EPI(K)

IMMUNIZATION

Contents

ABBREVIATIONS

AD	Auto-disable
BCG	Bacille Calmette – Guerin vaccine
CRS	Congenital rubella syndrome
CSD	Child survival and development
DVI	Division of Vaccine & Immunization
EPI	Expanded Program on Immunisation
FEFO	First expire first out
FIFO	First in first out
IPV	Inactivated polio vaccine
KEPI	Kenya Expanded Program on Immunization
MCH/FP PHC	Mother and Child Health/Family Planning and Public Health Care
MMR	Measles/Mumps/Rubella vaccine
NNT	Neonatal Tetanus
OPV	Oral polio vaccine
PHC	Primary Health Care
TB	Tuberculosis
TT	Tetanus toxoid
UCI	Universal Child Immunisation
UNICEF	United Nations
VAD	Vitamin A deficiency
VAPP	Vaccine associated paralytic polio
VVM	Vaccine vial monitor
WHO	World Health Organization

Specific Course objectives

By the end of the course you should be able to:

- Define some common terms applied in immunization
- Describe the EPI concept
- Describe the KEPI policy issues
- Describe the KEPI immunization schedule
- Explain how the cold chain system operates
- Explain what is involved in preparation of vaccination services
- Explain the community mobilization and involvement process
- Describe the prevention of various immunizable diseases
- Describe the travel medicine immunization process.

National Immunisation Coverage And Target Setting

Definition of Terms

Immunization: the process of reinforcing someone's immune system by the use of vaccines or related substances.

Immunity: the ability of the body to resist harmful disease organisms.

Antigen: is any substance which is capable, under appropriate conditions, of inducing a specific immune response. Antigens may be soluble substances, such as toxins and foreign proteins, or particulate, such as bacteria and tissue cells.

Antibody: Antibody is a special protein (immunoglobulin) found in tissue fluid and blood serum. It is produced in response to specific antigen for protection against specific antigen.

Prophylaxis: the administration of drugs or vaccines for prevention and not for curative purposes.

Natural immunity: When organisms invade the body, the white blood cells called **lymphocytes** identify the organisms or products referred to as the **antigen**. The body then produces antibodies to fight the antigens. This is referred to as natural immunity.

Artificial immunity: This is the type of immunity given through **vaccine** administration. A

vaccine will stimulate a protective immune response that will prevent disease in the vaccinated person if he gets into contact with the corresponding infectious agent

Vaccine: A vaccine is made of an organism or a toxin which is either killed or **attenuated**.

Attenuated: reduced power of virulence of micro-organisms - deprived them of their pathogenic properties without killing them, or inactivating their antigenicity properties. This means it is harmless. However, its antigenicity will be identified by lymphocytes and this will induce the production of antibodies.

Passive immunity: this is when one is protected temporarily by use of "borrowed" antibodies. It is common especially to newborn babies who utilize antibodies from their mother's immune system in the early months of life before they process their own.

Hard immunity: This develops when a high proportion of the community, 80% or more, have been immunized. A protective effect is developed for the few who have not been immunized in this community.

Expanded Immunisation Concept

It is estimated that in the world millions of children die as a result of diseases such as tuberculosis, measles, tetanus, diphtheria, whooping cough, Hepatitis B, HIB – meningitis, pneumonia, yellow fever and vitamin A deficiencies. Many more children become disabled through brain damage, paralysis, stunted growth, chronic lung diseases, deafness and blindness caused by these diseases which could be prevented through immunisation.

Child survival and development (CSD) has been negatively affected world wide by diseases of childhood that are vaccine preventable. Immunisation has proved to be a cost – effective weapon in the control, prevention and even elimination of these diseases.

Great success has been associated with the improvement of child health through the reduction of childhood vaccine preventable disease that had previously been the major cause of morbidity, mortality and disability.

Immunisation breaks the cycle of infection – diarrhoea - malnutrition – infection, thus extending its impact beyond the prevention and control of individual diseases.

It was in the light of this that the World Health Organization (WHO) identified the following as the way forward:

- Increased immunisation coverage
- Use of potent vaccines
- Training health workers who offer immunisation services
- Availing human and material resources for immunisation activities
- Community participation in the programme.
- Monitoring and evaluation

Due to this felt need the WHO, UNICEF and other agencies came with strategies to strengthen, improve and expand the existing immunisation services and thus the basis for the WHO Global Expanded Program on Immunisation (EPI).

Main Aim of the Expanded Program on Immunisation

The main aim of the Expanded Program on Immunisation is to make immunisation complementary to other Primary Health Care (PHC) services in order to reduce morbidity, mortality and disability from the vaccine preventable diseases of childhood.

Objectives of the Expanded Program on Immunisation

The objectives of the Expanded Program on Immunisation (EPI) are to:

- Provide immunisation against the EPI target diseases and Tetanus toxoid for pregnant women or women of child – bearing age.
- Promote immunisation programmes, including vaccine production and quality control.
- Intensify implementation of the immunization activities and sustainability within the framework of the maternal and child health services.

The Kenya Expanded Programme on Immunisation (KEPI)

Kenya is a member of the WHO and thus following the EPI programme initiative. The government adopted the Programme and called it the Kenya Expanded Programme on Immunisation (KEPI).

