**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.

**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**

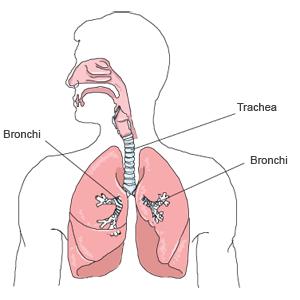
By the end of this section you will be able to:

* 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)**

This 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)**

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**

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, taphylococci, 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.

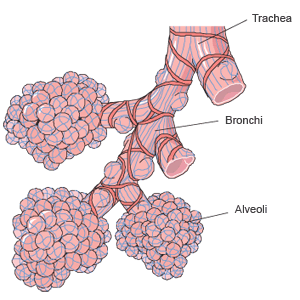
The parents should be encouraged to make attempts to improve the child's general health by providing a high protein diet, which will thereby increase their weight.

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.

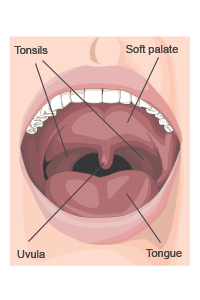
**Tonsillitis**

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.

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**Bronchial Asthma**

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:

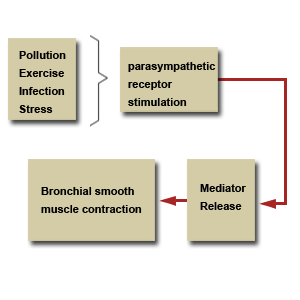
* Viral respiratory infections
* Emotional stress or excitement
* Exercise
* Drugs such as aspirin
* Inhalation of irritating substances such as cigarette smoke,   
  strong perfumes or air pollutants

The graphic illustration shows the relationship between the trigger and an asthmatic attack.

**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.

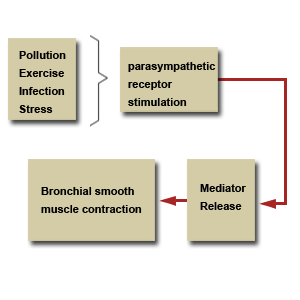
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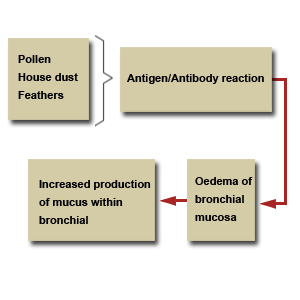
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**Pathophysiology**

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.

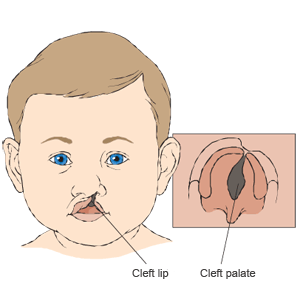
**Cleft Lip (Harelip) and Cleft Palate**

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.

n/a



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.

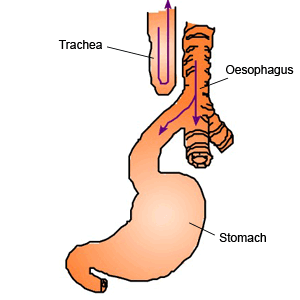
The child should not be allowed to consume any food for six hours before being sent to theatre but may be put on intravenous dextrose 5% during that period.   
Pre medications should be administered as ordered by the doctor. Ask the parents to sign a consent form, as the operation is usually performed 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**

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.

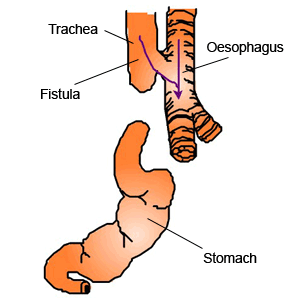
Feed the infant through the gastrostomy tube and ensure maintenance of fluids and electrolytes. Postural drainage should be carried out on a regular basis to prevent chest infections. Analgesics and antibiotics should be administered as ordered.

**Oesophageal Fistula**

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.

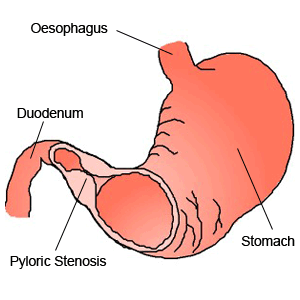
Advise the parents to monitor the child's progress, especially where difficulties with feeding and swallowing are noted, when the child must be returned to hospital immediately without delay.

**Congenital Pyloric Stenosis in Infants**

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**

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.

