Patient

The purpose of draping is to maintain an adequate sterile field for the surgical procedure.

The scrub nurse gives the surgeon the sterile towel to cover the area above the operation site and below and the sides.

After draping, the scrub nurse brings the operation trolley and instrument trolley next to the table.

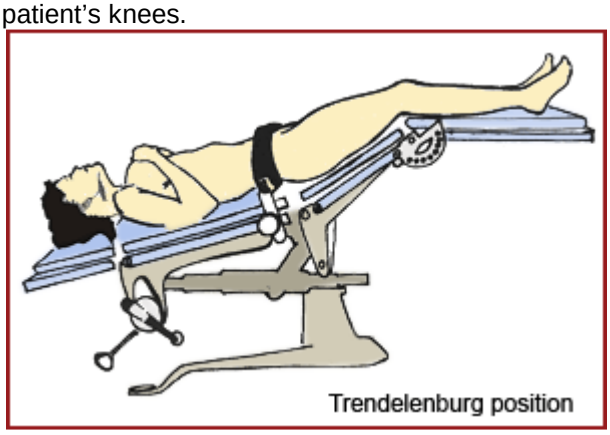
Positioning of Patient

Positioning is done by the other team members who have not scrubbed up and worn sterile gowns and gloves. Patients are positioned before the skin preparation and draping described previously.

This involves placing the patient on the operating table to a desirable level for surgery and ensures that any harm to the patient, such as pressure on the nerves, is prevented. After positioning, the theatre gown is removed and skin prepared.

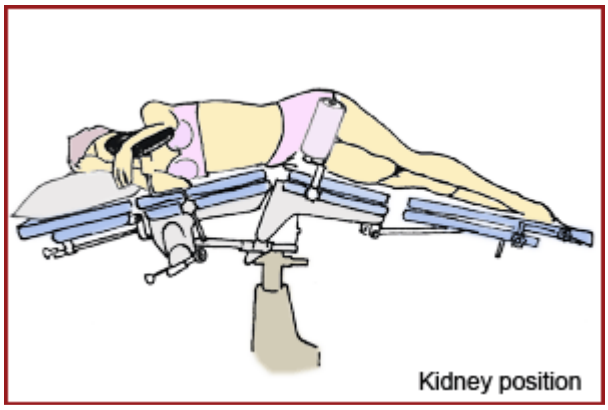
Trendelenburg

Trendelenburg, which is most commonly used in pelvic operations, where the patient is placed supine and the head lowered and the table is broken at the knee joint to lower the lower section slightly to flex the patient's knees.


Trendelenburg position

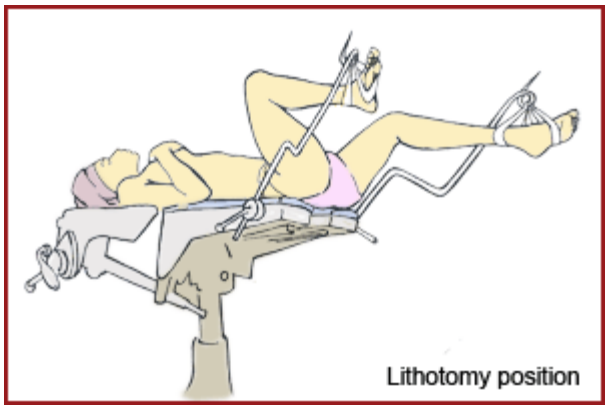
Kidney position

Kidney position, where the bridge of the table is raised to elevate the loins between the lower limbs and the iliac crest.


Kidney position

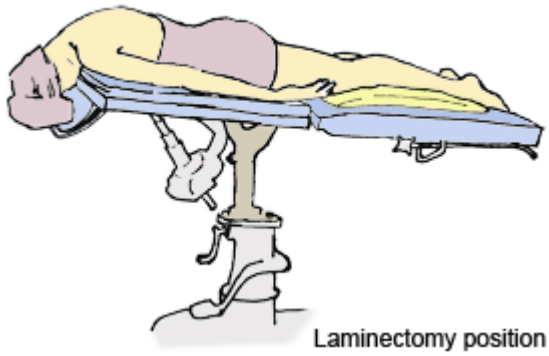
Lithotomy

Lithotomy, which is used in perineum operation. The patient lies supine and the lower limbs are raised on stirrups from the pelvis. Both legs must be raised simultaneously to avoid injury. The knees are flexed.



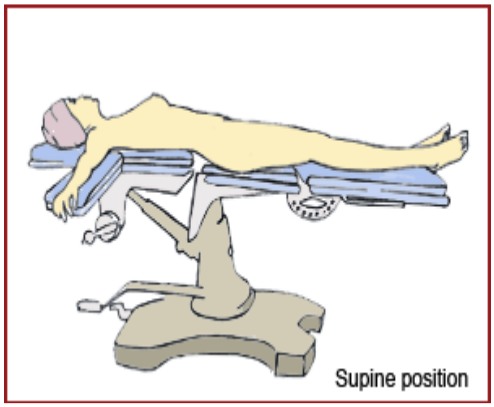
Laminectomy

Laminectomy position, where the patient is put in the prone position with the head beyond the end of the table with the forehead resting and supported on a horseshoe fixed six inches below the level of the table.



Supine (laparatomy position)

Supine (laparatomy position), where the patient lies on the back with arms on the sides on arm boards.



Equipment Used in Theatre

You are now going to look at the equipment that is normally used during an operation.

Ligatures and Sutures

A suture is a stitch or series of stitches used in surgery to bring together living tissues until the normal healing process takes place. A ligature is a suture used for tying blood vessels to arrest bleeding.

There are two types of sutures. They can be absorbable, which means they dissolve in the tissue after some time, for example, catgut. They can also be non-absorbable, which means that the body tissue cannot digest the material used, for example, silkworm gut, nylon, cotton, linen, silk and metal.

The latter must be removed when the wound is healed. Metal clips are also available and are used in neuro-surgery to compress nerve endings, and also on skin incision to give a good grip. Traumatic sutures are used together with a needle for suturing the skin. Ligatures are lengths of suture material used without a needle to tie a blood vessel in order to control or arrest bleeding. Most ligatures are non-absorbable, for example, those made of linen, cotton, silk, polyester, wire and clips. Absorbable include chromic catgut. Metal clips can be used as ligatures.

Cutting needles, which have a sharp edge, cut a crack as they pass, and are used on strong tissues, for example, skin, tendon, muscles.

Surgical Needles

These are made from plated carbon steel or stainless steel. The different parts of a needle are the eye, shaft, and point. The needle is either straight or curved. There are different classes of needles. These include:

Round bodied needles

Cutting needles, which have a sharp edge, cut a crack as they pass, and are used on strong tissues, for example, skin, tendon, muscles.

Atraumatic needles

Round bodied needles, which are round and smooth, cause less damage and make a puncture. They are used in delicate tissues and organs.

Cutting needles

Atraumatic needles, which are either cutting or round bodied whose traumatising chance is

minimal. These needles have no eye. Suture and needles are made joined-together.

General Set of Instruments

This is a set of instruments that are used for a general operation.
(see Houghton et al [1967] p.105 - 109) for more detailed information including photographs.

No	Item
5	Rampley sponge holding forceps
2	Bard parker handle No. 4 (BP)
1	Bard parker handle No. 3 (BP)
1	Mayo scissors curved on flat 71/2
2	Mayo scissors straight 71/2
1	Mayo scissors curved on flat 61/2
1	Cartless ligatures scissors
1	Dissecting forceps toothed
1	Dissecting forceps non-toothed
1	Dunhill Artery forceps curved or flat
10	Chances Artery forceps curved or flat
10	Spencer wells curved on straight
4	Little wood tissue force
2	Lanes Tissue forceps
4	Allis Tissue forceps
2	Langerbeek retractors 13/4 *1/8
2	Canny Ryalls Retractors
1	Lister Sinus forceps
1	Watson cheyne probe and dissector
1	Stanley Boyd's bone currettes double ended
1	Silver probe
2	Sinus needle Holders
10	Shardless cross Action Towel clip
4	Mayo pins
1	Yankaur Sucker Tube
1	Yankaur Universal Sucker Handles
1	Yankaur sucker tube fine
1	Yankuar tube medium
1	Yankaur sucker tube Basket type
1	Pressure tube Anti-static 2 metres long Diathermy heed
1	Diathermy handle with Ball or Riches forceps
1	Edinburch Tray 24'' * 113/4''
1	Spring cord
1	Green wrapper large
1	White wrapper
1	Basic pack contains: 2 bundles raytec gauze (20) 10 green towels 1 abdominal sheet 1 chest sheet 1 Mayo cover

Equipment

It is important to note that dirty and unsterile equipment can become a source of infection. To reduce this, all dirty equipment must be soaked in a standard disinfectant preferably Jik, for ten minutes. This makes it safe for handling and cleaning. It should then be cleaned in soap water, rinsed, dried and then taken for autoclaving. The same should be done to linen, for example, towels, abdominal draping sheets, and gowns, which become contaminated during the operation.

Anaesthesia

Anaesthesia is the loss of pain and sensation to a part or the whole body induced by drugs. There are two types of anaesthesia: local and general.

Local Anaesthesia

Local anaesthesia induces analgesia in the region where it is administered, for example, lignocaine, procaine hydrochloride, xylocaine and lidocaine.
The local anaesthesia last for forty five minutes to three hours depending on the type of anaesthesia used. It is given locally to the affected part of the body by one of the following methods:
Infiltration, nerve block, field block, refrigeration analgesia, spinal analgesia, epidural anaesthesia.

Local Anaesthesia Methods
Infiltration
The drug is injected on and around (in various points of) the affected area.

Nerve Block
The nerve supplying the affected area is infiltrated by the anaesthetic drugs, inducing loss of sensation on the affected area supplied by that specific nerve.

Field Block
Similar to nerve block but cover a larger area and may involve more than one nerve.

Refrigeration Analgesia
It is administered by use of a vapouriser. Drugs used include: Ethyl chloride or Diethyl ether.

Spinal Analgesia
Used for operations from the abdomen and below, e.g. caesarean section. A lumbar puncture is done and the local anaesthesia introduced through the spine. The drug paralyses the area below the puncture.

Epidural Anaesthesia
The drug is injected in the dura mater space of the spinal cord. Used for operations of the abdomen and below.

General Anaesthesia

General anaesthesia causes the patient to lose consciousness, for example, thiopentone, ketalar and halothane.

Anaesthesia can be categorised into: pre-medication, preoperative and postoperative procedures.

Pre-medication
The following procedures should be adhered to prior to the operation:

- Atropine 0.6mg intramuscular (for adults) administered one hour before the operation to reduce Respiratory Secretion (RS) and to prevent bradycardia; Children should be given 0.3mg.
- Pethidine 50 - 100mg intramuscular for adults, which has an analgesic effect on the patient; and 25 - 50mg for children depending on age and weight.
- Valium can be given one night before to a very nervous patient.
- Hyoscine 0.4mg for adults, which can also be given for pre-medication although it has the potential side effect of amnesia.
- Morphine 10 - 15mg intramuscular can also be used.
- Oral pre-medication is the best for children and should be administered two hours before operation.
- Remember to make the patient observe nil by mouth for six hours prior to operation.

Pre-operative Anaesthesia (Induction Agents)
There are several types of anaesthetic agents.

Volatile Agents (Inhalations)

Volatile agents include ether, which is highly inflammable in the presence of diathermy and irritates the respiratory tract. On the other hand, it has the advantage of being cheap to administer. Halothane is very good as an induction agent but can cause halothane hepatitis. Trilene is not a very good induction agent but is a good maintenance anaesthetic agent. Its side effects include tachypnoea and vomiting. However it has a good analgesic effect postoperatively and it is cheap. A mixture of O2 and NO2 and one of the volatile anaesthetic agents, is the best way of maintaining anaesthesia.

Intravenous Agents

Intravenous agents include barbiturates, for example, thiopentone, which causes sleep very quickly. Methohexitone can be used as an induction agent but cannot be used without equipment for resuscitation and is contraindicated in epilepsy. These are mainly sedative drugs thus they do not have any analgesic effect. Ketamine can be given IV or IM. It has an analgesic effect and can be used alone in minor surgeries. Side effects include bad dreams and elevated blood pressure. Ketamine is also used with valium. It is contraindicated in hypertension.

Muscle Relaxants

Muscle relaxants can be divided into two categories. Short acting (depolarising) relaxants include suxamethonium (scoline), which is mainly used for intubation. Its main side effect is that it causes bradycardia. Long acting (non-depolarising) relaxants include curare, flaxedil and pancuronium. The action of these agents has to be reversed to revive the patient by neostigmine atropine.

Analgesics

Analgesics are used to relieve pain and include pethidine, sosagen, morphine and fentanyl. The postoperative patient is given a drug for pain relief, for example, pethidine or valium, and an anti-emetic for instance, plasil (metoclopropamide), stemetil or phenergan.

SECTION 3: CARE OF PATIENTS BEFORE, DURING AND AFTER OPERATION IN THE THEATRE

Introduction

Having looked at safety and infection prevention in theatre, you will now look at the care of a patient before, during and after an operation.

It is important to note that fear and anxiety predominate the preoperative period of the patient, hence the care of a patient who is to undergo any operation does not start in the theatre but in the ward or outpatient department, and continues to theatre. Right from the ward, therefore, you need to reassure the patient and handle them with confidence so that their fears can be allayed.

Objectives

By the end of this section you will be able to:

- Describe the general preoperative care for a patient
- State your role as an anaesthetic nurse in the reception area, anaesthetic room, and operating room and during the postoperative period
- Describe your role as scrub up nurse
- State at least seven roles of a runner nurse
- Describe your role as a recovery room nurse
- Describe the general principles in the postoperative care of a patient

You will now look at what happens at the various stages starting from the traffic in room up to the recovery room.

Preoperative Care

The patient comes from the ward to the receiving area. They are then moved to the anaesthetic room, operating room, recovery ward, back transfer, and finally back to the ward.

The receiving area is where the ward nurse identifies the patient to the theatre nurse, discusses and hands over the patient's notes, and formally hands over the patient. You should note that at this point the patient is usually apprehensive and hence needs to be reassured again.

You should check the patient's identification bands, name on the notes, and in patient number (IP No.). All these should correspond. Check whether the consent form is the correct one and is correctly signed, and that the consent obtained is relevant to the operation about to take place. Check what pre-medication was given and indicated by ticking and signing, noting the time it was given on the preoperative checklist. The patient should then be transferred from the ward trolley to the theatre trolley. Make a physical check that the patient has been prepared and tick the patient traffic in theatre list.

Check for x-rays if indicated. It is the responsibility of the ward nurse to check for blood from the blood bank and to bring it to theatre. If these things are not properly done, patients should not be received.

The recovery area nurse should observe the patients waiting to go to the wards while still under general anaesthesia. Observe for any

abnormality, that is, the wound, vital signs and report any abnormalities to the anaesthetist or the surgeon.

Anaesthetic Room Nurse

The role of the anaesthetic room nurse is to offer assistance to the anaesthetist during induction, intubations and operation. You are in charge of the anaesthetic room and assist in setting up the anaesthetic equipment containing all drugs that are mandatory in anaesthesia.
As you receive the patient into the anaesthetic room, you should do your best to reassure them to allay any anxiety. You should also help during the emergencies, for example, cardiac arrest. Clean and tidy the anaesthetic room after use and see that the proper registers are available. Keep the required forms ready, for example, the pathological and x-ray forms. The anaesthetic nurse should also fix electro cardiac monitors and catheterise the patient. They should prepare anaesthetic throat packs and take and record vital signs observations. The anaesthetic nurse monitors urinary output and hands over the patient to the recovery area nurse.

You should collect the inventory, laryngoscope introducers, artery forceps, magills forceps, arm boards, endo tracheal tube jelly, dissecting forceps and a pair of scissors.
You should also ensure that the suction machine is in good order and a sterile suction tube is available. Ascertain that the drugs and equipment for induction, reversing drugs, muscle relaxants, infusions, cannulas, Ryle's tubes, needles and syringes are available.
Also make sure that there are various types of connectors and strapping cut in different sizes.

Duties of the Anaesthetist Nurse

During induction

The following are the basic duties of the anaesthetist nurse during induction:

- Help the anaesthetist to put the IV cannulas
- Administer oxygen by mask
- Hand over the airway and the strapping to fix the endotracheal tube
- Inflate the endotracheal tube and clip it with the artery forceps
- Remove the blanket cover and cover the patient with a draw sheet
- Wheel the patient to the operating room, position the patient and assist in putting the patient on the operating table

During the operation

During the operation you should:

- Fix the arms and secure them by strapping them to the arm board
- Observe the patient during the operation, check the colour, whether sweating, restless and report to the anaesthetist or doctor
- Assist the anaesthetist to remove the intubation tube after operation
- Tidy the anaesthetist room, clean the anaesthetist catheters and set for the next patient
- Clear all trolleys used and the trays and send them to the sluice room where they are to be thoroughly scrubbed

Scrub-Up Nurse

You should ensure sterility by cleaning yourself thoroughly, from the tip of the fingers to the elbow and by putting on sterile gloves and a gown hence ensuring sterility around the operating table. You should arrange the sterile instruments around the operating table before the operation. Check the numbers of each instrument category and report to the runner nurse. Prepare ligatures and put them ready for different stages of the operation.
You should count all the equipment at different stages where the cavity needs to be closed to prevent any loss in the cavity and report correctness to the surgeon. Pass the cavity mops to the surgeons (a sponge for cleaning the cavity or operation area). Clear all the instruments used, count them and take them for sterilisation in preparation for the next operation.