The Objectives of KEPI

KEPI aims to achieve:

- Immunisation of at least 95% of all children fully before the age of 1 year
- Eradication of poliomyelitis
- Eradication of Neonatal tetanus
- Control of measles.

The Components of KEPI

As the programme expands, it will improve existing immunisation activities through effective management, that is decentralisation from the National, down to the community level. To achieve this effective management, KEPI has developed the following operational components.

1. Integration

Integration of KEPI with maternal and child health services was done from the outset.

2. Training

The objective aimed at improving the knowledge and skills of health workers. Training was to be done at senior, supervisory and operational levels.

3. Social Mobilisation

Social mobilisation is one of the most important activities of the programme. To achieve the KEPI objectives, we need to convince families to bring children for immunisation so as to increase community involvement and participation.

4. Disease Surveillance

Surveillance is the collection and analysis of data for action. This is done through routine reporting, sentinel reporting and surveys.

5. Cold Chain System

The cold chain is a system of keeping vaccine cold and in a potent state from the manufacturers' level until it is administered to a child or a pregnant woman. A break in the cold chain system will render vaccines useless.

6. Monitoring and Evaluation

Monitoring and evaluation of all aspects of the programme at all levels are designed as on- going functions.

7. Logistics and Supplies

This includes vaccines, child health cards, reporting forms, cold chain equipment, transport, gas, syringes, needles, etc. The health workers should maintain the equipment to prolong its use.

8. Supervision

Meaningful supervision at district levels to be carried out by use of "checklists" and feedbacks provided.

Kenya's Policy on Immunisation

Each country has an immunisation policy, which usually follows the general guidelines developed by WHO. These policies enable a country to standardise immunisation procedures and practices. The policy in Kenya is to:

- Integrate immunisation activities into the MCH/FP PHC framework.
- Use one sterile syringe and needle per injection to prevent cross – infection.
- Use potent vaccines kept at 2^0C to 8^0C.
- Maintain cold chain at all times – monitor the refrigerators, twice in the day, that is, morning and evening, and keep vaccines on reconditioned ice packs during vaccination sessions.
- Discard all opened vaccines, especially the live attenuated vaccines such as measles, BCG within 4 – 6 hours after opening.
- Offer daily immunisation from 8 am – 5 pm at fixed posts and supplement that by outreach services.

If you answered the questions successfully we congratulate you. If some were difficult to remember, read the specific content and try to answer the questions again. Once that is done, you can proceed to the text on immunisation schedule.

National Immunisation Schedule (KEPI)

The Kenya Ministry of Health has set the various schedules for specific immunisations as summarized in the Tables 1 - 3.

Table 1. The National Childhood Immunisation Schedule.

AGE OF CHILD	VACCINE	DOSAGE	ROUTE
At birth or before two weeks	B.C.G. Birth polio	0.05mls (under 1year) 0.1 mls (over 1 year)	Intradermal Intradermal
At 6 weeks (1 ½ month) or soon after	Polio (OPV1) DPT, Hep B,HIB. *(Pentavalent) 1	2 drops 0.5 mls	Oral Intramuscular.
At 10weeks(2½ months or soon after	Polio (OPV 2) DPT, Hep B, HIB. *(Pentavalent) 2	2 drops 0.5 mls	Oral Intramuscular
At 14weeks (3½ months) or soon after	Polio (OPV 3) DPT, Hep B,HIB *(Pentavalent) 3	2 drops 0.5 mls	Oral Intramuscular
At 9 months or soon after	Measles Yellow fever	0.5 mls 0.5 mls	Subcutaneous
At 6 months or soon after	Vitamin A	1,000,000 IV	Oral
Give vitamin A every six months from 6 months to 5 years	Vitamin A	2,000,000 IV	Oral

Take Note

1. *In Kenya Yellow fever vaccine is given only in Koibatek, Keiyo, Marakwet and Baringo Districts of Rift Valley Province.*

2. *Primary vaccinations should be completed before the first year of life.*

3. *Pentavalent is a terminology that is used to refer to the combined vaccine for DPT, Hepatitis B and HIB.*

Study carefully Figures 1 to 5 which illustrate the different needle positions and sites for subcutaneous, intramuscular, introdermal and intravenous injections.

Let us now study the schedules for immunisation against tetanus applicable to pregnant women or for wounds and injuries in general.

Table 2. Tetanus Vaccination Schedule For Pregnant Women

GRAVIDA	DOSE	WHEN GIVEN
1st pregnancy	1st T.T. Dose	Fourth to sixth month of pregnancy (2nd Trimester)