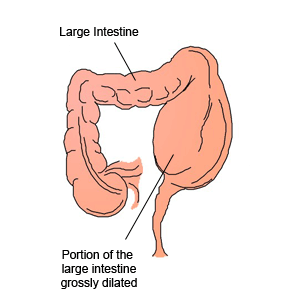
Postoperatively, the intravenous infusion is continued for a few more days, vital sign observations taken and recorded frequently and antibiotics in addition to analgesics are prescribed. You must constantly observe and report regularly the bowel action and the size of the infant’s abdomen for   
any distension.

**Megacolon (Hirschsprung’s Disease)**

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.

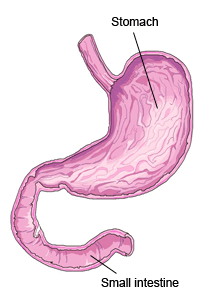
You should prepare and nurse the child as for any other patient who has undergone abdominal surgery including colostomy.

**Diarrhoeal Diseases**

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**](file:///C:\JEREMY\Module%201%20General%20Nursing\Unit%204%20Part%202%20Paediatric%20Nursing\pages\pg20060317062756460.html)

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**](file:///C:\JEREMY\Module%201%20General%20Nursing\Unit%204%20Part%202%20Paediatric%20Nursing\pages\pg20060317062756460.html)

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)**

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)**

**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**

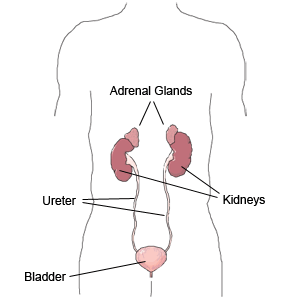
Tapeworm can be prevented if all beef and pork is eaten only after it has been fully and thoroughly cooked. Cooking destroys the infective stages of the tapeworm, which are in the meat (muscles) of the intermediate hosts (cattle or pigs).

**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**

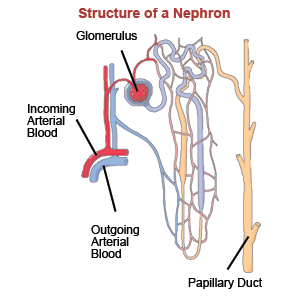


**Objectives**

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)** 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.

Paracetamol and brufen may be prescribed for pyrexia. Antibiotics, usually penicillin V or benzyl penicillin, are recommended for sore throat or any respiratory diseases. One or two doses of frusemide   
(a diuretic) will often help to reduce the oedema.

**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.

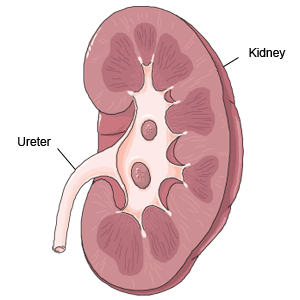
Complications can include:

* Severe hypertension
* Cardiac failure due to increased blood volume
* Convulsions
* Acute renal failure with raised urea and creatinine levels

**Nephrotic Syndrome**

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**

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)**

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

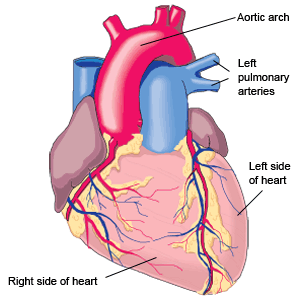
As with the other systems, cardiovascular problems may be congenital or acquired.

**Congenital Heart Failure**

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**

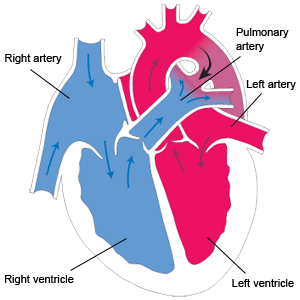
There are several types of heart defects.   
These include:

* 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.

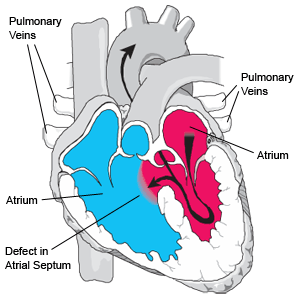
**Atrial Septal Defect (ASD)**

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:

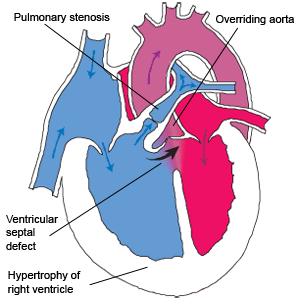
* Growth failure in severe cases but could be normal in   
  mild cases
* Cardiomegally, more marked on the left side of the heart
* The patient is fatigued due to exercise intolerance
* Dizziness and fainting may occur
* Pulmonary oedema may be experienced
* Chest pain and cardiac murmur

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**

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**

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.