Circulating or Runner Nurse

You should assist in positioning the patient. Always watch the scrub-up nurse and bring what they require and sterilise equipment as directed. Make sure any extra equipment for the operation is working properly, for example, diathermy

machine, suction machine and other electric apparatus.
Bring and change lotions as required. Check the records (swabs and packs) and count the used swabs and confirm correctness. You should also record the time the tourniquet was applied or removed. The circulating nurse ensures the welfare of the entire scrub-up team and the patient plus the sterility in the operating room. Finally, you should remember to record the bandages, IV fluids, drugs, and strapping used if need be.

Recovery Room Nurse

Observe the general condition of the patient and the vital signs (temperature, blood pressure, pulse, respiration) on reception of patient every fifteen minutes. A rise or fall in any of the vital signs indicates all is not well with the patient and alert the anaesthetist.
You should observe and ensure postoperative blood transfusion and other infusions are running as required. You should prepare all the equipments and medications required in the recovery area.
Monitor and record both fluid input and output. This helps you to monitor kidney functions.
A decrease in urine, or lack of its production, calls for urgent action. Should this happen, inform the surgeon immediately. If excess fluid runs in intravenously, administering a diuretic drug induces diuresis. This is recommended.

Theatre Attendant

Your duties as a theatre attendant include cleaning the sluice room thoroughly and washing all the instruments after an operation. You should also clean the mackintosh and arrange all the instruments for packing ready for sterilisation.

The Nurse Administrator

The nurse administrator is the overall administrator of the theatre and sees that all staff and patients are safe. They ensure that every area in theatre is satisfactorily staffed for 24 hours and the staff work as required.
This person should orientate new staff in theatre, and ensure availability of equipment needed in theatre. They should also liase with the specific wards and other departments for the smooth running of the theatre. Finally they should maintain discipline in theatre.

General Principles in Postoperative Care

The general principles in postoperative care include:

- Ensuring clear airway
- Supporting circulation
- Controlling bleeding
- Preventing infection
- Monitoring any complications
- Controlling pain
- Ensuring return of gastro intestinal motility
- Ensuring easy ambulation
- Preparing the patient for discharge and home-based care

Ensuring Clear Airway

You should place the patient in recovery position (three-quarters prone, or left-lateral). This allows secretions from the lungs and mouth to drain out. Suck the secretions using a suction machine if they are excessive.

Supporting Circulation

This is done in order to maintain the functions of the lungs, the heart and the kidney. This is achieved through adequate blood volume. You should maintain the infusion running at the required rates.

Remember
The amount of fluid required is calculated as: Maintenance requirement + fluid loss (loss during operation + normal body loss + insensible loss).

Supporting Circulation

In an adult, the body requires 35ml per kg body weight in 24 hours. The insensible loss (loss through skin, normal faeces and breathing) is approximately 0.5ml per kg body weight per hour. In children these figures vary by age as follows:

- Below three months old, the maintenance requirement is 5mls/kg/hour, or 150ml/kg/24 hours
- Infants above three months and weighing between 3-10kg require 5ml/kg/hour
- Those weighing 10-20kg need 3ml/kg/hour

- Children above 20kg need 2.5ml/kg/hour
  (Watters et al 1991)

You should select fluid that will supply the required electrolytes, for example, normal saline or ringer lactate 500ml to alternate with 1000ml of 5% dextrose and add 3g of potassium chloride per litre of dextrose (Watters et al 1991).

Controlling Bleeding and Wound Care

Monitor the wound for any signs of bleeding. Should this occur, apply a firm dressing and inform the surgeon. After 24 hours, check for signs of infection, these include redness, tenderness, oedema and low grade fever. If this occurs the sutures are removed to allow the pus to drain and the wound cleaned three times a day with antiseptic lotion.

Preventing Infection

Septicaemia is likely following an operation, due to peritonitis. Pneumonia may follow bed confinement. This is indicated by a rise in body temperature and should this occur, you will need to administer antibiotic without delay. In some hospitals it is a common practice to cover the patient with antibiotics following surgery, where septicaemia is likely. The principle of infection prevention that you covered in module one, unit one should be applied to prevent infection.

Monitoring of Complications

You should monitor pulse, blood pressure, and respiration rate and body temperature until they are stable and within the normal ranges for the age and sex of the patient. The recommended frequency is to observe the patient every 15 minutes for the first two hours, followed by every 30 minutes for the next two hours, then four hourly if they appear to be stable. Other important observations to make at the same time are level of consciousness, and urine output.

Controlling Pain

This is achieved by the administration of pain relief drugs once the patient is conscious. You should administer an intermittent bolus of pethidine 50-100mg intramuscularly or morphine 10-15mg for adult. Other measures include correct positioning of the patient so as to avoid pressure on the nerves, administering analgesics, use of heat/cold massage and guided imagery (a process of suppressing pain by focusing on something else).

Ensuring Return of Gastro Intestinal Motility

Postoperatively you should assess the return of gastric motility. This is indicated by the return of bowel sounds and passing of flatus. Following abdominal surgery (laparatomy), gastro intestinal motility returns to normal in three to four days. The patient should not take food orally before this period is over. The stomach is decompressed through nasal gastric tube suction. This should be removed when the aspirate falls bellow 400mls per day. Should postoperative diarrhoea occur, reassure the patient, as this clears in two to three days, but ensure adequate hydration. When bowel sounds are back give oral sips, fluid diet, light diet, then resume normal diet.

Ensuring Early Ambulation

Encourage the patient to move out of bed as soon as their condition allows. This will prevent deep venous thrombosis (the development of a blood clot in a vein), which can complicate to pulmonary embolism (a circulating blood clot in the veins of the lungs).

The signs of thrombosis include, warm swollen painful limbs and low-grade fever. If noticed, the affected limb should be elevated until the swelling subsides. Heparin in a dose of 5000units, eight hourly, is administered subcutaneously when the diagnosis is confirmed.

The postoperative care should start from the recovery area of a theatre, and continue in the postoperative ward where the patient is rehabilitated then discharged.

Preparing the Patient for Discharge and Home Based Care

The postoperative patient needs to be made aware of the expected outcome of the surgery as well as the medical and nursing care that they will require at home. This will reduce the possibility of last minute crises on the day of discharge.

The patient should be given an opportunity to get ready to cope at home and in the community as they ask you how to deal with a changed body image. Home based care concepts will be covered in detail in unit seven of module three.

UNIT SIX: COMMUNICATION AND COUNSELLING

This unit focuses on communication and counselling. In the last five units of this module you covered professionalism, fundamentals of nursing, adult nursing, paediatric nursing, critical care and operating room nursing. In this unit you are going to focus on communication and counselling.

Unit Objectives

By the end of this unit you will be able to:

- Describe the communication process
- Describe the key contexts of communication
- Describe barriers to effective communication
- Describe essential organisational communication
- Describe psychology
- Describe counselling
- Describe patient's rights and ethical issues
- Describe approaches to counselling
- Counsel target groups

SECTION 1: DEFINING COMMUNICATION

Introduction

You might have noted from the introduction that the first four objectives of this unit are on effective communication and the next four are on counselling. Therefore, this section will begin by focusing on communication, and later on counselling.

Objectives

By the end of this section you will be able to:

- State the definition of communication
- Describe different types of communication
- Explain the communication process
- Describe the components of the communication process

Communication

To begin with, consider the following question:
Think of the number of times you interact with patients each day. Can you count that number?
Perhaps it is impossible to count. Well, the conversation you hold with your patients and even colleagues while exchanging views is called communication. So, it could be said that communication is the exchange of information between two or more persons who are interacting with each other in such a way that the information is understood. It can, therefore, be concluded that communication is the transfer of meaningful information and the establishment of commonality with the audience.

Types of Communication

Communication can be formal, informal or unconscious.

Formal Communication
Formal communication is any official method of communicating with people (employees) in an organisation. The communication may be passed orally or in written form. The message flows from top to bottom, for example, from the top management to staff at the lower levels, following the hierarchy or chain of command in the
particular organisation.
Formal communication mainly involves giving instructions to be followed and clarifying the roles of staff in the organisations. It also emphasises the use of available resources to achieve the desired goals. Formal communication flows in three directions, namely:

- Downward communication
- Upward communication
- Horizontal communication

Downward Communication
This is where the communication flow comes from top management to the lowest level. The communication channels used include oral messages, telephone calls, written communication in the form of circular letters, memoranda, pamphlets or posters. The main advantage of downward communication is that it

is received immediately and is not distorted. For example, the district public health nurse may request the nurse working in a health centre to submit a written report on a monthly basis to their office.

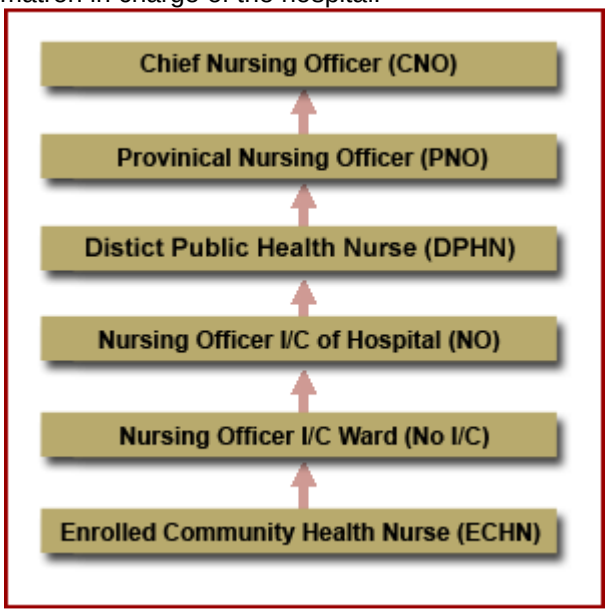
The main disadvantage of downward communication is that it is unidirectional, that is, there is no return path for communication, this delays feedback. For example, a nurse in charge of a unit may decide to keep a recommendation report for promotion in the file and delay sending it to the Public Service Commission for approval. Downward communication within the Ministry of Health is illustrated in the diagram (right).

Upward Communication

This type of communication flows from staff at lower and middle levels to the top management. This provides feedback regarding organisational progress, a consultative forum to improve the quality of service and a means for staff to request clarification of goals and/or additional resources. Practically, however, this very rarely happens and it is important to encourage staff at lower levels to participate.

The main advantage of this type of communication is that it helps to maintain the discipline of staff at lower levels. It also protects the seniority of staff at the middle levels.

The main disadvantage is that the middle level staff management may refuse to forward the grievances coming from the lower level staff. For example, a sister in charge of a ward may refuse to pass information from junior nurses to the matron in charge of the hospital.



Horizontal Communication

In horizontal communication the communication flow occurs between heads of departments or supervisors who are at the same level. The nurses in-charge of medical and surgical departments/wards consult one another. The supervisors at the same level exchange ideas on common goals in order to improve the quality of patient care. The supervisors may discuss the common problems affecting their departments with a view of getting solutions to recommend to the top management for approval.

Horizontal communication also occurs at the health centre and dispensary levels when the staff consult one another. The main advantages of this type of communication are that it encourages free communication by all staff in the departments all the time and ensures that staff do not fear each other, thus improving interpersonal relationships.

You now know what formal communication is. Move on toinformal communication.

Informal Communication

Informal communication is an unofficial form of communication between groups of people in the organisation. The messages are discussed casually and are not recognised by the management. Informal communication is also known as the 'grapevine'.

The grapevine is a form of information containing some half-truths and may emanate from the staff at the lower or middle levels in the organisation. The grapevine is common in organisations where a certain cadre of staff feels that their needs are not being addressed or where top management fails to clarify issues or communicate effectively with the middle and lower level staff. The grapevine should not be ignored because it gives a warning of impending issues of concern to the employees. The top management should provide current information to minimise grapevine rumours. Grapevine communication also gives a chance to the colleagues to express their views.

Unconscious Communication

Unconscious communication is where a wrong meaning has been transferred because of the way the communication has been conveyed unconsciously to the receiver. Usually the sender of the message is unaware that their behaviour is sending the wrong signals. For example, if you appear quite casual when giving important information, the recipient will misinterpret the importance of the information because of the manner in which you speak. Therefore, it is important for health workers to be aware of unconscious communication.

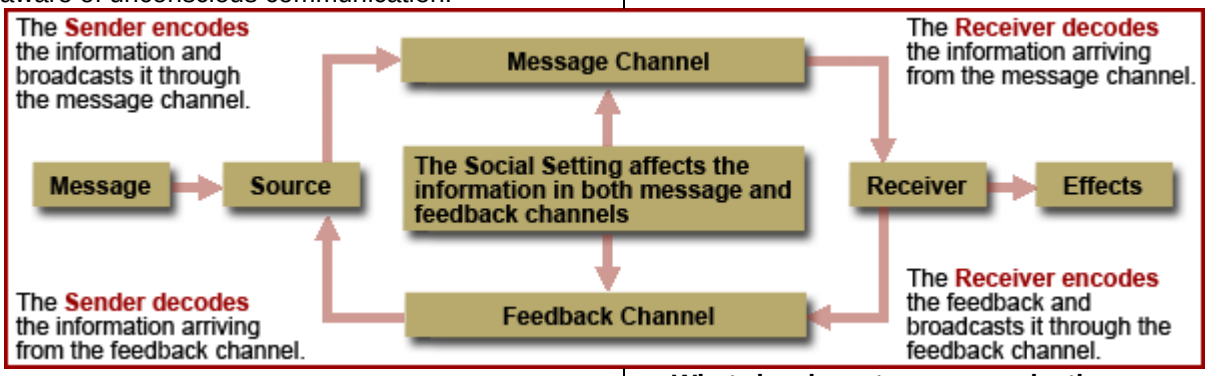
The Communication Process

Consider the communication process, what takes place when you have a conversation or exchange letters with another person? What are the elements involved? What can go wrong?
Make a note of your thoughts and then compare your answer with the following definition of the communication process.

The communication process can easily be defined as the passing of information from the sender to the receiver. The components of the communication process can be remembered using the acronym "MSCREFS" which stands for:

M - Message
S - Source
C - Channel
R - Receiver
E - Effects
F - Feedback
S - Social settings

The communication process is illustrated in the graphic below.



What barriers to communication can you identify from this graphic?
Please think through all the possible barriers before starting this section.

Section 2: Barriers to Effective Communication

Introduction

Despite your best attempts to communicate with your patients or colleagues, you may fail because of certain barriers or factors that hinder effective communication. It is, therefore, important for you to know some of these barriers and how you can overcome them.

Objectives

By the end of this section you will be able to:

- Explain what is meant by a barrier to effective communication
- Describe barriers that may affect the six elements of the communication process

Barriers to Communication

Barriers are the factors that prevent effective communication. After being placed in a channel, the message may be interfered with by some disturbance which increases the difficulty in perception or prevents some elements of the message from reaching the receiver.

Barriers to effective communication may be due to any breakdown in the six elements of the communication process: source, message, channel, receiver, effects and social setting. In this section, you will look at all the six elements and see how each can contribute to a breakdown in communication.

The person who initiates the communication process is called the originating communicator or source of the message. You will now see how the source of the message can become a barrier to effective communication.

Barriers Resulting from the Source

The source of the message should have qualities that facilitate effective communication. Firstly, the source should have a sound understanding of their audience and a good knowledge of their subject. The audience determines the level of language and vocabulary to be used. When addressing illiterate peasants, one has to put oneself in their situation to be able to appreciate their culture, values, perceptions, worries and hopes. Failure to recognise the importance of these socio-cultural and psychological factors can lead to a breakdown in communication.

In addition to the semantic barriers, there are also physical barriers. These may be attributed to the climate, for example, very cold or very hot weather, wind, noise and so on.

System overload may occur where an individual sends or receives too much information at the same time. For example, a nurse may be taking over an evening shift and all of a sudden she is urgently called to attend to a telephone call from the matron. This will deflect her attention which will lead to communication breakdown.

The privacy and confidentiality of the patient when taking their history is important. Where privacy and confidentiality are not observed, the readiness of the patient to talk freely is severely restricted which can lead to a communication breakdown. The sender should use appropriate language according to the level and age of the receiver.

Barriers Affecting the Message

The other component of the communication process is the message. The message is what the sender wishes to convey to the audience. In order for the message to be well-received and effective, the sender must plan it well with the needs of the audience in mind. In other words:

- What does the sender want the receiver to know?
- How do they expect the receiver to feel?
- Do they want to change the behaviour of the receiver?

Unless the sender plans their message with these factors in mind, the message is unlikely to have the desired effect on the audience.

Techniques for Creating Effective Messages

In order to avoid failure in communication, you must address the following factors:

- The message must be expressed in simple language. It must be short and to the point. The delivery of the message should involve proper communication, pauses and stressing of key words.
- The message must be problem-centred. It must address a health concern or issue affecting the individual or the community.
- The message should be culturally relevant and not offensive to the values and beliefs of the community or individuals. Religious beliefs are particularly important.
- The message must fall within the socio-economic abilities of the audience. Do not propose solutions that are beyond the reach of your audience.
- The message must demonstrate that it is much more important and beneficial to do what is proposed in the message than what the message opposes.