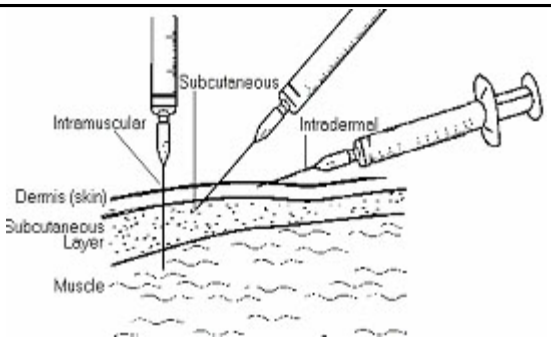


Fig 1 — Different Needle Positions

Fig 2 — Site and Position of Child in Intramuscular Injection in Infants

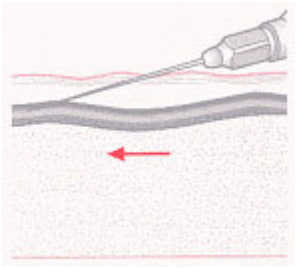


Fig 3 — Intravenous Injection

Fig 4 — Subcutaneous Injection

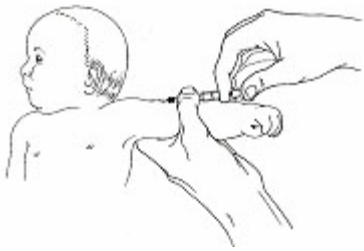


Fig 5: Intradermal injection

	2nd T.T. Dose	1 month after 1st Dose (5th & 8th month of pregnancy)
2nd pregnancy	3rd T.T. Dose	Between 4th – 8th month pregnancy
3rd pregnancy	4th T.T. Dose	4th – 8th Month pregnancy
4th pregnancy	5th T.T. Dose	Between 4th – 8th month pregnancy
Subsequent pregnancies	DO NOT GIVE T.T. VACCINE	

Table 3. Immunizations for Wounds/ Injuries

	Administration schedule	Duration of immunity conferred
1st T.T. Dose	At 1st contact or at least within seven days of the injury	Nil – It primes the immune system (anti –tetanus serum may be added.)
2nd T.T. Dose	One month after 1st T.T.	1 – 3 years protection
3rd T.T. Dose	Six months after 2nd T.T.	5 years protection
4th T.T. Dose	One year after 3rd T.T.	10 years protection
5th T.T. Dose	One year after 4th T.T.	20 years protection.

Take Note

T.T. Tetanus Toxoid is given intramuscular.

Important Facts to Remember about Immunisations

Vaccines are made of attenuated or killed organisms or toxins. This sometimes induces less antibodies than the natural infection and this explains why some immunisations require several doses to stimulate the lymphocytes to produce enough antibodies. For example, Polio and DPT/Hep B HIB require 3 or 4 doses, while tetanus toxoid for the mother requires 5 doses at least.

Furthermore, there is an optimal age for each vaccine. BCG and Birth polio are given at birth. On the other hand, DPT/Hep B HIB should be given at 6 weeks, because if it is given earlier, it will not provide protection.

The Measles vaccine should not be given before nine months because of remaining maternal antibodies that lower its efficacy.

The three doses of DPT/Hep B/ HIB and OPV must be given one month (4 weeks) apart to let the child's immune system process the previous dose and give the best antibody response. However, the vaccine will be effective if given after four weeks, but the sooner the baby has been given all doses, the earlier the baby is protected. Encourage the mother/ guardian not to forget the next appointment.

If a child is seen for the first time later than the scheduled age, such child must catch up with the immunizations. For example, if the child is 3 months old, give BCG, OPV, DPT/Hep

B/HIB immediately and explain the need of another appointment 4 weeks later. However, If the child is 9 months or older, give BCG, DPT/Hep B/HIB, OPV and measles vaccines at once. All the vaccines for which the child is eligible at an earlier age can be given together anytime you are in first contact with the child.

There are few contra- indicators to immunisation. All eligible children should be immunized even if they are sick. If a child requires admission, the decision is left with the admitting officer but no child should be discharged from the hospital without having its immunization status checked.

> **Take Note**
>
> BCG and Yellow fever vaccines are not given to infants who exhibit the signs and symptoms of AIDS. However, other vaccines should be given

You have to memorize the schedules so as to be effective in your service provision.
You have to keep in mind the immunization facts at all times.

Section 2: Providing Vaccinaton Services

In this section we are going to discuss what you need to do so as to provide high quality vaccination services for your target population. Let us start first by explaining what we mean by target population.

Target Population

The number of children that need immunization in a catchments area is the "target population". The aim is to protect all these children, if possible 100%. To be able to calculate how many children need immunization, you need to know the number of children born each year in the catchments area, as these are the new children that will require immunization.

A catchments area is a term that refers to the geographical region and the population within the region, that a health facility is mandated to serve. In Kenya, one can assume that the number of children born in any catchments area is 4% of the total population.

Determine the target population in the following communities.

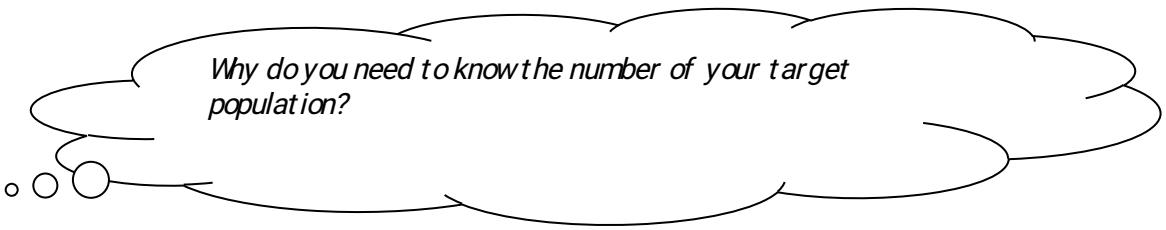
a) Kanga community with a total population of 24,000,
b) Kijani community with a population of 42,000,
c) Vinjar community with a population of 88,000,
d) Nyakijiji community with a total population of 164,000

Let us consider the Kanga community. The total population in the location is 24000.
Therefore, the number of children 0 – 12 months old to be immunized is 4% of 24,000, that is:

$$\frac{24{,}000}{100} \times 4 = 960$$

So, each year approximately 960 children will need immunization. This is the yearly **target population** for that community.