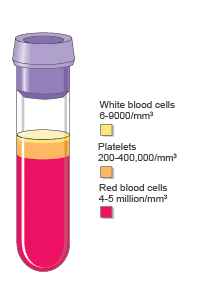
**Medical Treatment**  
Good nursing care is the most significant remedy for this patient. However, several drugs may be given, mainly to control pain and for prophylaxis. Antibiotics, such as penicillin V, or amoxil as prophylactic, are commonly used. Analgesics, such as aspirin or brufen, may be the 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**

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.

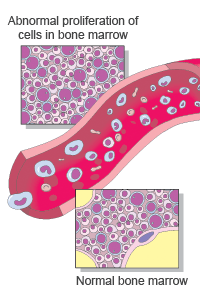
**Haemorrhagic Anaemia**

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.

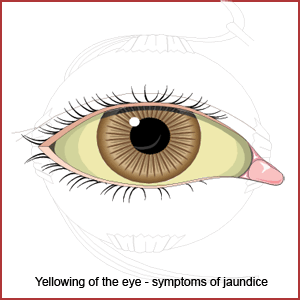


* Suppression of the bone marrow to produce adequate red blood cells
* Primary bone marrow failure of unknown root
* Toxic preparations, including drugs like chloramphenical and phenylbutazone
* Metallic substances, such as lead and gold also fall under this category
* Chronic or extensive infections 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



**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

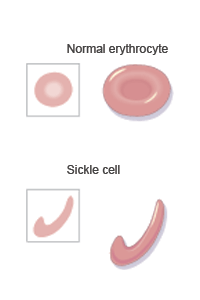
Sickle cell anaemia is a congenital genetic disease, which is transferred from parents to their offspring. The parents do not necessarily have to suffer from the disease but may be able to carry and pass the abnormal gene. The sickle celled red blood cells have very short life span of approximately 20 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)**

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](javascript:glossaryWin('TPR','Temperature,%20Pulse,%20Respiration','ltr');) 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**

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)**

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

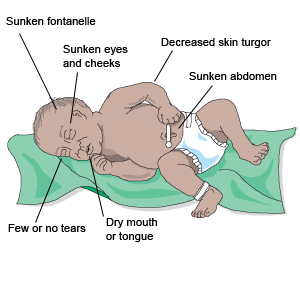
**Causes of dehydration**

* 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](javascript:glossaryWin('ORS','Oral%20Rehydration%20Salts','ltr');).

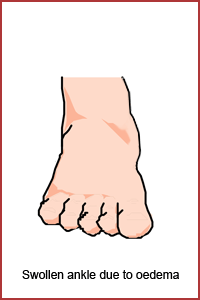
Moderate and severe dehydration may have to be managed in the following manner. Solid foodstuff and milk may have to be suspended temporarily to rest the alimentary tract in the case of diarrhoea and vomiting. Oral fluid (ORS) should be administered in small amounts at regular intervals. A liquid diet 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.



**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**

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**

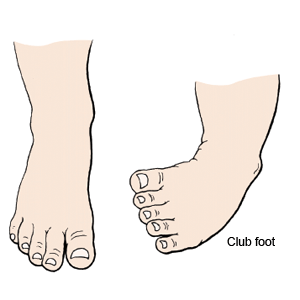
**Talipes**

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**

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.

**Joints and Muscle Disorders**

**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

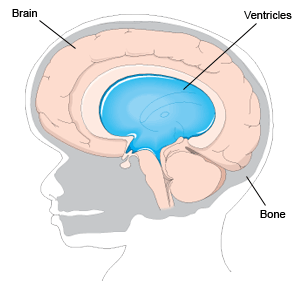
You will start with the congenital abnormalities related to the nervous system.

**Hydrocephalus**

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. **Mild**, which affects only the defective bone.
2. **Naevus** (or hairy patch), which is a depression covered by hair over the spinal defect and can easily be missed.
3. **Severe abnormality**, which is further sub divided into two categories. The first is meningocele, which is a condition where the meninges are herniated (protrude) and the sac contains CSF. The second is meningomyelocele, which is the protrusion of the meninges, nerve tissue and cerebral spinal fluid.

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**

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**

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)**

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**

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**

**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 proneto 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**

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**

**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**

**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.