Barriers Resulting from the Receiver

The next component of the communication process that can bring about communication breakdown is inadequate knowledge or understanding of the socio-economic and cultural factors surrounding the audience. Understanding the audience is key to successful communication.

The receiver is a very important element in the communication process.

Factors in a Communication Breakdown at the Receiver

- If the receiver of the message is inadequately prepared physically,

socially and psychologically about the venue and time of giving a health message, they may arrive late.

- If the receiver does not know the benefits to gain from the message, they may have little interest to listen to the message.
- If the receiver of the message does not understand the language because it is expressed in complicated jargon. The sender must speak in a language that is familiar to the audience.
- If the sender stammers and speaks inaudibly there will be communication breakdown because of poor delivery of message.
- If the message is received in a noisy environment, then the receiver will not hear it well.
- If the message is transmitted to the receiver when they are emotionally disturbed, there will be a communication breakdown because of lack of concentration.
- If the message transmitted is against the religious beliefs of the community, the communication process will be ineffective. For example, sharing health messages with Catholics on artificial methods of family planning, especially condom use when they believe in natural family planning methods. There will be a conflict of interests leading to communication breakdown.
- There will be a likely communication breakdown if the sender of the message does not know the socio-economic status of the community. This is because the sender and receiver will not be able to relate and share the meaning of the message in the same way.
- If the message contains too much information, the receiver may not be able to cope with the information. They will be overwhelmed and confused.
- If the the message takes a long time to reach the receiver, the audience will change their priorities.

Barriers Resulting from the Social Setting

You have seen that the social setting is the environment in which the message is transmitted. The social setting creates 'noise' which interferes with the message. This 'noise' can be anything that interferes with the message signal, or distracts the source or recipient, it is not limited to actual noises, it can be visual, olfactory, tactile, electronic, cultural, racial or age related.

- The selected venue for receiving the message has different posters, which are not relevant to the health message given. The posters act as detractors thus decreasing the level of concentration.
- The sender does not consider the social status of the audience. For example, when you are organising a health meeting, include respected persons in the society like chiefs, councillors and members of parliament. These are individuals that the community has accepted as their leaders.
- The sender of the message must consider the age and marital status of the audience when planning the venue. This is because married people may not feel free to discuss certain issues in the presence of single people. Intergenerational communication is not easy so, in planning the message, the age differences must be borne in mind.
- The sender does not consider cultural beliefs of the audience. For example, if you are giving a health message to some communities, where men and women do not mix easily, make an effort to address each group separately.
- The message is not action-oriented. The message must tell individuals and community members what they should do in order to improve their health status

Barriers Affecting the Communication Channel

Communication channels are the means by which a message travels from the source to the receiver.

- In verbal communication the sender may speak in such a low voice that the receiver cannot hear well. A good example is when one talks to a large crowd in a low voice without an amplifier. The crowd may not be able to follow the message.
- When the channel selected to transmit the message is through the mass media like the radio, television, or the print media such as newspapers, films, and magazines without considering the socio-economic status of the receiver. Many in the audience may not have the means to access the media used.

- If you select a verbal communication channel without considering the age of the receiver, the message content, language and delivery might lead to breakdown with youth or older persons if their special needs are not addressed.

Effective communication is often facilitated by using more than one channel. In other words, you might need to use two or more channels to achieve effective communication. For example a nurse might use a poster to show the various family planning methods and their spoken voice to explain how each method works, and for whom it is best suited. The nurse may even have a video of satisfied family planning users talking about their experiences. You can see that, used in this way, more than one channel can ensure that the message is successfully delivered.

Barriers Affecting the Impact/Effects of Communication

Effects are the outcomes resulting from the communication of a message. These outcomes could be new knowledge, change in attitudes, or change in behaviour. Getting the desired effects depends upon the successful communication of the message. A communication breakdown can occur as a result of problems in managing any or all of the components of the communication process. This is particularly important for a nurse in practice because a breakdown in communication can lead to serious consequences including loss of life.

- If the sender of the message fails to use the appropriate language and to prepare the audience on the importance of the message for the improvement of their health status.
- The receiver of the message may be emotionally disturbed and, therefore, does not understand the message as intended. Failure to acquire knowledge will not influence the audience to change their attitudes and behaviours.
- The sender of the message may fail to involve the receiver (audience) in the planning phase and, therefore, disregards the cultural beliefs of the community. For example, a male midwife sharing a health message with a group of women who believe only female midwives should conduct deliveries according to their customs. The message may not produce the intended effects because the wrong communication channel was used leading to a breakdown in communication.

Barriers Affecting Feedback

Feedback is another component of the communication process which can cause a breakdown in communication. Feedback is used to determine if the intended message is understood by the receiver (or audience). A breakdown in communication occurs when the sender receives a negative response indicating that the message is not understood.

SECTION 3: ESSENTIAL ORGANISATIONAL COMMUNICATION

Introduction

In section two you explored the barriers to effective communication and how they interfere with effective communication. In this section you will learn some aspects of essential organisational communication.

Objectives

By the end of this section you will be able to:

- Describe four forms of communication in detail
- Explain how to present and desseminate reports
- Explain how to write an official/business letter
- Explain how to conduct meetings and take minutes effectively

The Importance of Effective Communication

The importance of effective communication in a health facility cannot be overstated. Doctors and nurses collaborate with each other to ensure the patients get the care they deserve. No single medical personnel can provide effective quality care without involving the others.

Nurses communicate with other medical personnel such as physiotherapists, laboratory technologists, pharmacists, nutritionists and so on every day during the course of their work. All cadres of medical personnel play different roles but share the same goal of providing quality care to their patients. In your practice you will have consulted with your colleagues before making important decisions concerning the care of your patients.

Effective communication in a health facility is important because it highlights the role each

professional is playing towards the care of the patients. It is through communication that the managers are able to harmonise the care of the patients.

Forms of Communication

Communication in a health facility may occur in four forms, namely:

Intrapersonal Communication
Intrapersonal communication occurs when you communicate to yourself without verbalising. It is an imaginary conversation reflecting the individual's thoughts and feelings. Intrapersonal communication helps you to think critically about important issues before solving a problem. For example, when planning patient care, you think about the problems and the correct action to alleviate the problem. Intrapersonal communication is important before planning a health message to share with a group of people/patients. It is, therefore, an important part of planning the message. Its importance, however, lies in how successfully it is translated into action.

Interpersonal Communication
Interpersonal communication is face-to-face communication between two or more persons. This kind of communication may occur between nurses and their patients or other medical professionals. Interpersonal communication is very effective and you should be able to share health messages with the community/patients in order to change their attitudes and behaviours. For example, you can use this type of communication to persuade the patients to abandon a harmful cultural practice such as Female Genital Mutilation (FGM).
The advantage of interpersonal communication is that the audience can ask questions on unclear issues for clarification. They can also give their own views on the matter under discussion.

Components in Interpersonal Communication
There are three primary sources of the message in any interpersonal communication. One study in communication determined the percentage that each component contributed to the message being conveyed.

Component	Contribution to overall message
Spoken word	7%
Body posture and gestures	38%
Voice tone and inflection	55%

From this breakdown you can see just how important it is to be aware of your body language and the tone of your voice when communicating. Only 7% of the message is conveyed by the words you are using, 93% is conveyed by things most people are not conscious of.

Mass Communication
Mass communication is a form of communication that is used to reach many people at the same time through the media of mass circulation or coverage, for example, television, radio and newspapers.
The mass media's contact with medical staff tends to coincide with major events such as vaccination campaigns, natural disasters or disease outbreaks. There have been times when health personnel have been recalled to duty using the mass media because of an emergency. Emergencies warranting communication through the mass media include times of war, disaster or disease outbreaks.

Organisational Communication
Organisational communication occurs between the management and the employees. This form of communication is necessary in order to achieve the desired goals of the organisation. It may occur between the managers, supervisors and all employees. The communication may occur vertically from the top management to all employees in the organisation or vertically when supervisors consult one another. Organisational communication also occurs between organisations with common interest.
Organisational communication is important because it explains the behaviours or conduct expected of the employees, for example, through circulars and documents. Organisational communication harmonises all activities performed by different technical and non-technical personnel in the institution. It also regularises the activities of the public and private institutions sharing common interests in the same locality for example public hospitals and non-governmental organisations.

Written Communication

You have now learnt the forms of communication which occur in a health facility. You shall now explore in detail two forms of written communications that are used in the health profession, namely, reports, and letters. First you will look at how to write a report in a health facility.

Presentation of Reports

Writing reports is nothing new to you, you have probably written several reports during your career to date. As a nurse in practice you may have presented a report to your colleagues or superiors. If you are working in a health centre or a dispensary you might have presented a report to the District Public Health Nurse or to the Medical Officer of Health (MOH) in charge of the district.

Nursing reports are written in the cardex and they cover a shift of 24 hours. Reports are presented to all nurses reporting in each shift. The number of shifts differ from hospital to hospital but three main shifts are the most common. The three shifts cover morning, afternoon and night duty. In each of these shifts, nurses write a report about the condition of the patients and any special investigation done. The report is important for continuation of care. The afternoon shift nurses write another report detailing the very sick patients in the ward and forward them to the matron on night duty. If you are working in a health centre/dispensary, you write a report on monthly basis for presentation to the District Public Health Nurse.

The aim of writing a report is to inform the authorities or other members of staff about what is happening in a unit or institution. A day shift report is given to inform the nurse taking over the shift of all the important activities or events which occurred in their absence. The report is required for effective continuity of patient care. A health centre or dispensary writes monthly and quarterly reports to inform the MOH and District Public Health Nurse of what has happened in the health facility over the last quarter or month.

In this topic you will explore the principles of writing a report and you will see an example of how you should organise the content. You should also go through previous reports in the files in your health facility and then make a comparison to identify the differences.

When writing a report it is important for you to consider the following points:

- The purpose of writing the report
- The type of information to be included in the report
- The person(s) who will read the report

Principles of Writing a Good Report

When writing a report, always keep in mind the following standards:

- Know the reason why you are writing a report
- Know the subject matter you are writing about. The content should be factual
- Omit your opinions from sections concerned with facts
- Keep the report accurate, relevant and concise
- Organise your points in a logical manner. All the related ideas should follow each other
- The main ideas or key points in the report should be highlighted
- When writing a report always start with the most pressing problem which needs immediate action
- Use a language suitable to the reader. Write in a simple and clear language that the reader will understand
- Use clear headings for each section of the report. A new paragraph should be started for unrelated ideas
- Use your judgement and experience when suggesting actions or making recommendations to the reader/authority
- The report should always emphasise ideas or facts which provide solutions to the problems

Report Styles

The hospital authorities or the Ministry of Health should give you guidelines on the format to be followed when writing a report. The style of writing the report should be logical and acceptable to the reader. The following information will help you to write a good report:

- Give information related to the main activities/events which have taken place since last year's report.
- Indicate the problems you have experienced and how you dealt with them.
- Give recommendations or suggestions on what the authority should do.

- Indicate the decisions you want the authority/MOH to rectify and emphasise ideas which help the reader to come up with solutions to the problems.

A Health Centre Report consists of four main sections.

Staff

- Total number
- New members
- Resignations
- Transfers
- Retirees
- Sick leave
- Staff on leave

Cadres of Staff

- Clinical officers
- Laboratory technicians
- Public Health Technicians
- Enrolled Community Health Nurses
- Enrolled Nurse/Midwives
- Statistical clerks
- Subordinate staff
- Driver(s)
- Watchmen

Cases Seen

- New cases
- Reattendances
- Referred
- Deaths
- No of deliveries
- Supply of drugs
- Supply of vaccines
- Reproductive health services and breakdown according to methods

Problems Experienced

You should report all the problems which according to your opinion are affecting the normal functioning of the health facility. You should also be able to identify the problems which need the attention and support of your superiors.

Examples of Problems Experienced

- Staff failing to come on duty without good reason/permission
- Complaints presented by the staff
- Complaints presented by the community leaders/health service consumers
- Mechanical breakdowns of vehicles and the estimated cost of repairs
- Amount of money collected through cost-sharing during the period of reporting
- Drugs received (drug kit) and whether it was adequate to meet the needs of the patients
- Broken equipment needing repairs and the estimated cost
- The outbreak of a disease should first be reported through the phone immediately

When you are writing a report always remember to start with the most pressing problem indicating its urgency. The description of the problem should be accurate and very clear. You should emphasise the action which the authorities should take after reading the report.

Writing a Negative Incidence/Accident Report

During your employment as a nurse perhaps you have witnessed several accidents happening in the ward. If you have ever witnessed an accident, consider the following questions:

- What was the nature of the accident?
- What action did you take when the accident occurred?
- What is the general policy of your health facility regarding patient accidents in the wards?

A Negative Incidence Report is a formal statement on any unusual event occurring in a nursing unit/ward with a risk of possible legal action. A legal action may be taken against the hospital by the patient or relatives for negligence or malpractice. The patient may claim a colossal amount of money in damages for injuries sustained, including developing bedsores. The purpose of a Negative Incidence Report is to inform the employer of the unusual incident which has occurred. The report is important as it will serve as evidence in case a law suit is launched by the patient.

Incidents Requiring a Negative Incidence/Accident Report

- A patient committing suicide in the ward
- A child absconding from the ward
- A patient falling from the bed and sustaining injuries
- A patient sustaining burns in the ward
- A patient being given wrong medication

- A nurse fighting with a mentally ill patient
- Wrong identification of a patient leading to wrong treatment or surgical intervention

You can probably think of a number of incidents where a nurse had to write a negative report during your nursing practice. Most hospitals have policy guidelines on what action nurses should take when accidents occur. A nurse who is on duty when an accident occurs should write a statement to describe what happened.

Principles for Writing a Negative Incident Statement

1. The hospital accident reporting form should be completed in triplicate. One copy goes to the hospital authorities, the second copy is retained in the ward and the third copy is kept in the patient's file.
2. The statement should be concise, brief, clear, unambiguous and non-emotional.
3. It is a factual report. Write only the facts without exaggeration.
4. Write the events that occurred at the time of the accident.
5. Quantify the observable damage. For example, if it is a burn, indicate the extent in centimetres.
6. The writing should be legible, avoiding use of medical terms and abbreviations.
7. State only the truth of exactly what you saw with your own eyes.
8. Write down the names of all the witnesses who saw the accident happening including staff on duty.
9. Give an accurate date and time when the accident occurred.
10. Describe the immediate action which you took after the accident occurred, that is:
    • The first aid you offered to the patient
    • The observations you made
    • Informing the doctor to come to review the condition of the patient
    • The time the doctor came to see the patient
    • The immediate investigations ordered by the doctor and the findings
    • Medications prescribed after reviewing the patient
11. The statement should include the name of the patient in full, diagnosis, inpatient number and the bed number.
12. When you have completed writing the statement, write your name in full, designation, and signature.

You should write a Negative Incidence Report immediately after the incident before you forget the events that took place. Write a statement which does not incriminate you in a court of law.

Writing Appraisal Reports

The staff appraisal reports are written by the immediate supervisors in a ward or unit. Appraisal reports are written annually for each employee. The report gives a summary of an employee's performance and abilities for that period based on their job description.

The supervisor writing an appraisal report should be very objective and accurate. The information written on the report should reflect the actual behaviour of the employees without any bias. The report should be written in a balanced manner, giving the strengths and weaknesses of the appraised.

Depending on the format of the appraisal form, the employee being appraised may be required to complete the form too, following a certain criteria.

Contents of an Appraisal Report

In summary, an appraisal report should consist of the following information:

- Qualifications of the appraisee
- Seniority/experience
- Ability to perform assignments
- Strengths
- Character
- Relationships with co-workers
- Areas needing improvements
- Recommendation for competency
- Recommendation for training/promotion

When you complete writing the appraisal report, discuss it with each employee. The appraisee should be allowed to read the report and make comments if necessary.

The other form of communication which is common in the health facility is the official letter.

Writing an Official Letter

Writing official letters is a rare activity for many employees in an organisation, letters are sometimes written when it is necessary to inform the employer about important occurrences. Letters are also written to request transfers to another station, to apply for study leave, or to request promotion. Whatever the reason for writing a letter, the structure of an official letter is the same. In this section you will learn the correct way of writing an official letter.

Our Reference / Your Reference: 'Our Reference' is always followed by a number. It links the letter to another communication in organisation and sometimes to a file number. It helps to trace the earlier communication/record maintained in the organisation. 'Your Reference' is usually the reference quoted in the letter to which you are replying. It also makes it easier to trace the communication in the filing cabinet.

Date: All letters should have a date. This makes it easier to file in a correct chronological order. The month should be written in full without abbreviations, for example, 4th December 2001.

Receiver's Name and Address: 'Mr' is the title commonly used for men. 'Ms' is used for women instead of 'Miss/Mrs' because it refers to both without indicating whether an individual is married or unmarried. 'Miss' or 'Mrs' should be used only if you know the marital status of the individual. The address should be written in full.

FAO: Short for 'For the Attention Of'. The attention indicator refers to the officer/person taking action on the letter.

Salutation: This is the opening greeting of a letter. It depends on how well you know the person you are addressing the letter to. However, in official letters, the usual form of salutation is indicated below:

- Dear Sir: This is used when you are writing a letter to an organisation or firm in general and not to an individual within it.
- Dear Sir or Madam: Either of these is appropriate if you know the sex of the person you are writing to.
- Dear Mr/Mrs/Miss/Ms: These are used to begin letters to people whom you have met or written before and are followed by the surname of the addressee, e.g. Dear Mr Johnson, Dear Mrs Petersen.