Now calculate the target populations for the other three communities.



The target population is used to calculate the requirement of vaccines, syringes and needles

at the national, regional, district vaccine store and at the Health Facility.

Find out the number of doses contained in each vial of
a) BCG vaccine
b) OPV
c) Pentavalent
d) Measles.

Determining Vaccination Coverage

For effective monitoring and evaluation of the immunization services in a community it is jimportant to determine the vaccination coverage rate. This mainly indicates how many children or mothers were actually immunised in comparison to the targeted population. The vaccination coverage rate is determined using the following formula:

$$\frac{\text{Number of doses of vaccine given to children under one year of age}}{\text{target population of children under one year of age}} \times 100$$

This will then give you the percentage of the target population covered with the vaccine.

If Janja community had used 2,400 doses of Pentavalent 1 on children below one year during the year 2005, while their target population was estimated at 2800, find out the percentage coverage of Pentavalent vaccine for that year.

Using the formula above you will get:

$$\frac{2400}{2800} \times 100 = 86\%$$

This community has a good coverage percentage since the national policy targets 85% coverage.

1. Kalaze community has a population of 88,000 people.
   a) Determine the immunization target population
   b) Determine how many doses were administered if the coverage that year was estimated at 72%

2. Halide community had a population of 104,000 people.
   a) Determine the immunisation target population
   b) If only 67600 doses were administered during the year,

determine the
immunisation coverage percentage
c) If the targeted national level of coverage is 85% what is the
community coverage failure rate.

Preparation of Vaccine Service Delivery Site/Facility

The service delivery site/facility for vaccination could be in a health facility such as a hospital, dispensary or clinic. In some communities due to inaccessibility of the health facility, mobile services are offered and the vaccination services may be provided at a community hall, a classroom or under a shade. However, in all these sites/facilities, the following conditions should be observed:

- The area should be clean, and not directly exposed to sunlight, rain or dust.
- The place should be easily accessible, not overcrowded.
- It should be convenient for the Health worker who is preparing and giving doses of vaccines.
- It should be quiet enough for the health worker to be able to explain and give advice before administering the doses of vaccines.
- There should be a table to arrange vaccines/ injections and any equipment on.
- There should be chairs for the health worker and the mother to sit.
- The place should be spacious enough for registration, history taking, weighing, counselling, immunization, health education, treatment, antenatal care, postnatal care and family planning to take place.
- There should be adequate space to keep records tools such as child health care card, tally sheets, permanent registers, and summary sheets.
- The care provider should be equipped with sufficient supplies of syringes, needles, gloves, disinfection equipment and a safety box among others.

Setting Up an Immunisation Session

What factors do you need to consider when setting up an immunisation session? List them down then compare your answers to the discussion below.

While setting up an immunisation session the health care worker should:

- Condition the ice packs to prevent sensitive vaccines from freezing.
- Take the vaccines and diluents out of the refrigeration. Decide how many vaccines you will require before you open the refrigerator.
- Check if vaccines are safe by re-confirming expiry dates on labels and the vaccine vial monitor (VVM).
- Prepare the vaccine carrier – by placing the conditioned ice – packs, place the vaccines, diluents, a thermometer into the vaccine carrier and close the lid tightly.

Precautions for Preventing Cross Contamination

In a bid to prevent cross contamination of especially blood-borne diseases from one child or mother to another, the following precautions are recommended:

- Use a new sterile standard or safety syringe and needle from a sealed pack for each injection. (Auto disable syringe).
- Never re-use disposable syringes.
- Use a sterile syringe and needle for reconstitution of vaccines.
- Dispose used syringe and needle into a safety box.

Remind yourself what you have covered by answering the following questions:

- *What is a target population?*
- *What is a catchments area?*
- *In a normal population, what is the estimated percentage of children below one year of age in Kenya?*
- *State the factors you have to consider when selecting a vaccination site/facility.*
- *What precautions would you take to avoid or minimize cross infection?*

Assessing Infants and Women and Recording the Findings

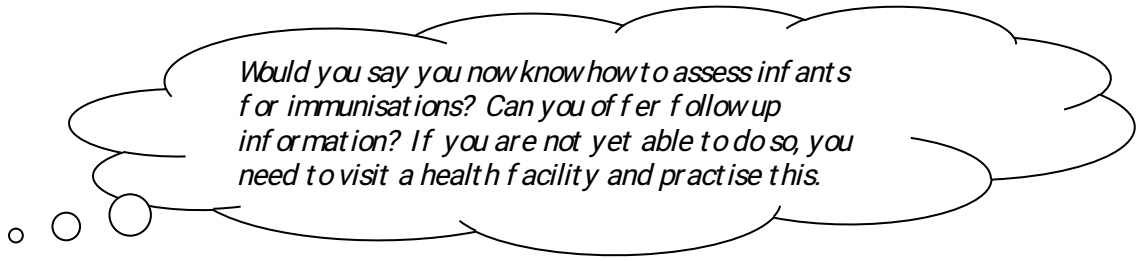
Many a times we forget to assess the infants when they are brought for vaccinations. Emphasis should be especially for those coming for the first time and more so those born at home. During the assessments you should not forget to do the following:

- Determine the infant's age.
- Determine which vaccines the infant has received.
- Determine all vaccines for which the infant is eligible.
- Assess infant and mother need for vitamin A supplementation.
- Assess women for tetanus toxoid (T.T) immunization.
- Complete the register. This helps health workers keep track of the immunisations services.

Follow Up

The role of the parents is to bring their children for the due vaccines as per the schedule. However, they should be encouraged to do so by the health care workers. Your role is to ensure that:

- All parents know the current immunisation schedule.
- Each eligible child receives all the vaccinations he or she was supposed to receive.
- Parents can tell the possible post vaccination reactions and what to do about them.
- Parents know the return dates and the importance of subsequent immunisations.
- Parents are given the immunisation cards and encouraged to bring the cards at each visit to the health facility either for immunization or when ill.



Records Information

I am sure you are familiar with the saying that in health care services what is not recorded is assumed not to have been done. It is important to record timely, accurately and appropriately, using the correct charts.

This ensures that:

- Children and pregnant women are fully immunized, thus you will achieve the target.
- You can trace defaulters.
- You can assess vaccine needs.
- Appropriate monitoring and evaluation of the vaccination program
- A basis for future predictions and planning for vaccination programs is formed and maintained.

Maintaining Immunization Records

We are now going to look into some immunisation records that you need to open up and maintain.

Child Health Card (MOH 806)

This card should be issued the first time you see the child. Enter the particulars as indicated on the card and give the child an identification number. This is the number that will also appear in the permanent register. This card is very important because it contains all information on:

- Growth pattern
- Immunisation received
- Diseases contracted
- Helps in the continuity of care, especially when a mother moves to a new area.

Daily Immunization Tally Sheet (MOH 702)

Each immunization you perform, you tally on this sheet.

Monthly immunization summary sheet (MOH 710)

This is submitted every end of the month at the district level. It is the summary of the

immunisation performed in that particular month.

Permanent register

Mother and child immunization data is recorded in a hard cover register in which the data are entered on the first visit of the child and then on any subsequent visits. The permanent register helps to identify and trace the defaulters.

Destruction of Opened and Used Vaccines

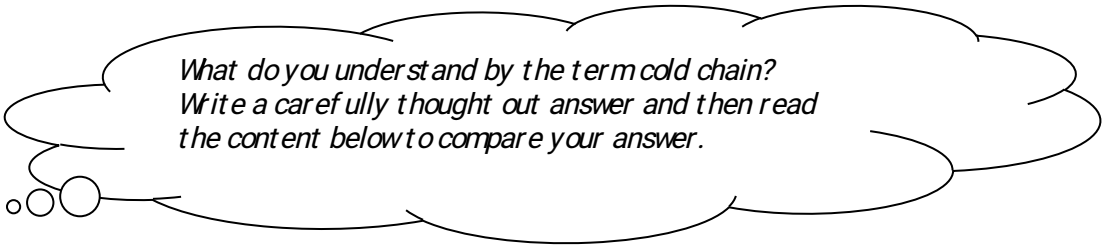
At the end of each vaccination session, unused vaccines should be disposed of in the following ways:

1. Pour vaccines into pit latrines.
2. Burn them.
3. Break the empty vials.

Visit any health facility near you and request to be shown the cards and record sheets that are indicated above so that you can familiarize yourself with them.

We are now going to turn our attention to another very important section in this unit – the cold chain system.

Section 3: Cold Chain And Quality Standard Equipment



General Principles of the Cold Chain System

The cold chain is a system/process of maintaining the vaccine in a potent state from the time it is manufactured and as it passes through various suppliers and stores to reach its final recipient, that is, the mother and child. Vaccines are very delicate and easily loose their potency, when exposed to **high temperature**, **sunlight** or **freezing** conditions. A failure in the cold chain system will make the vaccines useless because vaccine that has lost its potency can no longer protect people from diseases. If such vaccines are given to babies, those babies will not be protected.

> **Take Note**
>
> You cannot tell just by looking with your naked eye whether a vaccine has expired or not.

In order to safeguard the vaccines you have to keep them at the required temperatures of between +2 degrees centigrade and +8 degrees centigrade at all times, starting from the manufacturer till they are administered to mothers and children.

Elements of the Cold Chain System

An efficient cold chain system requires three elements:

- Trained, skilled and motivated staff.
- Efficient and reliable equipment.
- Efficient distribution of vaccines.

Storage Conditions in the Cold Chain System

The cold chain system is standardized world- wide and the recommended procedure is to store the vaccines under the conditions illustrated in Table4.

Table 4: Recommended temperature and duration of vaccine storage in various health care facilities

Vaccine maximum storage level time	Central store Up to 8 months	Regional up to 3 months	Health facility up to 1 month	Transport up to 1 week
MEASLES BCG ORAL POLIO HIB	- 15^0C TO - 25^0C			
DPT/HEP B TETANUS TOXIOD			- 2^0C to +8^0C	

Now study Figure 6 which illustrates a typical cold chain system from the point of manufacture to the consumer level and which indicates the different types of stores and temperatures at which the vaccine has to be kept at all times.