Body of the letter: The body of a letter consists of:

- A subject heading, the aim of which is to briefly and clearly state what the letter is about. For example, 'Your request for promotion' or 'Your notice of intention to retire'
- An introduction part or acknowledgement if there has been previous correspondence
- A second part which gives information and states the facts
- A final paragraph suggesting the action the reader of the letter should take

Subscription or Complementary Close: This is the formal conclusion of the letter. Its form is decided by the form of salutation used, that is, letters beginning 'Dear Sir' or 'Dear Madam' should end with 'Yours faithfully'. Letters beginning 'Dear Mr/Mrs/Ms' should end with 'Yours sincerely'.
Letters beginning 'Dear Pilipili' can end less formally and on a warmer and more personal note, such as 'Yours', 'With best wishes' or 'Kind regards'. It should be done when the writer and the addressee know each other well.

Writer's Name and Signature: When a letter is typed, a space is left after the close of the letter for the writer to sign their name. The writer's name should appear in full, below the signature. Beneath this the position of the writer should be below the name. The employment identification number should be below the position.

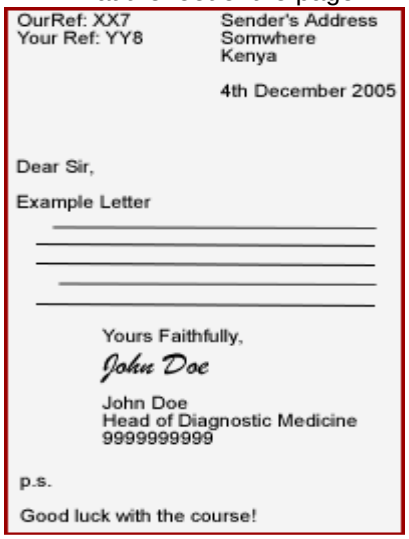
Enclosures: Abbreviated as 'Enc.' is typed beneath the signature at the foot of the page. This is to remind the sender to enclose the item, and also make sure that the receiver notes this and does not discard it with the envelope.

PS: This stands for 'Post Scriptum'. This is used when adding something which has been left out from the body of the letter.

Layout of the Letter
The style described on the previous page is used when writing to any organisation or to a company. It is important to note the following:

- The sender's address appears at the right hand side of the page.
- Each paragraph should be indented and begin about 1.5cm from the left hand margin. If paragraphs are not indented, then double spacing should be left between paragraphs.

- The complementary close and the name typed beneath it should be at the centre at the foot of the page.



OurRef: XX7
Your Ref: YY8

Sender's Address
Somwhere
Kenya

4th December 2005

Dear Sir,

Example Letter

Yours Faithfully,

John Doe

John Doe
Head of Diagnostic Medicine
9999999999

p.s.

Good luck with the course!

Principles of Letter Writing

There are three basic principles you should keep in mind when writing any form of letter. These are courtesy, clarity and conciseness.

Courtesy

Courtesy is not only about using polite phrases such as 'your kind enquiry', but also showing consideration for your correspondent. It is the ability to tactfully refuse to perform a favour but at the same time keep a friend. You, therefore, need to write in a friendly manner avoiding words that may sound harsh or rude.

Clarity

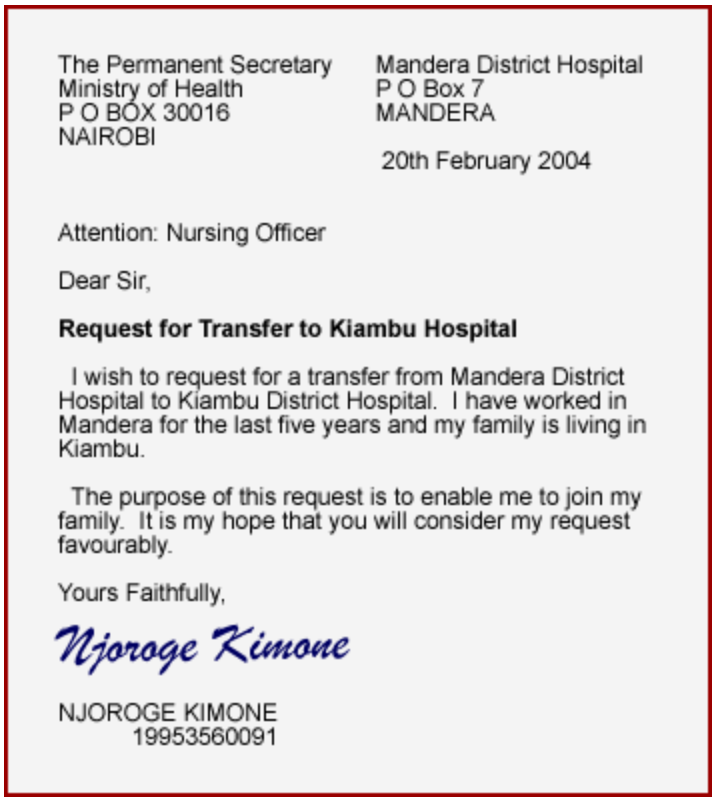
Always use simple language and explain in full any complex ideas you wish to convey. The reader should understand the message with ease. Make the letter as interesting to the reader as possible as this aids understanding. If difficult language or incorrect grammar is used, the reader may misinterpret the message.

Conciseness

A short message is easily understood by the reader, get to the point without beating about the bush.

You should now have captured the essence of writing an official letter.

Example of an Official Letter



The Permanent Secretary
Ministry of Health
P O BOX 30016
NAIROBI

Mandera District Hospital
P O Box 7
MANDERA

20th February 2004

Attention: Nursing Officer

Dear Sir,

Request for Transfer to Kiambu Hospital

I wish to request for a transfer from Mandera District Hospital to Kiambu District Hospital. I have worked in Mandera for the last five years and my family is living in Kiambu.

The purpose of this request is to enable me to join my family. It is my hope that you will consider my request favourably.

Yours Faithfully,

Njoroge Kimone

NJOROGE KIMONE
19953560091

Meetings

To begin with you will look at how to conduct staff meetings in the health facility. Meetings are held for specific purposes, the purpose of a staff meeting is mainly to pass important messages to a group of people or to review progress and activities. It is also a convenient way to hear ideas and views from a large number of people. Meetings are often held when the management of the organisation wants to introduce changes in the organisations. Nurses in different departments/wards organise meetings to discuss important issues affecting the care of patients. In Nursing Departments/Units meetings may be organised either monthly or weekly to discuss important issues.

Nurses also organise public meetings during disease outbreaks to provide the community with necessary information to prevent its spread. The District Health Management Team (DHMT) hold meetings to discuss proposals and projects to utilise available resources. Meetings are necessary to exchange views on what is happening in the institution or to pass new information to all the staff.

Steps Towards a Successful Meeting

The following are the steps essential for a successful meeting:

- Prepare for the meeting
- Prepare an agenda for the meeting
- Manage and conduct the process of the meeting effectively
- Record its proceedings and circulate the minutes

Preparation for Public Meetings

The preparation of a meeting is important and mainly focuses on the objectives to be achieved. When preparing a meeting you should consider the following key points:

- Prior notification of the meeting to all concerned participants.
- The date and day of the meeting is given. If it is a public meeting, select a day which is convenient to the majority of the participants. Avoid market days or when people are engaged in other activities like picking coffee, tea, pyrethrum, or cotton.
- The venue of the meeting is selected for its convenience to the majority. If it is a public meeting, consider the geographical directions and the availability of transport.
- The time of starting and closing the meeting should be indicated in the invitation letter.
- The participants should be given the agenda or matters which will be discussed in the meeting in advance.

Agenda

An agenda is a statement of matters/issues to be discussed in a meeting. It consists of all the items to be discussed during the meeting. These are listed down in a proper sequence. During the preparation of the agenda, it is important to consider the duration of time for which each item will be discussed.

The purpose of the agenda is to ensure that:

- The objective of the meeting is accomplished
- No listed item for discussion is omitted
- Matters/issues are discussed in the correct sequence
- Important points/issues in the meeting are highlighted

The agenda enlightens the participants on issues to be discussed in advance. It is prepared by the secretary, in consultation with the chairman.

Example Agenda

Departmental Staff Meeting

10.30 a.m. 12 July 2005 in the Board Room

Agenda

1. Welcoming the participants.
2. Confirmation of the minutes of previous meetings.
3. Other important matters and closure of the agenda of the previous meeting.
4. Matters arising from the previous meetings.
5. New matters to be discussed.
6. Correspondence.
7. Any other Business (A.O.B).
8. Closure of the meeting and announcement of the date, time and venue of the next meeting.

Process of Conducting a Meeting

The chairman and the secretary are required to attend the meeting punctually. The chairman calls the meeting to order when the participants make a quorum, that is, the minimum number of participants, at the scheduled time.

Activities of the Chairman

- To call the meeting to order
- To welcome all the participants
- To finalise and close the agenda
- To maintain order during the meeting
- To maintain the timeframe each participant is given to make contributions
- To ensure participation of every member
- To keep discussion focused on the agenda
- To give guidance at the right time
- To decide when a point is debated exhaustively
- To summarise different opinions
- To guide the secretary to write the correct decisions on the minutes
- To close the meeting
- To announce the date of the next meeting

The functions of the secretary are to record all the events/minutes discussed in the meeting without exaggeration.

Activities of the Secretary

- To circulate an attendance list to the participants
- To take accurate minutes of all decisions reached during the meeting
- To avoid use of abbreviations and vocabulary/technical words the participants cannot understand
- To circulate the minutes in advance to all the participants
- To make the preparations for the next meeting

The Minutes

The minutes are a short summary of the proceedings and decisions reached on each agenda item during a meeting. The minutes consists of the following:

- The date, time and venue of the meeting
- The names of the office bearers
- The names of other members in attendance
- The names of those present at the meeting
- The names of those who sent apologies
- Decisions made by the participants
- The responsibilities arising from a decision and the name of the person responsible for carrying them out
- The results in the event of a vote
- The names and signatures of the chairman and secretary after the minutes are approved

It is important to note that approval of minutes is proposed by a member who attended the previous meeting and is then seconded by another member who had attended the meeting. The secretary keeps the approved minutes safely. Meetings should not be held without a purpose or any objective to be achieved.

SECTION 4: PSYCHOLOGY

Introduction

In this section you will explore aspects of psychology that will be useful in counselling.

Psychology may be defined as:
"The scientific study of behaviour and mental processes."
The Oxford English Dictionary defines psychology as:
"The study of the mind and how it functions."
Both definitions can be used.

Objectives

By the end of this section you will be able to:

- Define psychology
- Describe human growth and development
- Describe personality structure and psychoanalytic theory
- Describe anxiety
- Describe psychological defence mechanisms
- Describe stress and coping mechanisms

Human Growth and Development

Take a look at these definitions of growth and development:

Growth is the progressive development of a living thing, especially the process by which the body reaches the complete physical development. It is also the process by which humans increase in size and develop their mature form and function.

Development is the process of growth and differentiation

Studying human growth and development provides practical guidance for you as a healthcare provider and others who deal with people so as to support healthy growth. This knowledge will help you understand andbetterassistindividualswithspecialneeds,such as those with emotional difficulties.

There are several theories that attempt to explain human growth and development, the four primary theories being:

- Psychoanalytic theory
- Learning
- Cognitive
- Social cultural

Each of these offers insights into the forces guiding human growth and development, but each has some limitations. You will now explore one of the most influential models; Psychoanalytic theory.

Psychoanalytic Theory

At the end of the 19th century, Austrian physician Sigmund Freud developed the theory and techniques of psychoanalysis; it formed the basis for several later psychoanalytic theories of human development. Psychoanalytic theories share an emphasis on personality development and early childhood experiences. In the psychoanalytic view, early experiences shape one's personality for an entire lifetime, and psychological problems in adulthood may have their origins in difficult or traumatic childhood experiences.

In addition, psychoanalytic theories emphasize the role of unconscious, instinctual drives in personality development. Some of these drives are sexual or aggressive in quality, and their unacceptability to the conscious mind causes them to be repressed in the unconscious mind. Here, they continue to exert a powerful influence on an individual's behaviour, often without his or her awareness.

Most psychoanalytic theories portray development as a series of stages through which all children proceed. According to Freud, child development consists of five psychosexual stages in which a particular body region is the focus of sensual satisfactions; the focus of pleasure shifts as children progress through the stages.

During the oral stage, from birth to age one, the mouth, tongue, and gums are the focus of sensual pleasure, and the baby develops an emotional attachment to the person providing these satisfactions (primarily through feeding).

During the anal stage, children focus on pleasures associated with control and self-control, primarily with respect to defecation and toilet training.

In the phallic stage, children derive pleasure from genital stimulation. They are also interested in the physical differences between the sexes and identify with their same-sex parent. The latency phase is when sensual motives subside and psychological energy is channelled into conventional activities, such as schoolwork. Finally, during the genital stage, from adolescence through adulthood, individuals develop mature sexual interests.

Stage	Age	Focus or Interests
Oral	0 - 1	Focus on mouth, teeth and gums
Anal	1 - 3	Focus on control and self-control (primarily toilet training and defecation)
Phallic	3 - 6	Focus on genital stimulation and gender differentiation
Latency	7 - 11	Energy focused on non-sensual activity
Genital	12+	Development of mature sexual interests

An American psychoanalyst, Erik Erikson, proposed a related series of psychosocial stages of personality growth that more strongly emphasise social influences within the family. Erikson's eight stages span the entire life course, and, contrary to Freud's stages, each involves a conflict in the social world with two possible outcomes. In infancy, for example, the conflict is 'trust versus mistrust' based on whether the baby is confident that others will provide nurturance and care. In adolescence, 'identity versus role confusion' defines the teenager's search for self-understanding. Erikson's theory thus emphasises the interaction of internal psychological growth and the support of the social world.

Psychoanalytic theories offer a rich portrayal of personality growth that emphasises the complex emotional and sometimes irrational forces within each person. These theories are hard to prove or disprove, however, because they are based on unconscious processes inaccessible to scientific experimentation.

Personality

Freud further developed a structure of personality he described three components of personality. Personality usually refers to that which is unique about a person, the characteristics that distinguish them from other people. these are Id, Ego, and Super Ego.

The Id

In psychoanalytic theory, Id is one of the three basic elements of personality; it can be equated with the unconscious of common usage, which is the reservoir of the instinctual drives of the individual, including biological urges, wishes, and affective motives. The Id is dominated by the pleasure principle, through which the individual is pressed for immediate gratification of his or her desires. In strict Freudian theory the

energy behind the instinctual drives of the Id is known as the libido, a generalised force, basically sexual in nature, through which the sexual and psychosexual nature of the individual finds expression.

The Ego

Ego in psychoanalysis is a term denoting the central part of the personality structure that deals with reality and is influenced by social forces. According to the psychoanalytic theories developed by Sigmund Freud, formation of the Ego begins at birth in the first encounters with the external world of people and things. The Ego learns to modify behaviour by controlling those impulses that are socially unacceptable. Its role is that of mediator between unconscious impulses and acquired social and personal standards.

The Super Ego

The Super Ego, as postulated by Sigmund Freud, the term designates the element of the mind that, in normal personalities, automatically modifies and inhibits those instinctual impulses or drives of the Id that tend to produce antisocial actions and thoughts. According to psychoanalytic theory, the Super Ego develops as the child gradually and unconsciously adopts the values and standards, first of his or her parents, and later of the social environment. According to modern Freudian psychoanalysts, the Super Ego includes the positive Ego, or conscious self-image, or Ego ideal that each individual develops.

States of Mind

During your nursing practice there are several states of mind that will require your intervention, the most common are:

- Anxiety
- Defence mechanisms
- Stress

Anxiety

Anxiety is a state of tension that motivates a person to do something, it is an emotional state in which people feel uneasy, apprehensive, or fearful. People usually experience anxiety about events they cannot control or predict, or about events that seem threatening or dangerous. For example, students taking an important test may feel anxious because they cannot predict the test questions or feel certain of a good grade. People often use the words fear and anxiety to describe the same thing. Fear also describes a reaction to immediate danger characterised by a strong desire to escape the situation.

Anxiety develops as a result of a conflict between id, ego and super ego over the control of psychic energy.

The physical symptoms of anxiety reflect a chronic 'readiness' to deal with some future threat

Anxiety Symptoms

Symptoms of anxiety may include:

- Fidgeting
- Muscle tension
- Sleeping problem
- Headaches

Higher levels of anxiety may produce such symptoms as:

- Rapid heartbeat
- Sweating
- Increased blood pressure
- Nausea, and dizziness

All people experience anxiety to some degree. Most people feel anxious when faced with a new situation, such as a first date, or when trying to do something well, such as give a public speech. A mild to moderate amount of anxiety in these situations is normal and even beneficial. Anxiety can motivate people to prepare for an upcoming event and can help keep them focused on the task at hand.

However, too little anxiety or too much anxiety can cause problems. Individuals who feel no anxiety when faced with an important situation may lack alertness and focus. On the other hand, individuals who experience an abnormally high amount of anxiety often feel overwhelmed, immobilised, and unable to accomplish the task at hand. Ego should take appropriate action to control the anxiety. If it does not control the anxiety by rational and direct methods, it then relies on unrealistic one called ego defence mechanisms.