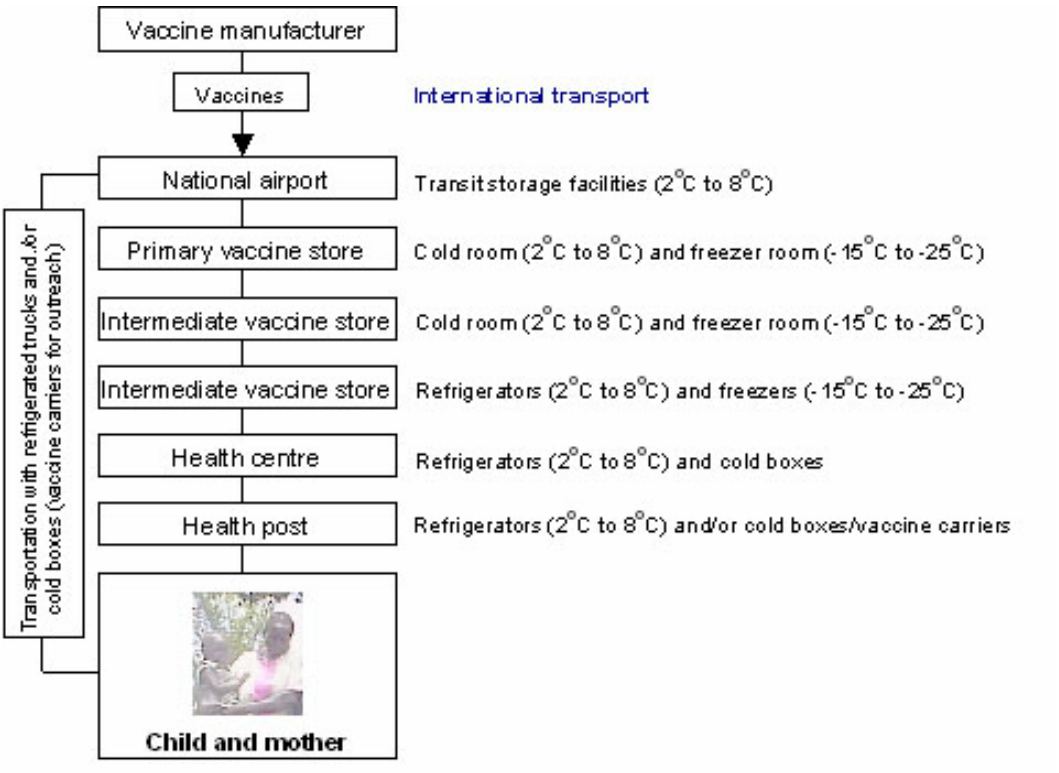


Figure 6: A typical cold chain system

Proper Vaccine Management Conditions

You have to ensure that you handle the vaccines as per their different and specific characteristics. Different vaccines are damaged by different conditions. For example, the polio vaccine is damaged by heat, measles and BCG should not be exposed to direct sunlight as it will damage them, while DPT, TT and HB can be damaged if frozen.

Hence avoid such conditions when handling each of these vaccines.

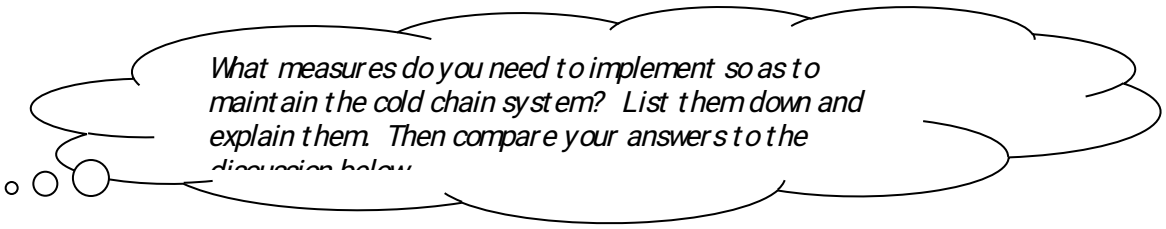
Cold Chain Equipment

The cold chain is maintained by using the following facilities and equipment:

- Cold room and its accessories. This is used for bulky storage at central stores.
- Refrigerators are used mainly for storage at the health facility level.
- Cold boxes are used for storage, especially during transportation.
- Vaccine carriers are only used for temporally storage during short distance transportation and service delivery.
- Ice packs are needed to maintain low temperature in cold boxes and vaccine carriers and placement of vaccines during service delivery.

- Thermometers are needed to monitor the temperatures at all times.

Monitoring of the Cold Chain System



Temperature Recording

This is done twice daily, in the morning and in the afternoon. This is important since any failure in the functioning of the refrigerator will be noticed and immediate action taken. This will save the loss of vaccines and prevent administration of vaccines that might have been exposed to high temperatures.

Cold Chain Monitor Cards (3m)

This is a special rectangular card with 4 oral windows with a "stabilizing strip" at the end. The monitor has a heat sensitive indicator in the form of strip with 4 windows stuck to it. This indicator operates at temperatures of 10^0C and above 34^0C. It detects cumulative heat exposure above the stated temperatures.