Ego Defence Mechanisms

In order to fulfil its function of adaptation, or reality testing, the ego must be capable of enforcing the postponement of satisfaction of the instinctual impulses originating in the id. To defend itself against unacceptable impulses, the ego develops specific psychic means, known as defence mechanisms.

Repression
The exclusion of impulses from conscious awareness.

Projection
The process of ascribing to others one's own unacknowledged desires.

Reaction Formation
The establishment of a pattern of behaviour directly opposed to a strong unconscious need.

Compensation
The process of masking weaknesses or developing certain positive traits to make up for limitations, for example a person who feels intellectually inferior may direct a great deal of energy to building up his body.

Sublimation
This involves diverting sexual energy to some other socially acceptable and sometimes admiral activities. These and other defence mechanisms are put into operation whenever anxiety signals a danger that the original unacceptable impulses may re-emerge.

Stress is an unpleasant state of emotional and physiological arousal that people experience in situations that they perceive as dangerous or threatening to their well-being. However, most psychologists regard stress as a process involving a person's interpretation and response to a threatening event.

The word stress means different things to different people. Some people define stress as events or situations that cause them to feel tension, pressure, or negative emotions such as anxiety and anger. Others view stress as the response to these situations. This response includes physiological changes - such as increased heart rate and muscle tension - as well as emotional and behavioural changes.

Stress is a common experience. You may feel stress when you are very busy, have important deadlines to meet, or have too little time to finish all of your tasks.

Often people experience stress because of problems at work or in social relationships, such as a poor evaluation by a supervisor or an argument with a friend. Some people may be particularly vulnerable to stress in situations involving the threat of failure or personal humiliation.

Others have extreme fears of objects or things associated with physical threats, such as snakes, illness, storms, or flying in an airplane, and become stressed when they encounter or think about these perceived threats.

Major life events, such as the death of a loved one, can cause severe stress.

Stress can have both positive and negative effects. Stress is a normal, adaptive reaction to threat. It signals danger and prepares us to take defensive action. Fear of things that pose realistic threats motivates us to deal with them or avoid them. Stress also motivates us to achieve and fuels creativity. Although stress may hinder performance on difficult tasks, moderate stress seems to improve motivation and performance on less complex tasks. In personal relationships, stress often leads to less cooperation and more aggression.

If not managed appropriately, stress can lead to serious problems. Exposure to chronic stress can contribute to both physical illnesses, such as heart disease, and mental illnesses, such as anxiety disorders. The field of health psychology focuses in part on how stress affects bodily functioning and on how people can use stress management techniques to prevent or minimise disease.

Sources of Stress
The circumstances that cause stress are called stressors. Stressors vary in severity and duration. For example, the responsibility of caring for a sick parent may be an ongoing source of major stress, whereas getting stuck in a traffic jam may cause mild, short-term stress.

Some events, such as the death of a loved one, are stressful for everyone, but in other situations, individuals may respond differently to the same event. What presents as a stressor for one person may not be stressful for another. For example, a student who is unprepared for a chemistry test and anticipates a bad grade may feel stress, whereas a classmate who studies in advance may feel confident of a good grade.

For an event or situation to be a stressor for a particular individual, the person must appraise the situation as threatening and lack the coping resources to deal with it effectively.

Stressors can be classified into three general categories: catastrophic events, major life changes, and daily hassles. In addition, simply thinking about unpleasant past events or anticipating unpleasant future events can cause stress for many people.

Catastrophes

A catastrophe is a sudden, often life-threatening calamity or disaster that pushes people to the outer limits of their coping capability. Catastrophes include natural disasters - such as earthquakes,
tornadoes, fires, floods, and hurricanes - as well as wars, torture, automobile accidents, violent physical attacks, and sexual assaults. Catastrophes often continue to affect their victims' mental health long after the event has ended.

Major Life Changes

The most stressful events for adults involve major
life changes, such as death of a spouse or family
member, divorce, imprisonment, losing one's job,
and major personal disability or illness. For adolescents, the most stressful events are the death of a parent or a close family member, divorce of their parents, imprisonment of their mother or father, and major personal disability or illness. Sometimes, apparently positive events can have stressful components. Getting married
is usually considered a positive experience, but planning the wedding, deciding whom to invite, and dealing with family members may cause couples to feel stressed.

Daily Hassles

Having to deal with daily hassles in our jobs, personal relationships, and everyday living circumstances cause considerable stress. Examples of daily hassles include living in a noisy neighbourhood, commuting to work in heavy traffic, disliking one's fellow workers and worrying about owing money. When taken individually, these hassles may feel like only minor irritants, but cumulatively over time, they can cause significant stress. The amount of exposure people have to daily hassles is strongly related to their daily mood. Generally, the greater their exposure is to hassles, the worse is their mood. Studies have found that one's exposure to daily hassles is actually more predictive of illness than is exposure to major life events.

The Stress Response

When experiencing stress, the body undergoes a number of changes that heighten physiological and emotional arousal. First, the sympathetic division of the autonomic nervous system is activated. This prepares the body for action by directing the adrenal glands to secrete the hormones epinephrine (adrenaline) and nor epinephrine (nor adrenaline). In response, the heart begins to beat more rapidly, muscle tension increases, blood pressure rises, and blood flow is diverted from the internal organs and skin to the brain and muscles. Breathing speeds up, the pupils dilate, and perspiration increases. This reaction is sometimes called the fight-or-flight response because it energises the body to either confront or flee from a threat.
Another part of the stress response involves the hypothalamus and the pituitary gland, parts of the brain that are important in regulating hormones and many other bodily functions. During stress, the hypothalamus directs the pituitary gland to secrete adrenocorticotropic hormone. This stimulates the cortex of the adrenal glands to release glucocorticoids, primarily the stress hormone cortisol (see Hydrocortisone). Cortisol helps the body access fats and carbohydrates to fuel the fight-or-flight response.

Coping With Stress

People who cope well with stress tend to believe that they can personally influence what happens to them.

Coping with stress means using thoughts and actions to deal with stressful situations and lower our stress levels. Many people have a characteristic way of coping with stress based on their personality.
People who cope well with stress tend to believe they can personally influence what happens to them. They usually make more positive statements about themselves, resist frustration, remain optimistic, and persevere even under extremely adverse circumstances. Most importantly, they choose the appropriate strategies to cope with the stressors they confront.
Conversely, people who cope poorly with stress tend to have somewhat opposite personality characteristics, such as lower self-esteem and a pessimistic outlook on life.

Coping Strategies

Psychologists distinguish two broad types of coping strategies: problem-focused coping and emotion-focused coping. The goal of both strategies is to control one's stress level. In problem-focused coping, people try to short-circuit negative emotions by taking some action

to modify, avoid, or minimise the threatening situation. They change their behaviour to deal with the stressful situation. In emotion-focused coping, people try to directly moderate or eliminate unpleasant emotions. Emotion-focused coping methods include rethinking the situation in a positive way, relaxation, denial, and wishful thinking.

In general, problem-focused coping is the most effective coping strategy when people have realistic opportunities to change aspects of their situation and reduce stress. Emotion-focused coping is most useful as a short-term strategy. It can help reduce one's arousal level before engaging in problem-solving and taking action, and it can help people deal with stressful situations in which there are few problem-focused coping options.

Coping Strategies in Action

In this scenario a premed student in college faces three difficult final examinations in a single week. She knows she must get top grades in order to have a chance at acceptance to medical school. This situation is a potential source of stress.

To cope, she could organise a study group and master the course materials systematically (problem-focused coping), or she could decide that she needs to relax and collect herself for an hour or so (emotion-focused coping) before proceeding with an action plan (problem-focused coping). She might also decide to watch television for hours on end to prevent having to think about or study for her exams (emotion-focused coping).

Social Support

Support from friends, family members, and others who care for us goes a long way in helping us to get by in times of trouble. Social support systems provide us with emotional sustenance, tangible resources, aid, and information when we are in need. People with social support feel cared about and valued by others and feel a sense of belonging to a larger social network.

People with strong social support are better at coping with stress.

A large body of research has linked social support to good health and a superior ability to cope with stress. For example, one long-term study of several thousand American residents found that people with extensive social ties lived longer than those with few close social contacts. Another study found that heart-attack victims who lived alone were nearly twice as likely to have another heart attack as those who lived with someone. Even the perception of social support can help people cope with stress. Studies have found that people's appraisal of the availability of social support is more closely related to how well they deal with stressors than the actual amount of support they receive or the size of their social network.

Relaxation

Two major methods of relaxation are progressive muscular relaxation and meditation. Both methods reliably reduce stress-related arousal. They have been used successfully to treat a range of stress-related disorders, including hypertension, migraine and tension headaches, and chronic pain.

Progressive Muscular Relaxation

Progressive muscular relaxation involves systematically tensing and then relaxing different groups of skeletal (voluntary) muscles, while directing one's attention toward the contrasting sensations produced by the two procedures. After practicing progressive muscular relaxation, individuals become increasingly sensitive to rising tension levels and can produce the relaxation response during everyday activities (often by repeating a cue word, such as 'calm', to them).

Meditation

Meditation, in addition to teaching relaxation, is designed to achieve subjective goals such as contemplation, wisdom, and altered states of consciousness. Some forms have a strong Eastern religious and spiritual heritage based in Zen Buddhism and yoga. Other varieties emphasise a particular lifestyle for practitioners. One of the most common forms of meditation, Transcendental Meditation, involves focusing attention on and repeating a mantra, which is a word, sound, or phrase thought to have particularly
calming properties.

Aerobic Exercise

Aerobic exercise - such as running, walking, biking, and skiing - can help keep stress levels down. Because aerobic exercise increases the

endurance of the heart and lungs, an aerobically fit individual will have a lower heart rate at rest and lower blood pressure, less reactivity to stressors, and quicker recovery from stressors. In addition, studies show that people who exercise regularly have higher self-esteem and suffer less from anxiety and depression than comparable people who are not aerobically fit.

SECTION 5: PRINCIPLES OF COUNSELLING

Introduction

The last four sections of this unit dealt with the process of communication, barriers to effective communication, essential organisational communication and psychology. In the next few sections on counselling, you will build upon the knowledge you acquired from the section on communication skills.
Counselling is one of the most important tasks of a nurse. In fact, you are always counselling without necessarily being aware of the process. You counsel your patients, children, relatives, and even colleagues. By the time you complete this section, you should be a better counsellor who will offer help, information, support and hope to your patients as you deal with them.

Counselling is the act of working with a patient to help them clarify personal goals and find ways of overcoming their problems with the aim of assisting the individual change behaviours that are interfering with attainment of basic needs.

Objectives

By the end of this section you will be able to:

- Define counselling
- Describe types of counselling
- Describe the characteristics of an effective counsellor

Types of Counselling

Different patients come for counselling with various problems. The type of counselling is, therefore, determined by the nature of problems presented by the patients.

Individual Counselling
Individual counselling occurs when a counsellor is working with only one person at any given time, i.e. when a nurse is dealing with a single patient.

Group Counselling
This occurs when a counsellor is working with more than one person at any given session. Group counselling is recommended for people facing the same problem, for example, alcoholics. In group counselling individuals need each other's support and encouragement to change their behaviour.
For example, Alcoholic Anonymous (AA), is an association formed by alcoholics who have or are trying to stop drinking and provides group counselling and support for each other. People are encouraged to discuss personal experiences and changes in their daily life.

Marital Counselling
This occurs when the counsellor is working with married couples. Marital counselling is conducted by a trained therapist who understands the problems and trials of marriage and married life. Marital counselling is done when both couples are present. The counsellor assists the couple to understand their problems and to find solutiions to their problems.

Family Counselling
This occurs when a counsellor is working with more than two members of a family at any given session. Family counselling focuses on family issues and is conducted when all the family members concerned are present. Effective counselling cannot occur if some family members are excluded from counselling sessions.

Special Group Counselling
The special group is composed of any group of people who require counselling to enable them to adjust better in their life. For example:

- Drug and substance abusers
- Rape victims and rapists
- HIV/AIDS infected and affected people
- Terminally ill people of all categories
- Families/individuals with handicapped persons
- Marital or family disputes
- Those who need abortion or have procured abortion

- People requiring reproductive health/family planning assistance
- Those experiencing sex difficulties/importence
- Retirees
- Retrenchees

Qualities of a Good Counsellor

Patience
A good counsellor should be very patient with their patient, no matter how many times the patient repeats themselves. You should not hurry the patient at all or show impatience. Nor should you show you are bored or tired of holding long discussions. You should only go to the next step of explaining when the patient has understood clearly the content of the information you are giving. If you are patient, your patient will feel that you accept themselves as a person and are interested in what they are talking about. This encourages the patient to open up even more.

Warmth
You should show warmth without being possessive during counselling. Smile and show a lot of concern and acceptance to the patient.

Confidentiality
Confidentiality means keeping all the information given by the patient secret. As a counsellor, you should not let anyone know what your patient has discussed with you.
To maintain confidentiality, counselling should be done on an individual basis (where appropriate) and in a private room. You, as a counsellor, have an obligation to treat all the information you have been given with confidence. The patient consults you because they believe that all information they disclose will remain secret. It is unprofessional to disclose any information obtained from a patient during counselling except to other professionals who have are involved in the care.

Honesty
Honesty refers to the act of telling the truth to the patient. As a good counsellor you should always tell your patient the truth. You should never tell a lie to your patient. If, for example, you are not sure of something, tell them simply that you will go to look for information. Honesty is exercised by both patient and counsellor. You should encourage your patient to be very honest on the information they are giving. Similarly, you should not hide any information of concern to your patient. Being honest makes the patient regard you as a dependable and trustworthy counsellor.

Empathy
Empathy is defined as the ability to imagine oneself in the position of another person, and thus, share and understand that person`s feelings. Empathy is the ability of the counsellor to put themselves in the position of the patient by understanding their feelings. As a counsellor, you should understand what your patient is feeling and communicate this understanding to them.
Empathy involves being very close to the patient and sharing your thoughts and feelings. When you share your feelings with the patient they feel accepted, loved and understood.
Empathy is characterised by both sharing and separateness. Although as a counsellor you share thoughts and feelings with the patient, the counsellor should remain separate and retain objectivity. This allows you to give objective responses to assist the patient in making the right decisions.

Observance
A good counsellor must be very observant. As you listen to your patient talking, observe their facial expressions and try to interpret the meaning of any nonverbal communication. Facial expressions may reveal painful memories expressed in the form of anger, sadness and frustrations.
Listen very carefully to the patient, observing if their facial expressions correspond with their speech. Observe carefully any mood swings and their relevance to the conversation. The observations are made to detect any inappropriate behaviour expressed by the patient. Close observation also makes the patient feel the counsellor is interested in the conversation.

Accepting
Being accepting means the patient is accepted the way they are. The counsellor recognises the basic rights of the patient, whether they are good or bad. When the patient feels that they are accepted as a person with their own rights,

they are encouraged to disclose information.
As a counsellor you should be nonjudgemental. You should avoid criticising the patient even if you feel they are wrong. You should listen carefully when the patient is talking to understand the message they are conveying. You can only give suggestions and not criticism.

Avoiding Embarassment
Embarassment is a situation where one feels uncomfortable in a social setting. You can avoid embarassing your patient by holding the counselling session in a private room. You can also avoid embarassing the patient by understanding the cultural background of their community. Try to avoid sensitive probing questions which make the patient develop feelings of guilt. Probing questions are statements which focus on the experiences, feelings and thoughts of the patient.
As a counsellor, you should observe and interpret nonverbal communication after asking a sensitive probing question. You can restate the same question in a different fashion if you note your patient is uncomfortable.

Relevant Discussion
Relevant discussion means that the counselling session is confined to the topic. During counselling the patient is given sufficient time to narrate their story. The counsellor listens and observes the patient carefully to pick up the core information related to the problem. The counsellor encourages the patient to come out with core information while noting any deviations or irrelevant information. The counsellor assists the patient in keeping focused on solving the problem.

Respect Opinion
This means the counsellor accepts the patient as a human being with their own rights to make decisions concerning their welfare. The counsellor should know that the patient has the ability to give constructive ideas to solve their problem. The counselling relationship improves when the patient becomes aware their views are respected.
The counsellor recognises that the patient is better placed to know their own problems and has the resources to solve them. This means that the counsellor accepts the views of the patient in principle even if they may not be good. The counsellor's role is to provide the patient with additional information and to suggest alternative options of solving the problem. The patient is, therefore, assisted to solve his problems through the counselling process.

Process of Counselling

The process of counselling refers to the cycle of events that take place within the counsellor/ patient relationship. The counsellor tries to establish a good interpersonal relationship with the patient during the interview. The establishment of a good rapport enables the patient to voluntarily give information related to the problem facing them without any fears. The following section explores the best way to conduct a counselling session. Just compare this with what you have been doing in your health facility.
The role of a Health Care Worker (HCW) is to support and assist the patient by practising

- Listening to the patient
- Understanding the choices that need to be made
- Helping the patient explore their options and circumstances
- Helping the patient develop self-confidence enabling them to carry out the decision made

The HCW is not responsible for resolving all of the patient's worries and concerns or for the decisions the patient ultimately makes

Basic Counselling Skills

Successful counselling requires the use of good communication skills.
This unit will explore the basic counselling skills that enable HCWs to effectively guide and support their patients. Counselling requires that the HCW be clear about their weaknesses, strengths, fears, anxieties, and doubts. All of these can facilitate or hinder working with patients. Therefore, HCWs who provide counselling must continuously engage in a process of self-exploration. They should be aware of themselves, how others affect them, and the effect they have on others.

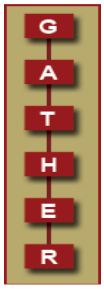
Interviewing
Interviewing is a purposeful interaction involving two or more people. The individuals holding an interview exchange views with one party asking questions while the other is responding. In nursing, patients are interviewed to gather information, enabling nurses to plan patient

care. In counselling, interviews are conducted to gather information to help patients to resolve their own problems. The interview conducted by a counsellor is called a therapeutic interview.
The purpose of conducting a therapeutic interview is to identify any social or psychological problems affecting a patient. A patient initiates a therapeutic interview when they visit a counsellor or therapist. The technique of asking the patient interview questions determines the effectiveness of counselling.
The counsellor may select to use structured or unstructured probing, open or closed type of questions during the interview. Probing and open-ended questions are recommended for interview because the patient's response is unlimited.

Preparation for Interview
The interview should be conducted in a private, quiet, well ventilated room with no distractions. The room should be spacious enough to allow the counsellor and patient to sit comfortably and should be clean and tidy.
The preparation of the room is also determined by the type of interview to be conducted. For example, if you are interviewing a patient to offer reproductive health services, visual aids on different methods of family planning should be displayed on the walls in the interview room.

The Steps in the Counselling Process

When you counsel a patient, you progress through a series of interconnected and overlapping stages to help them make informed decisions. Both you and the patient actively participate as you exchange information and discuss the patient's feelings and attitudes about the matter at hand.
There are six basic steps applied in the initial counselling process and they are remembered with the acronym or memory aid GATHER.



Stages of Counselling

The counselling process is often split into three stages: exploration, understanding, and action.

Exploration Stage
This is the beginning stage in which the counsellor helps the patient clarify their current difficulties, problems, issues, concerns, and undeveloped opportunities. The aim here is to establish a relationship with the patient so that they feel safe enough to explore the issues that they face by identifying and clarifying problem situations, unused opportunities and the key issues calling for change. It is essential to concentrate on the patient's agenda, not to impose one's own agenda or try to satisfy one's own curiosity. The counsellor should also help the patient to be specific and focus on core concerns.

Patient's question: 'What are my problems, issues, concerns and what are the undeveloped opportunities?'

Understanding Stage
This stage, also called the middle stage, is the stage of understanding and insight, promoting new perspectives, and looking at the preferred scenario. Now that rapport has developed and the patient has aired some issues, a greater depth of understanding can be reached. The preferred scenario helps patients determine what they want and need. Extra skills are needed to draw together themes, offer new perspectives, provide accurate empathy, work in the here and now, promote self-disclosure, help them set appropriate goals and be genuine in support. The patient must feel supported, yet challenged, to face the difficulties ahead. By the end of this stage the patient will have an idea of how they want to change.
Patient's question: 'What do I need or want in place of what I have?'

Action Stage
The aim here is to develop goal accomplishing action strategies by helping the patient discover how to get what they want. The key tasks here are to help the patient find a realistic set of choices, make decisions and formulate an action plan, and to assist the patient in the implementation of the plan. It is the patient who chooses the course of action, and the counsellor needs to know different decision making strategies and problem solving techniques to help the patient do this. In some models, the

action or implementation stage is left to the end, while in others it is acknowledged that patients need to act from the beginning, both within the counselling session and in their daily lives.

Patient's question: 'How do I get what I need or want?'

The counselling process is not a linear one, that is, it does not necessarily follow these stages in order. The counsellor needs to be aware of which stage the patient is at, and when it is appropriate to facilitate moving the patient to the next stage. This decision is the patient's, the counsellor offers guidance but does not make the decisions.

Communication Skills for Counselling

The HCW uses specific types of verbal and non-verbal behaviour to help patients through their process of exploration, understanding and action. These are basic communication skills. People use them knowingly or unknowingly every day in their day to day life.

Active Listening

Active listening seems like a simple concept to grasp yet people often fail to listen to one another. Active listening helps establish rapport, trust, and bridge differences; it helps patients disclose their feelings; it helps gather information and create a base of influence; it helps patients assume responsibility. People want the presence of the other person, not only the physical presence, but also their presence psychologically, socially and emotionally. Listening is an important part of effective communication.

Complete listening involves:

- Listening to and understanding the patient's verbal messages
- Observing and reading the patient's non-verbal behaviour; posture, facial expressions, movement, tone of voice
- Listening to the context; the whole person in the context of the social settings of their life
- Listening to sour notes; things the patient says that may have to be challenged

Barriers to listening, both internal and external, should be worked on and avoided. The session should not be interrupted by phones, note taking, noises and visitors.

Attending Skills

Attending demonstrates that you are visibly tuned in to the patient. Effective attending tells the patient that you are listening and puts you in a position to listen carefully to the patient's concerns. Attentive presence invites patients to open up and explore the significant dimensions of their problem situations. To attend to patients, counsellors can use the SOLER skills.

SOLER (Attending Skills)

S – Sitting squarely facing another person is considered a basic posture of involvement. If for any reason facing the person squarely is too threatening, then an angled position may be more helpful. It is the quality of your presence that is most important.

O –Open posture should be adopted. Crossing the legs and arms can be a sign of lessened involvement with others or less availability to them. Open posture may signify that you are open to the patient and to what the patient is saying.

L – Leaning forward towards the patient at times is a natural sign of involvement. It is a sign of bodily flexibility or responsiveness that enhances the counsellor's communication with the patient.

E – Eye contact should be maintained, without staring or glaring. Maintaining good eye contact is a way of communicating your presence and interest. It is helpful for counsellors to explore with their supervisor why they may be uncomfortable or unwilling to maintain eye contact with certain patients.

R – Being relatively **relaxed** and natural when doing all of the above is important. Do not fidget or chat nervously. Feeling comfortable with your body can be a vehicle of personal contact and expression.

These external behaviours help to convey your respect and genuine caring. However, these are just guidelines and not rigid rules, and counsellors must take into consideration the patient's culture as well as their own.

Paraphrasing

A skill that allows the counsellor to confirm and clarify statements made by the patient by repeating them using different words. For example, if a patient says, 'I'm not able to tell my

partner about my HIV test result.' the counsellor may paraphrase by saying: 'Talking to your partner about your HIV test result sounds like something that you don't feel you're able to do.' The Counsellor can then say: 'Let's talk about that.' Paraphrasing shows that you have both heard and understood the patient.

Reflecting Feelings
This involves understanding a patient's emotional responses and communicating this back to them. For example, if a patient says, 'I am worried that I will suffer a lot with HIV.' the counsellor might reflect these feelings back to the patient by saying: 'You are feeling anxious and fearful about the discomfort and pain that HIV may bring you.'

Questioning
Helps the counsellor to identify, clarify and break problems down into more manageable components. Open-ended questions that begin with 'how', 'what' or 'when' encourage responses that can lead to further discussion. For example, a counsellor may ask: 'What concerns do you have about having an HIV test?'

Clarifying
Prevents misunderstanding and helps people focus and sort out what has been said. For example, if a patient says, 'I can't exclusively breastfeed my baby.' the counsellor may ask: 'In what way is exclusive breastfeeding a concern for you?'

Summarising
Summarising pulls the threads together so that the patient can see the whole picture and gain greater understanding of it. It helps to ensure that the patient and the counsellor understand each other correctly.

- The counsellor should review the important points of the discussion and highlight any decisions made.
- Use summarising throughout the entire the counselling session.
- Offer support and encouragement to patients to help them carry out the decisions they have made.
- Agree on the return date and on any assignments the patient is expected to do at home.
- Ensure the patient has enough time to ask questions.

Termination of Counselling

Termination means ending the counselling relationship. Termination is decided by the counsellor when the patient shows signs of improvement and the ability to solve their problems. As a good counsellor, you should prepare your patient to be ready for termination of counselling relationships.

Techniques of Termination
The counsellor introduces the idea of termination and encourages the patient to rely on themselves instead of the counsellor. Self-reliance gradually separates the counsellor and the patient. Both counsellor and patient agree to reduce the number of sessions and to complete all pending issues before termination. There are some patients who may require further counselling support after termination. In this case, encourage gradual termination and allow the patient the opportunity to visit you when the need arises. The actual process of separation may be challenging for the patient and they may exhibit one or more of the reactions listed below.

Denial
Denial is experienced when the counsellor informs the patient of their intention to terminate the counselling sessions. The denial is characterised by a feeling of shock, disbelief, panic and refusal to accept the idea of terminating counselling relationships. The patient refuses to believe the counsellor can really stop the counselling sessions. You can help the patient at this stage by convincing them that they are doing very well and there is need to stop the counselling for a while to see how they progress alone. You can identify specific changes which have occurred since commencing counselling sessions.

Anger
Anger is experienced by the patient for losing a person so good and helpful. The patient keeps on asking why such a thing should happen only to them and not to somebody else. Patients may become very angry and sometimes refuse to eat.
As a counsellor you should assist the patient to overcome the state of anger by letting them express their feelings about what is happening. Encourage them to continue expressing the feelings and accept the termination.

Bargaining
Bargaining is where the patient tries to change the counsellor's mind about the idea of termination. The patient tries to prolong the counselling sessions by setting unrealistic goals. The patient may come up with arguments to support the unrealistic goals hoping the counsellor will change their mind.
As a counsellor you should listen attentively to their complaints and/or arguments and then emphasise the achievements they have made alone and the necessity for them to be independent.

Depression
Depression occurs when the patient realises the counsellor is serious and will definitely terminate the counselling relationships. The patient may feel very sad after realising that there is nothing they can do to change the situation. They may experience a feeling of hopelessness and despair. They may also withdraw from their friends. A feeling of depression may also be characterised by anorexia and insomnia.

Acceptance
Acceptance results when the patient accepts the reality of termination. They start to plan ways of coping with the new situation without the help of the counsellor. The patient gains confidence that they have the ability to manage their own affairs independently.

SECTION 6: BARRIERS TO EFFECTIVE COUNSELLING

Introduction

This section covers barriers to effective counselling, the rights of a patient, and some of the ethical issues encountered in counselling.
Many of the factors that cause breakdown in everyday communication also present barriers to counselling. These can include physical barriers, differences in socio-cultural backgrounds, nonverbal communications, language barriers and the relationship between patient and counsellor.
The patient has their own rights, which the counsellor should observe and respect, it is important for the counsellor to observe a code of ethics during counselling sessions. This includes knowing when to step aside and allow more competent counsellors to take over.

Objectives

By the end of the section you will be able to:

- Describe different types of barriers to effective counselling
- List the rights of a patient
- Explain ethical issues to be considered when counselling
- Describe theoretical approaches to counselling

Types of Barriers

Section two covered the factors that might lead to a breakdown in communication. To a great extent the counselling process is concerned with effective communication. Therefore, many of the barriers that will be covered are related to the communication skills which were explained at the beginning of this unit. Barriers to effective counselling interfere with the counselling process by making the patient unable to make informed decisions or disclose their feelings and concerns fully.
Barrier Types include:

- Physical barriers
- Differences in social and cultural background
- Inappropriate non-verbal behaviour by the provider
- Barriers caused by the patient and the counsellor
- Language and level of education
- Pyschological barriers

You will explore these barriers in the following pages.

Physical Barriers
Physical barriers refer to factors both in the environment and related to the counsellor themselves that prevent or reduce opportunities for the communication process to occur.

Interview Room
The interview should be conducted in a quiet, private room. The room should be spacious enough to allow the counsellor and patient to sit comfortably. The room should be clean and tidy, with adequate ventilation, a good size table, comfortable chairs and no distracting equipment, or pictures on the wall. It should be free from noise and have adequate lighting. The

counsellor and patient should sit facing each other.
The preparation of the room is also determined by the type of interview to be conducted. For example, if you are interviewing a patient to offer reproductive health services, visual aids on different methods of family planning should be displayed on the walls in the interview room.

Appearance
If you do not look presentable and pleasant, the patient may have a problem listening to you and taking you seriously.

Age and Sex
A difference in age between the counsellor and the patient may affect the outcome of the session. If the counsellor is young enough to be the patient's child, the patient might find it difficult to open up. Similarly, especially in youth counselling, it is advisable for counsellors to be the same gender as the patient. This helps the patient overcome discomfort when discussing personal and sensitive issues.

Differences in Social and Cultural Backgrounds
When a patient comes from a different nationality, race or ethnic group, it may be difficult for you to understand the patient's beliefs, taboos and cultural practices. The patient may not be able to take your advice because perhaps the information you give them does not tally with their beliefs. As a good counsellor you should endeavour to know the patient's cultural background before you start your session.

Non-Verbal Communication
This involves all the little things you do while you talk to a patient. The gestures you make could make the counselling session a success or failure. Some of the gestures that could make you
fail include:

- Frowning
- Showing signs of boredom or amusement
- Showing signs of disgust
- Displaying signs of disapproval towards the patient

Your response should be geared towards encouraging the patient to disclose their feelings and concerns fully to you. Therefore, try to cultivate the use of gestures that demonstrate interest and concern such as a smile and an occasional nod in appreciation of what the patient is telling you. Try to mirror their own feelings.

Barriers Caused by the Patient and Counsellor
Barriers caused by the patient can include lack of interest and the patient's emotions. It is likely that you will encounter one or both of these barriers and you will need to motivate your patients and arouse their interest from the outset of the counselling session. Stimulate active thinking and learning while providing a shared experience. Lack of interest makes a patient inattentive and creates prejudice. If you feel that the patient is so emotionally disturbed that they will not benefit from the session, you can postpone it to another day, to give them time to deal with the emotions they are experiencing at that time.

Counsellor and Patient related Communication Barriers

- Failure to listen may occur when the counsellor feels that they are not receiving the intended message.
- Failure to probe occurs when the counsellor does not get adequate responses from the patient. The counsellor may fail to ask the patient the relevant questions.
- Being judgemental, that is, the counsellor may approve or disapprove the statements from the patient.
- Rejection occurs when the counsellor refuses to discuss some topics with the patients. This may imply the counsellor has a right to pass judgement to the patient.
- Parroting, that is when the patient continues to repeat the same phrases even if you ask them a question in a different way.
- Defending, which is an attempt to protect something or someone from negative feedback.
- Giving advice, that is the counsellor telling the patient what he thinks should be done.
- Privacy disruption, which occurs if counselling sessions are held in a room where privacy is not observed. For example, if an interview is held in the presence of relatives or other people.

- Changing topics, that is the counsellor directing the interaction into areas of self-interest rather than following the lead of the patient.
- Failure to understand the culture, which may lead to the patient feeling that the counsellor has no respect.

Rights of a Patient
You have seen that barriers to effective counselling may come from both the patient and the counsellor. The patient has their own rights which the counsellor should observe during counselling sessions.

Respect and Freedom from Prejudice
The patient is a human being with their own rights to be respected. This means the counsellor should respect the patient as a person with their own culture who is entitled to give their own views. The patient has a right to receive appropriate care without any consideration of sex, race colour, ethnic or political affiliation.

Privacy and Confidentiality
Counselling sessions should be conducted in a private room. This allows the patient to share information with the counsellor freely. The patient trusts that any issues or information discussed during counselling sessions is confidential. You, as a counsellor, should never tell any other person about the discussion held without their consent, not even their closest relatives.

Consent
The patient should give consent on all decisions made during the sessions. No decisions should be imposed on the patient.

Right of Refusal
The patient feels confident that they are receiving quality services from a competent counsellor. This means the patient has the right to refuse any counselling services offered by an incompetent counsellor.

Involvement
The patient should be informed about plans of action to be carried out for their own benefit. This means the patient should be involved in planning the course of action.

Informed
The patient should be informed about their own health status. The counsellor should answer all queries raised by the patient without any hindrances. This means that the patient must be told the whole truth about their health.

Right of Referral
The patient expects a systematic and accurate investigations of their health concerns by a competent counsellor. The counsellor should, therefore, refer the patient if not able to meet their needs.

Ethical Issues in Counselling

The primary role of a counsellor is to serve their patient's interests at all times. The counsellor has a responsibility to the patient in areas of confidentiality, competence, maintenance of ethical standards and possibly referrals when the need arises. The counsellor should respect the patient's rights as an individual human being. They should respect the values and beliefs of their patient.
The counsellor should never disclose any issues discussed with the patient to anyone. The function of the counsellor is to assist the patient to see themselves clearly in all their positive, negative and contradictory aspects. The counsellor does not offer the solution to the problem of their patient. The counsellor should be seen by the patient as a helper rather than an adviser.
Code of Practice
The counsellor should observe the code of ethics at all times of their practice. The counsellor has a responsibility to take all reasonable steps to ensure that the patient does not suffer any physical or psychological harm during counselling. The counsellor's approach in counselling should make the patient feel accepted as a person with their own rights. The counsellor is responsible for setting and monitoring the boundaries between counselling and any other relationships with the patient.
The counsellor does not give advice to the patient but provides assistance so they can explore their problems. The counsellor should work together with the patient to find ways which will assist them to control their own lives. It is important for the counsellor to respect the patient's ability to make decisions and to change in line with their own beliefs and values.
The counsellor should not exploit their patients financially, sexually, emotionally, or in any other way. Engaging in sexual activity with the patient

is an unethical behaviour. It is also important that the patients are offered privacy during counselling sessions. Patients should not be observed by anyone other than the counsellor.