Vaccine Vial Monitor (VVM)

A vaccine vial monitor (VVM) is a label made of heat – sensitive material that is placed on a vaccine vial to register cumulative heat exposure over time. The combined effects of time and temperature cause the monitor to change colour gradually and irreversibly. VVM can be used on vaccine vials or the ampuole. Now study Figure 7 which illustrates how the VVM indicates whether you can use the vaccine or not.

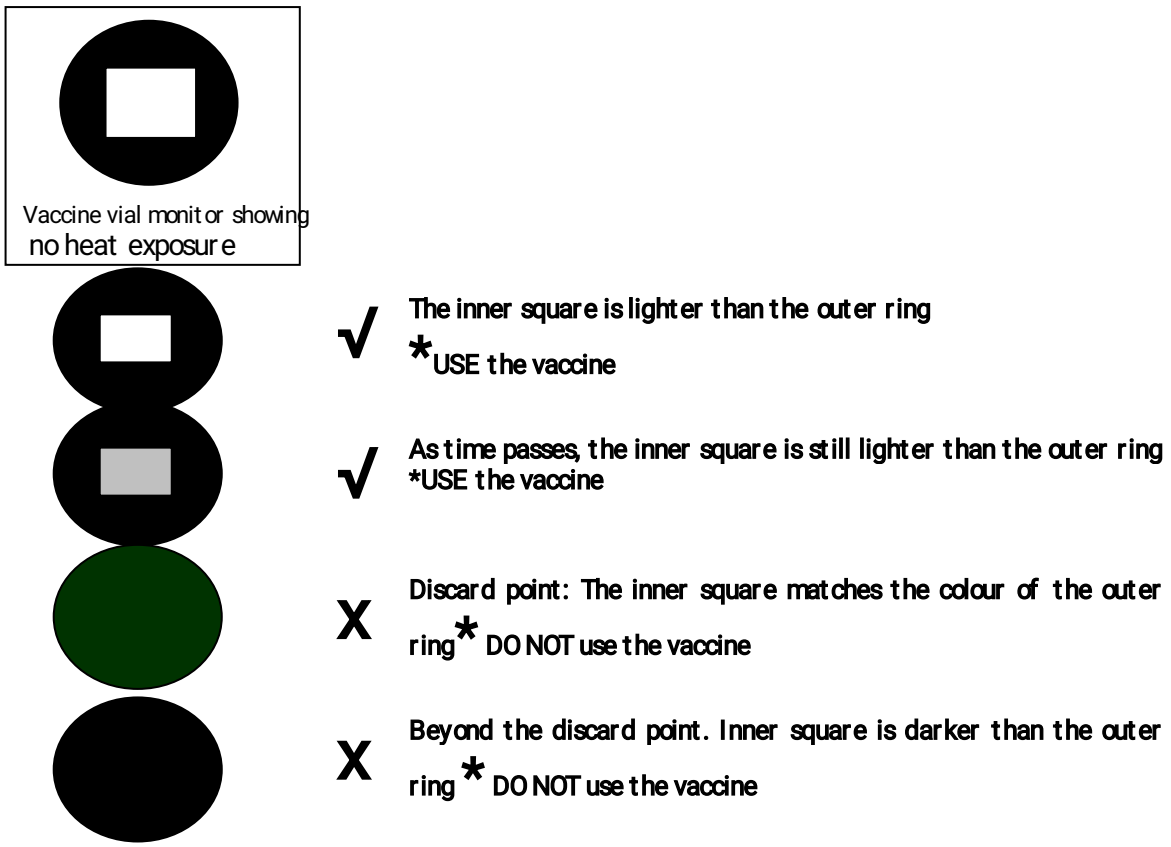


Figure 7: An illustration of VVM

The Freeze Watch Indicator

The freeze watch indicator tells you when the vaccine has been exposed to freezing temperatures. It is useful in detecting vaccines such as DPT, TT, HEP B that should not be frozen. If these vaccines have been frozen, they must not be used as they will have lost their potency.

Shake Test

This is a simple test that can be easily done at every stage of the cold chain and is used mostly in testing TT vaccines. The sedimentation rate of a suspect vial is compared with a similar Tetanus Toxiod vial that is known to have been stored at the correct temperature. Shake the two vials vigorously and inspect carefully in strong light.

General Rules for Storing Vaccines in a Refrigerator

The coldest part of the refrigerator is the freezing compartment. It is used to store ice packs for freezing. Never store DPT/ HEP B, TT in the freezing compartment. They lose their potency at very low (freezing) temperature.

The lower part of the refrigerator keeps the temperature low but does not freeze the vaccines. This is where you should keep both vaccines and diluents. Place the vaccines neatly in piles and leave enough space all around to allow for free air circulation.

Do not keep any vaccines on the door shelves or on the bottom shelf. Always use the oldest vaccine first. This is known as the "first in, first out" principle (FIFO).

The refrigerator must be level, at least 12 inches away from the wall, to allow free air circulation. Place the refrigerator away from direct sunlight.

QUALITY STANDARD EQUIPMENT

For the purpose of maintaining high quality of service, all health facilities must comply with certain standards.