Terms of Counselling

Counsellors are responsible for communicating the terms on which counselling is offered. The terms of counselling should be explained to the patient in the initial contact and should include:

- Availability of the counsellor and the specific time and location of the session.
- Expectation of fees for cancelled appointments.
- Number of counselling sessions per week/month.
- The patient should be given an opportunity to review the terms.
- The patient is made aware it is their choice to participate in the counselling process.
- Records of counselling sessions should be kept and the patient made aware of it.
- In case of need for referral, confer with the patient and get permission before consulting other counsellors.

Counsellor Competence

Competence is an essential element in counselling and is acquired through proper training and practice. The counsellor should, therefore, work within their known limits of competence and should not offer counselling services if their ability or objectivity is impaired due to personal or emotional difficulties, illness, alcohol, drugs, or for any other reason. The counsellor should refer any patient they are unable to help to a competent person.

The counsellor should be honest and tell the truth to the patients at all times. Counsellors should not fear to tell the truth to the patients. Counsellors remain accountable for relationships with former patients and must exercise caution over entering into friendships and business relationships with them.

Any possible relationships must be discussed during counselling supervision. As a counsellor you should guard and respect the rights of the patient.

SECTION 7: THEORETICAL APPROACHES TO COUNSELLING

Introduction

In the previous section counselling was defined as a process of assisting people to understand the problems they are experiencing and how to use their own resources to solve them. A sound knowledge of the theoretical approaches to counselling is important because it helps the counsellor to understand the personality of the patient. In this section you will explore four common theoretical approaches to counselling.

Objectives

By the end of this section you will be able to:

- Describe four different theories on human behaviour
- Relate these theories to counselling

This section will highlight four different approaches to counselling, namely:

- Psychoanalytic
- Person-centred
- Behavioural
- Eclectic

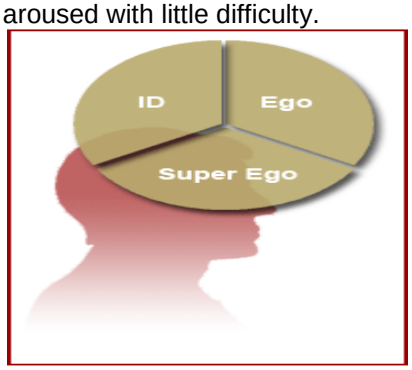
You will start by exploring the psychoanalytic approach to counselling.

Freud's Psychoanalytic Approach to Counselling

The psychoanalytic theory in counselling is based on Freud's theory of the human mind. In this theory, Freud divided the human mind to three components: the unconscious (Id), the preconscious (Ego or Self) and the conscious (Super Ego). The Id component always seeks gratification to satisfy pleasure needs and avoids pain. The Id has no judgement value (no good, no evil) and no morality. It consists of wishful thinking and is not governed by any logic. Freud further asserted that the unconscious mind is composed of repressed past experiences, which can be aroused from the unconscious state to a conscious state.

The Ego component mediates between the Id seeking pleasure needs and the Super Ego component that seeks perfection. The Ego

represents reasoning and common sense between the external world and the demands made by the Id. The Ego controls the demands the Id makes by deciding the manner of satisfying needs by suppressing their excitation. According to Freud, the preconscious mind comprises past experiences, which can be aroused with little difficulty.



The Super Ego represents the reality of the external world. The function of the Super Ego is to contain the demands of the Id through moral influence of the Ego. The conscious mind has a sense organ, which perceives stimuli coming from the environment (or external world). This theory proposes that the mind of a growing child is influenced by experiences from the parents and that of the peer group (environment).

Howard (1996) made some assumptions derived from Freud's psychoanalytic theory which he identified as useful basic insights the counsellor may consider in the course of his work.

Howard's Derivations From Freud's Psychoanalytic Theory

- Human beings are not always conscious of what they are doing. Our thoughts, feelings, wishes and actions often pass unnoticed and unexamined.
- Even if we do notice what we are doing, we do not always know why. We may be aware without being able to explain.
- Awareness and self-awareness may be painful and uncomfortable. We actively avoid awareness of some thoughts, feelings and behaviours.
- If our avoidance is successful, we have to evade our evasiveness. We may thus become unable to see what is obvious to others.
- In so far as we find it painful to come to terms with ourselves, we remain defensive, vulnerable and liable to manipulation.
- Our guilt and shame keep facets of our personality buried.
- We all carry unfinished business from the past, unreleased traumas, unrecognised frustrations, dilemmas, and conflicts which are misunderstood and misconceived. These are liable to shape, disrupt, and disturb our dealings in the present. Usually we shall be quite unaware of what is happening.
- That which we repress is liable to threaten and haunt us, leaving us feeling uncertain and uneasy.
- Much that we avoid should be manageable if we have the courage and faith to face it. Others can help us, especially if they are experienced, skilled and have come to terms with their own personality.
- Our ability to change and be free from the past is nonetheless limited.

Interpretation of the Psychoanalytic Theory

The psychoanalytic counsellor focuses on what happened to the patient in the past, that which has been forgotten. They also focus on what is presently happening in the life of the patient. The analysts try to understand repressed experiences which may be contributing to the current problems the patient is experiencing. As a result of understanding the problems, the counsellor is able to offer effective counselling services to the patients.

The knowledge gained in learning the psychoanalytic theory will assist you to identify patients who require referral to the psychologist for further management. It is, therefore, important that you understand this theory.

The Person-centred Approach

The Person-centred theory is based on Maslow's theory of self-actualisation. The counsellor using this approach assumes that 'self-actualisation' motivates human beings to exploit their capabilities or potentialities. It is assumed that people have the capability to guide, regulate and control themselves provided that certain definable conditions exist.

In the Person-centred approach, it is assumed that an individual's psychological problems are caused by failure to actualise to the maximum. Psychological problems cause blockages to the

process, and the work of counselling is to release the blockage.

Assumptions of Self-Concept

- A person's self-concept is the way an individual perceives the self. It is the means by which an individual interacts with life in a way that allows them to meet their basic needs.
- A person's self-concept is important because self-perceptions enable the individual to understand how psychological maladjustment is maintained.
- Self-concept is viewed as a structure made of a variety of self-conceptions related to each other in different ways. This means it is a process by which they ignore, deny, distort or accurately perceive experiences.
- Congruence/Incongruence, that is, many self-conceptions may match the reality of what people experience, in which case, there is congruence between self-conception and the experience or reality. Other self-conceptions may differ from the reality of their experiences in which case a state of incongruence exists.
- Condition of worth or incongruence implies that a self-conception is based on a condition of worth rather than the individual's own valuing process. For example, an incongruent self-concept for a person may be, 'I want to be a nurse', whereas a congruent self-perception may be 'I want to be a teacher'. Being a teacher may be based on values internalised from the parents whereas being a nurse represents the person's own valuing.
- Real-ideal implies that whereas real self-conceptions represent my perceptions of how I am, ideal-self conceptions represent how I would most like to be. Both the real and the ideal-self form parts of people's self-concept complex.

The Person-centred theory helps counsellors to identify the maladjusted behaviour of the patients. Through counselling the counsellor is able to identify the resources the patient has to sustain or correct the maladjusted behaviour. The role of the counsellor is to provide the necessary conducive climate (environment) characterised by the core conditions to enable the patients solve their own problem. There are three core conditions, namely:

- Unconditional positive regard
- Respect
- Empathy

Behavioural Theory

The Behavioural theory of counselling is also known as 'Behaviour Therapy'. This theory is based on the principles of learning to assess the behaviour of the patients. In the behaviouristic view you are born as 'blank slate' and so everything you are as an individual you have learned from other people or from your life experiences. Learning does not change you completely, so behaviour learned can be unlearned. You can unlearn thoughts, feelings and behaviour that distress you and replace them by learning better ways of thinking, feeling and behaving. This theory deals with behaviour in the here and now, the past cannot be changed and therefore it is not significant, but the future can be modified.

Behavioural psychologists design psychometric tests, numerical scores, checklists and questionnaires, which are given to the patients to respond to. The assessments are done to try to understand the human emotions and behaviour.

Nelson et al (1995) define behaviour therapy as a conditioning therapy involving the use of experimentally established principles of learning for the purpose of changing the patient's maladaptive behaviour. Thus the counsellor using behavioural approach of counselling tries to identify the maladaptive behaviour of the patient. Nelson emphasises the objectives the counsellor must ensure are achieved for effective counselling to occur.

Objectives of Behavioural Therapy

- Alter the maladaptive behaviour, for example, by increasing socially assertive responses
- Optimising the decision making process by making a list of possible courses of action for solving the problem
- Preventing problems from occurring by implementing a system of helping young men and women to select partners if the problem involves a sexual relationship

Counsellors using the behavioural approach should set realistic goals. Some of the goals the counsellor may set are included in the list below:

- Overcoming deficits in behaviour
- Strengthening maladaptive behaviour
- Weakening maladaptive behaviour
- Encouraging the capacity to relax, to ease tension and headaches
- Encouraging adequate social skills, that is, socialise more with people, talk more with people, attend social gatherings like going to church or women group gatherings and/or men's social activities
- Capacity for self control, that is, encourage the patient to control emotions

Assessment of the Patient's Behaviour

The counsellor does not do the assessment but instead refers the patient to the psychologist. The assessment is necessary for the counsellor to be able to identify suitable therapeutic goals. The psychologist designs a questionnaire tool to assess the patient's overt behaviour, how they act in response to their emotions, or how they perceive the environment.

The assessment questionnaires may ask the patient to indicate what stimuli cause them to develop anxiety. Another kind of questionnaire might ask the patient to explain which types of activities, events and experiences they find most rewarding.

A questionnaire is useful in identifying actual and potential re-enforcers, which can be used together with treatment. The information identified by the psychologist assists the counsellor to set relevant treatment goals to correct the maladaptive behaviour. In effect the behavioural approach enables the counsellor to get more information about the patient so they can set realistic counselling goals.

The Eclectic Approach

Arnold Lazarous, a clinical psychologist developed this approach. The eclectic approach (or multimodal approach) is based on the belief that there is no single psychological theory, which can effectively be used in counselling all patients. The Multimodal approach borrows concepts and techniques from different schools of thought depending on the individual patient's unique psychological problems and circumstances. The eclectic theory describes human personality as consisting of seven modalities remembered by the acronym 'BASIC ID'. A complex chain of behaviour and other psychological processes connects the seven modalities. The counsellor tailors the therapy to the individual patient.

B-A-S-I-C-I-D

Behaviour

Some people may be described as doers or are action oriented. They keep themselves busy and get work done through other people.

Affect

Some people are very emotional and may or may not express it.

Sensation

Some people attach a lot of value to sensory experiences, such as sex, food, music and other sensory delights. Others are very much aware of minor aches and pains, and discomforts

Sensation

Some people attach a lot of value to sensory experiences, such as sex, food, music and other sensory delights. Others are very much aware of minor aches and pains, and discomforts

Imagery

This is thinking in pictures, visualising real or imagined experiences, letting your mind roam.

Cognition

Some people are very analytical and like to plan things. They like to reason things through.

Interpersonal

This is your self-rating as a social person. This is how you interact with friends or keep aloof.

Drugs/biology

This is being conscious of personal health and how you maintain a health state. It is being concerned with social habits, which improve the health status or contribute to poor health. For example, regular exercise, getting enough sleep and avoiding junk food improves the health status, while smoking, overeating and over drinking contribute to poor health.

Counselling Relationship

The counselling relationship using the multi-modal approach focuses on working closely with the patient and avoiding causing any offence to their personal dignity while providing the therapeutic support required to correct or alleviate the maladaptive behaviour. The counsellor modifies their counselling approach

depending on information (or complaints) obtained using the modalities of BASIC I.D.
The counsellor using multimodal counselling should be skilled in numerous theoretical approaches to be able to conduct effective counselling. For example, they could be skilled in Psychoanalytic Counselling, Person-centred Counselling, Behavioural Counselling and Cognitive Counselling. The understanding of several psychotherapeutic approaches enables eclectic counsellors to provide highly effective counselling services to their patients.
In sections four and five you covered the process of counselling, including barriers to effective counselling while in section six four psychotherapeutic approaches to counselling were introduced. There are many other counselling techniques you will come across that are not covered in this section. You can learn more techniques by reading clinical and counselling psychology textbooks.

SECTION 8: COUNSELLING SPECIAL GROUPS

Introduction

In this section you will explore the application of knowledge, skills and attitudes you have acquired on counselling to help patients with HIV/AIDS, rape, disabilities or chronic illnesses, and those requiring family planning services.
No doubt you will meet patients with other problems such as victims of marital violence and so on. However, it is important to remember that in all groups, you will apply the principles you have learnt so far to help them overcome or solve their problems. By gaining understanding in these special groups you will understand the process of counseling better during your practice.

Objectives

By the end of this section you will be able to counsel special groups of patients including:

- HIV/AIDS patients
- Rape victims
- Patients with disabilitities or chronic illness
- New family planning patients

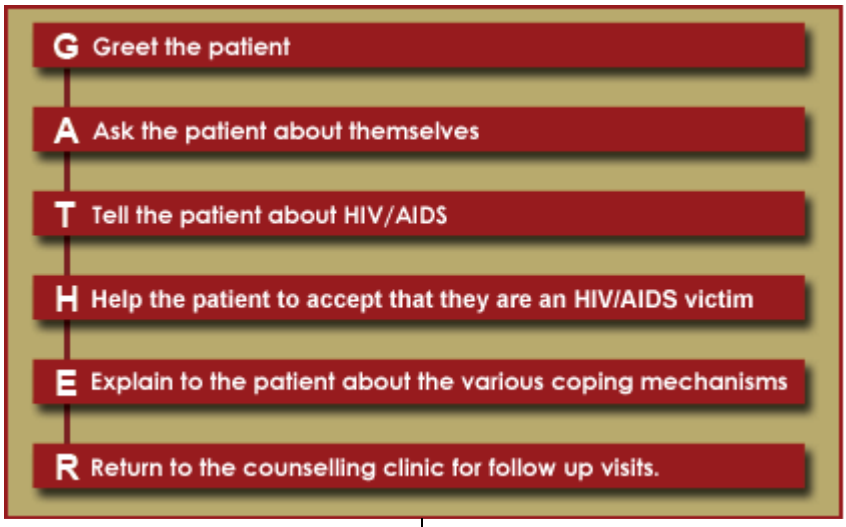
You will now go on to cover each of these categories in more detail.

Counselling HIV/AIDS Patients

As you have already seen, the counselling process is generally composed of three main identifiable stages namely:

- Initial contact stage
- Working stage
- Termination stage

When you counsel HIV/AIDS patients, you go through all three stages, trying to adapt to the individual needs of the patient. Both you, as a counsellor, and the patient must participate fully when exchanging views on HIV/AIDS. You need to provide the patient with adequate information on HIV/AIDS while they respond by explaining their own feelings and attitudes about their condition.
During the first day of the meeting with an HIV/AIDS patient, it is very important to show a lot of concern and readiness to offer help. This is because HIV/AIDS has no cure yet and the patient may not have confidence that you as a counsellor will be in a position to help them. The interaction you hold with the patient helps them to understand how to live better with the HIV/AIDS condition.
Can you recall the meaning of the acronym “GATHER”? If you have forgotten review the section again. In counselling an HIV/AIDS patient, you follow all the six elements described by the memory aid known as GATHER, that is:



Having greeted the patient and established a rapport you can begin to explain to the patient about HIV and AIDS.
Let the patient know that you understand how a diagnosis of HIV/AIDS causes a social stigma and a feeling of rejection by members of the family and the community. Tell the patient it is normal for human beings to experience anger, fear, sadness, frustrations, feeling of guilt, hopelessness or isolation when a terminal diagnosis is made. Tell the patient it is very important to express their feelings to prevent social/psychological stress which may lead to developments of anxiety or depression. Tell the patient about the needs for pre and post HIV/AIDS test counselling.

Reasons Why Pre HIV/AIDS Test Counselling is Necessary

- To provide the patient with accurate information about HIV/AIDS
- To assist the patient to understand the implications of a positive or negative result
- To assess the patient's ability to cope with a positive result
- To make the patient have an informed decision whether or not to take the test
- To help the patient manage fear and anxiety while waiting for the results
- To help the patient to consider positive changes in behaviour to prevent transmission of HIV
- To establish a relationship of trust for post-test counselling

Information an HIV/AIDS Patient should Know before Testing

Before an HIV/AIDS test is carried out, the person should be informed about the following:

- That a person may be infected but have no symptoms.
- The virus is spread through sexual intercourse, blood transfusion, operation, transplant, tattooing or circumcision, which could have happened many years earlier.
- Once the person is infected, the virus affects the immune system and, therefore, weakens the individual's body defence mechanisms against infections.
- The disease is fatal and eventually causes death.

To confirm HIV/AIDS, a blood sample is taken to the laboratory to test for the presence of antibodies against HIV. A positive result is confirmed by doing a second test.
You should also tell the patient about other ways HIV/AIDS is transmitted which include the following:

- Use of unsterilised used syringes and needles
- Traditional circumcision of both boys and girls, using unclean procedures
- Handling blood without gloves, especially when one has cracks or wounds on the hands
- Kissing a partner with oral thrush
- Handling body fluids of infected people without gloves.

Information an HIV/AIDS Patient Should Know After Testing Positive

Tell the patient about the sexual behaviour necessary to prevent the spread of HIV/AIDS. This includes:

- Avoiding sex with multiple partners
- Being faithful to one partner
- Avoiding unprotected sex by using condoms
- Avoiding sex with commercial sex workers

You should also inform the patient about the complications of HIV/AIDS. A patient with HIV/AIDS develops complications when the immune system is weakened and opportunistic infections occur.

Typical HIV/AIDS Complications

- Tuberculosis which is caused by TB Bacilli
- Diarrhoea lasting more than one month. The diarrhoea is accompanied by nausea, vomiting, anorexia, flatulence, abdominal cramps and no specific organisms are identified
- Loss of body weight
- General body weakness
- Infections with the herpes virus occur in any part of the body, especially in the pubic and anal areas
- Infections with herpes zoster ophthalmicus causing unilateral or bilateral blindness
- Pruritic papules which occur in the warm areas of the body like the armpits, pubic and anal areas
- Enlargement of lymphatic glands
- Oral thrush caused by fungal infections

Tell the patient about how HIV/AIDS complications are managed and that there is no effective drug therapy for HIV/AIDS. A person infected with HIV/AIDS can live a normal life for many years by managing the opportunistic infections. Let the patient know it is important to avoid exposure to infections which weaken the body's immune system. Tell the patient how to deal with the following infections:

Diarrhoea

Encourage a patient who has diarrhoea to take plenty of fluids (boiled water, weak tea, soup, juice) to prevent dehydration. The patient should take a nutritious, easily digestible food with extra vitamins. The food should be well cooked and mashed if necessary. The patient should avoid eating fats, oils, milk products and citrus fruits. Diarrhoea is effectively treated with metronidazole
and imodium.

Skin Conditions

These include rashes, sores, boils, abscesses and itching which can be managed by cleaning the skin often with soap and water, keeping the skin dry between washings, using calamine lotion for itching, washing open sores with soap and water, dressing big open wounds daily, treating mouth sores with antifungal drugs like nystatin and nizoral and treating TB with anti-tuberculosis drugs.

You should help the patient to accept being an HIV/AIDS victim. When giving the results, sit with the patient in a private room where nobody else can hear your conversations. Help the patient to understand that they may have many more years to live. Assure them of the potential to continue living a normal economic life despite the occurrence of opportunistic infections. You should also help the patient to understand that opportunistic infections can be effectively treated with available antibiotics, antimicrobial and antifungal drugs.

Explain to the patient that they will remain infectious throughout the rest of their life and plans should be made to protect sexual partners. Help them to understand that family support is needed and, therefore, family members should be informed. Family members should be requested to attend a counselling session with the patient if they consent.

Assist the patient and family to express their feelings and to think positively about their future plans. Help them to discuss sensitive issues threatening their future plans and assist them in finding solutions. If there is a husband or wife involved, counsel them together. Help the patient to identify the available resources.

Explain to your patient the way the disease is managed with antiretroviral and antifungal drugs. Explain to the patient the importance of diet in the management of HIV/AIDS. Let the patient know the antimicrobial drugs for treating HIV/AIDS are very expensive though they prolong life. Tell the patient not to sell their property to buy antimicrobial drugs. You can give the examples of the antiretroviral and antifungal drugs.

Examples of Antiretroviral and Antifungal Drugs

For HIV:

- Didanosine or videx
- Foscarnet sodium or foscarvir
- Ganiciclovir or cymevene
- Zuicitabine or hivid
- Zidovudine or AZT or retrovir

For Oral Thrush:

- Nizoral
- Nystatin

For Herpes:

- Acyclovir or zovirax

Explain to the patient the importance of maintaining good personal hygiene to promote a healthy skin. Encourage your patient to join HIV/AIDS counselling groups to share ideas on how the other HIV/AIDS sufferers are coping with their problems. Explain to the patient the risks of infecting others unless they use condoms. Also explain the implications of being an HIV/AIDS patient.

Ask the patient to return to the clinic as follow up visits are very important. Encourage the patient to come back to see the doctor any time they have a problem. Tell the patient to come for counselling individually and to join groups of HIV/AIDS patients.

Preparing HIV/AIDS Patients for Death

The terminally ill HIV/AIDS patients finally realise death is imminent as the condition worsens every day. As the days pass by, they become aware death is impending and there is no way to avoid it. The patients may get worried about being a big burden to the family or being abandoned at the time of death. They may also feel a lot of guilt if they infected their partners. They fear the family may wish them dead as soon as possible to get rid of the stigmatising condition. Such thoughts may make the HIV/AIDS victim want to commit suicide or become very hostile to the relatives. Sharing thoughts of death and dying with a counsellor may help the patient to accept and face death courageously in a dignified manner.

The process of death and dying is an important aspect of preparing the HIV/AIDS victim to expect to die one day. The individual should be made to understand that death is a normal process that all human beings pass through when the time comes. As a counsellor, you encourage the individual to discuss their feelings about death.

Preparing AIDS/HIV Patients for Death

Here are some useful areas for discussion with terminally ill patients.

- What the patient feels about dying
- What the patient would like the family to do at the time of death
- What the patient would like to accomplish before death
- What the patient feels about the deteriorating condition of their health
- What the patient thinks will happen after death
- What the patient has / has not accomplished
- What debts the patient owes
- What the patient feels about unfinished jobs
- What the patient feels about writing a will, do they have a will?
- What the patient feels about getting pastoral services

As a counsellor, you should invite the patient's relatives to a counselling session (providing the patient accepts), and discuss all the things they are worried about. Discuss how any unfinished jobs would be accomplished and how debts will be settled. Always empathise with the patient and provide moral support. Discuss the meaning of death and possibly life after death and what they believe will happen.

Ask the patient to discuss with their family what they would like to be done at the time of death. Let the patient talk about how their property should be distributed or give the name of the lawyer keeping the patient's will. Discuss the cultural rituals the patient would like to be performed during the burial ceremony. Let the patient consider anything they may be worried about and the actions their family should take.

The Benefits of Counselling for the Terminally Ill

- It makes individuals accept the eventuality of death
- It prepares the patient for a dignified peaceful death
- It prepares the patient to cope with stress caused by guilt feeling of the stigmatising disease
- It prepares the individual to make peace with the relatives on important issues

- It gives the patient a chance to prepare self spiritually for life after death
- The patient becomes settled psychologically when the family promises to settle all debts and to complete the unfinished jobs

The counselling of terminally ill patients together with the family members is vital. Both the counsellor and the relatives should be very patient and understanding. They should show considerable empathy and concern for all the issues raised by the patient.

Counselling a Rape Victim

You have gone through the process of counselling a HIV/AIDS patient. You will follow a similar process in this subjection, when counselling a patient who has been raped.

Initial Stage

Rape victims are usually bitter, frightened, worried, and emotional. You will need to apply all your counselling skills with care in order to get the victim to tell you how it happened.

As a counsellor, you must listen attentively and give feedback and encouragement where appropriate. Be aware of the patient's need to take a break or pause the session to recover emotionally. Encourage them to express their feelings about what happened in order to relieve the anger and anxiety. Rape victims often express a great deal of anger for various reasons.

Emotional Reactions Arising From Rape

- They are feeling ashamed because of the forced sexual intercourse
- They are feeling a lot of pain due to bleeding per vagina caused by injuries
- Has fear of the loss of their virginity
- They may fear that they might become pregnant
- They may fear that they have contracted sexually transmitted infections and HIV/AIDS
- They may have a feeling of self hatred because they were unable to prevent the stranger from raping them and cursing God for not protecting them
- Fearing the parents may not allow them to have an abortion
- Fearing the consequences of infertility after inducing abortion
- Fearing they may hate the child if the pregnancy is not terminated
- Wondering why it had to be them

As you conduct the interview, continue observing the emotional behaviour displayed by the patient through non-verbal communication.

Emotional Behaviours Displayed by Rape Victims

- They may be physically restless
- May keep on crossing and uncrossing their legs
- May keep on rubbing their head, thighs or back
- Wiping their tears with their hands or not wiping their tears at all
- Observe whether the nonverbal communication is showing a feeling of anger, despair, frustration or sadness

Once the patient is emotionally calm and ready to talk confidently, ask them to explain the help they require from you. Ask the patient whether the matter has been reported to the police or if they have any intention of doing so. Discuss with your patient the possibilities of consulting a doctor for medical examination. Find out who else the patient has told about the incident and their reaction. Find out if they wish to inform their parents or close relatives.

Process of Conducting Medical Examination

Explain to the patient what is involved in the medical examination, be sure to be as accurate as possible whilst taking into account their feelings. Bear in mind that a medical examination following a rape may feel almost as invasive and unpleasant as the rape itself. Explain that a report is necessary as evidence in case the rapists are apprehended and taken to court by police. The examination may help bring the offenders to justice.

Medical Examination Process

- The whole body of the patient is examined to identify any injuries or bruises sustained when they were restrained. The injuries/bruises are likely to be found at the back of the upper arms, shoulder blades and buttocks.
- The clothes are checked for blood stains, dust or mud and any tears. The underpants may be stained with blood or seminal fluid.
- A genitalia/vulval examination of the vulva is done to identify any vulval

swelling, bruises, tears, lacerations or bleeding

- The state of the hymen is checked to find out whether it is broken/unbroken. A hymen with fresh tears will have tender margins and will be oedematised.
- The pubic area is checked for blood/seminal fluid on the hairs. Ensure any foreign hairs seen on the pubic area are taken together with that of the patient.
- The vagina is examined for any bruises, lacerations, or abrasions of the walls. Vaginal fluid is taken to examine the presence of seminal fluid. A vaginal swab is taken for culture and sensitivity to identify any sexually transmitted infections.
- Refer to VCT for HIV status and prophylactic ARV if HIV negative.
- The patient is advised to see a gynaecologist to do a therapeutic dilation and curettage. The patient is also informed of the risk of contracting HIV and therefore the need for a follow up examination in the clinic.

Reassure the patient to allay anxiety that a medical examination is done to rule out sexually transmitted infections. Reassure the patient that the majority of sexually transmitted infections are effectively treatable without causing any future complications of infertility. Also assure the patient the doctors would prescribe antibiotics to prevent other infections in case of any lacerations of the vulva or vagina.

If the patient expresses fear of pregnancy, tell them to come for pregnancy test after two months. If they are found to be pregnant, a therapeutic abortion can be done by a gynaecologist safely with no bad repercussions in the future. In case of a minor, should the parents refuse a therapeutic abortion, the pregnancy can be allowed to continue and after delivery the child can be adopted. Explain to the patient about the process of child adoption should they choose to allow the pregnancy to continue. Inform the patient about all the homes which are available to adopt the child after birth.

When you have responded to all their questions, plan together for more counselling sessions in the future. Tell the patient to come for further discussions and follow up in the medical clinic.

You should now have an understanding of the process for counselling a patient who has been raped. The next section looks at another special group of people requiring counselling.

Counselling a Patient with Disabilities/Chronic Illness

A disability is a handicap which prevents an individual to use their body or mind optimally. A chronic illness is a disease of long duration involving slow changes. For example a person with an amputated arm has a disability because they cannot perform activities requiring the use of both arms. Similarly, the blind, alcoholics, drug addicts, epileptics and mentally ill persons have disabilities. A person who is deaf has a disability because they cannot move freely on the road due to fear of being hit by motor vehicles.

Principles of Counselling People with Disabilities/Chronic Illnesses

Some people will make efforts to distance themselves from persons with disabilities/chronic illnesses. They, therefore, tend to feel rejected. As a counsellor, it is very important to recognise the feelings of people with disabilities.

Many people with a disability do not accept they have a disability. They need to be counselled to accept it so that they can learn how to cope with it. As a health worker, it is important to know the people with disabilities in the community where you work because they will need counselling services.

There are four basic principles behind counselling people with disabilities.

Principle 1 – Treat the patient as a human being.

Your use of language should reflect the fact that people with disabilities/chronic illnesses are first and foremost human beings and should be treated like any other person. You should note that the feelings attached to the word 'disability' are of great concern to both the patient and the family. The language you use as a health worker should not display any form of blame or create feelings
of guilt.

Principle 2 – Consider the Social Impact of the disability.

A disability or chronic illness affects the whole family and social network, not just the individual. For example, a family with an epileptic child cannot leave them for fear of injury during an attack. Family counselling is important.

It is important to bear in mind that most people have difficulties living with persons suffering

from any disability. Many have feelings towards disability which need sharing with a counsellor. These can include guilt, sorrow, anger, resentment and frustration.
Many people dislike being dependent on others and may feel like a burden on society. For example, a person who lived a normal, active and productive life and then lost their sight during a bomb blast can no longer perform the work they used to. Such a person becomes dependent on others for many things and requires counselling in order to adjust to the new life.

Principle 3 – Consider the Practical and Emotional impact.
The meaning of disability is as important as the disability itself. As a health worker, it is important to consider the meaning of disability from the practical and emotional aspects. Disability reduces an individual's capacity to work normally, for example, a person who is blind may not be able to operate some types of machinery.
The limitation to perform certain activities makes the individual think other people/family members may not love them. The aim of counselling people with disabilities and their families is to examine and try to change the meaning of the condition. For example, an epileptic person can be rehabilitated by identifying a job which they can do safely without fear of injury in case of an attack.

Principle 4 – Confront the Reality of the Condition
Getting patients to confront the reality of their condition is an essential part of counselling. People are often afraid that their relationships would be damaged by accepting the reality of their condition. For example; an alcoholic may be afraid to tell the truth about the main reasons of their drinking. The counsellor in this case should approach the alcoholic in a tactful manner to obtain relevant information to make the correct diagnosis.
The counselling of a person with a disability or chronic illness is not easy and needs a lot of thought. The counsellor is faced with the problem of making the patient to accept their disability whole heartedly. Secondly, the counsellor is faced with the problem of influencing the patient to believe that other family members have accepted them as a human being with his their rights. Thirdly, to influence the patient to recognise the reality of their disability and agree on realistic coping mechanisms.

Counselling a New Family Planning Patient

By this point you will have acquired some knowledge on the principles of counselling after reading about counselling of rape and HIV/AIDS victims. You will now explore counselling patients seeking reproductive health services in a health facility. As a community health nurse, you may have come across several patients seeking family planning services in the clinic.
As a nurse in practice you should be familiar with all the methods used to provide reproductive health services. The GATHER methodology of counselling will be used for this section. However, before you start this section you should revise the following:

- The anatomy and physiology of the male and female reproductive organs
- The methods used in Family Planning andtheir
  relative merits

Receiving a Family Planning Patient
Here is a guide to using the GATHER methodology with a family planning (FP) patient.

Greet
Greet the patient as they enter clinic/FP room and offer them a seat. Close the door and (if appropriate) open the windows for fresh air. Introduce yourself to the patient and explain the type of reproductive health services offered in the clinic.
Assure the patient about the confidentiality of everything discussed. Ensure there is privacy in the room and nobody else can hear the discussion. The room should have no distracting diagrams, except those of family planning. After establishing rapport with the patient and feeling that the patient has gained confidence, ask them what they need from you.

Ask

Ask the patient about themselves and their family. Ask them to tell you what they know about family planning. Ask them to describe any of the specific methods they are aware of. Ask them if they have discussed reproductive health with anyone else before coming to the clinic. Ask them to tell you if their partner is supportive of the idea of practising family planning. Ask them

if there is any specific method that their partner prefers.
You must listen very attentively to what the patient is telling you. Show a lot of concern and understanding. Observe any non-verbal communication through the patient's facial expression and gestures. Try to identify the type of methods they are interested in, or are putting a lot of emphasis on.

Tell
Tell the patient about all the methods of family planning you can offer. Tell the patient about the other reproductive health services/choices available elsewhere other than in your clinic. Tell the patient about the advantages and disadvantages of each of the methods discussed. Demonstrate how each of the methods discussed is used and how it functions. Encourage them to ask questions during the demonstrations. Tell them to discuss the methods both partners may be interested in. Ensure they understand all available methods of family planning.

Help
Help the patient to make an informed choice; one which would suit both themselves and their partner. Ensure the patient has adequate knowledge of the method of family planning they are interested in.
If possible, discuss the selected method with both partners. Allow both partners to express their opinions and concerns about the selected method. Help them to understand the suitability of the method as not all methods are suitable to all people. Help both partners to understand the effectiveness of the selected method and that the selected method does not affect sexual activity in any way. Help both partners to understand that fertility returns when the method used in family planning is stopped. For example, if the patient stops taking the pills regularly, they may
become pregnant.

Explain
Explain and demonstrate to the patient fully how to use the selected method and ensure the patient is able to use the selected method. For example, if the patient has selected the natural method, ask them to describe it. If it is a male patient who has selected vasectomy, explain to both partners how the procedure will be carried out. Let the couple understand they will not get any more children.

Continue encouraging the patient to ask questions to alleviate any doubts they have about the selected method. It is important to give the patient a chance to demonstrate how to use the selected method. Ensure you provide the moral support to patient all the time.

Return
Return to the clinic. Discuss with the patient when they should return for a follow up and to collect any new supplies. Tell the patient to feel free to return any time for assistance if the need arises. Tell the patient to consult a doctor if they notice anything abnormal.