Equipment, Materials and Supplies Inventory

Each health facility must at all times have the following:

- Immunization Permanent Register – 1 in use.
- Tally sheets (MOH 705) – 100 copies.
- Summary sheets (MOH 710) – 6 blank copies.
- Child Health Cards (MOH 706) – 100 blank copies.
- Cold Chain Temperature Monitoring Sheets – 12 blank copies.
- IDSR case – based reporting forms – 20 blank copies.
- Vaccine ordering forms – 12 blank copies.
- Immunization monitor charts – 2 (1 in use, 1 reserve)
- AEFI monitoring forms – 20 blank copies.
- Supervision book – 1 in use.
- Standard disease case definition poster – 1 (displayed)
- Lay disease case definition poster – 1 (displayed)
- Vaccine management guidelines – 1 copy
- Performance management handbook – 1 copy

- Thermometers – 2 (1 in refrigerator and 1 in the vaccine carrier)
- Vaccine carriers – 2
- Auto – disable (AD) syringes – 300
- Reconstitution syringes – 100

Each health facility must at all times comply with the following.

:

- All used tally sheets and summary sheets must be orderly filed (by month and year) and stored for at least 3 years before disposal.
- Each health facility must have at all times, a micro – plan for EPI.
- Number of doses of each vaccine in stock at all times must be within the minimum and maximum stock levels for the health facility. A copy of the vaccines forecast sheet for the current year should be pasted on the vaccine refrigerator.
- All vaccines vials not in use should be stored in fridge or vaccine carrier ($+2^0$C to $+8^0$C).
- Vaccines should be kept in trays inside the refrigerator in order to protect them from heat and light sensitivity
- Polio, BCG and measles vaccines should be kept in the coldest part of the refrigerator.
- DPT+ HepB+Hib and Tetanus Toxoid must never be frozen.
- The Vaccine refrigerator temperature must be monitored twice every day (morning and evening) including on weekends and public holidays. The temperature reading should be recorded on the "Cold Chain Recording Chart" pasted on/near the refrigerator.
- Vaccine taken out for outreach should be stored separately and used at the earliest opportunity.
- Use of vaccines should be based on "First Expiry First Out" (FEFO) basis.
- The empty vaccine vials must be destroyed immediately through burning or incineration where possible and appropriate forms filled immediately.
- No vaccine vials with VVM that has reached discard point must be stored in the refrigerator.
- No vaccine vials which have exceeded their expiry date must be stored in the refrigerator
- No reconstituted vials of the following vaccines must be found in the refrigerator – Measles, Yellow Fever, BCG, HIB.
- The number of vials of measles vaccine in stock must equal the vials of measles diluents.
- The number of vials of BCG vaccine in stock must equal the vials of BCG diluents

available.

- The number of vials of DPT – HepB vaccine in stock must equal the vials of HIB available.

Answer the following questions:

- What is cold chain?
- Name the elements of an effective cold chain system.
- State the appropriate environmental conditions for each vaccine.
- How do you monitor that the cold chain does not break at any stage?
- List the mandatory requirements for a health facility that offers vaccination services.

Section 4: Community Mobilization And Involvement

In this section we are going to discuss how you can involve the community in your immunisation campaigns, how to improve your communication skills, and how to identify your target groups. I hope that this section will be informative and useful to you in your work. Let us start by explaining why it is so important to involve the community in our vaccination work.

Importance of Community Mobilization for Immunisation

Even if you develop and maintain the best physical and materials infrastructure for immunization services, if the community does not make use of them, then you have failed. This is because the ultimate objective of these services is the reduction of the vaccine preventable diseases of childhood, commonly referred to as EPI –target diseases. So, if the parents do not bring their children to you for immunisation, then you cannot reduce the vaccine preventable diseases of childhood.

A review of many countries' EPI –programmes revealed that it is unlikely that Universal Child Immunization (U.C.I) will be attained unless the programmes moved faster, or in other words, there is need for Programme Acceleration, with an aim of raising the immunization coverage for the eligible children and at the same time reducing the drop –out rates.

To achieve effective programme acceleration and a reduction of the drop –out rates, community participation is indispensable. The community needs adequate and correct information. People cannot participate in what they do not know, believe in or practice. Hence, there is need to inform through social mobilization, families and communities of the potential benefits of immunization. In social mobilization the health worker ought to be knowledgeable and skilful in communicating with the service users. A parent who has brought a child for immunization should be informed what immunization the child has just received, the possible side effects and what to do if such side effects arise. The health worker should also motivate the parent to bring the child for a return visit and clearly give a date for a return visit.

Communication Skills

Face to face communication has been known to be the most effective way of communicating as it allows for interaction and instant feedback. Health workers should have good interpersonal communication skills since they are known to be the most important and credible source of information on immunization for the mother. Therefore, it is crucial for health workers involved in immunisation activities to enhance their communication skills, so as to be able to motivate mothers to return to complete all immunisations.

The experience of the mother at the health facility will determine to a large extent whether or not she will return. For instance, if she came across a rude health worker, this will put her off.

The following guidelines will help health workers communicate better with the mothers:

- Be polite and helpful.
- Make the mothers feel comfortable and at ease.
- Use simple language in explaining issues. Avoid medical jargon.
- Listen to and encourage mothers to talk of their experience and concerns and encourage them to ask questions.
- Ask them "open" questions. Avoid questions that require a "yes" or "no"
- answer.
- During your discussions, use teaching aids, such as hand outs, audio tapes, charts, posters and actual objects like vaccine vials that will help make your explanations clearer.

Before the parent leaves the facility, the health worker should establish that they know the following information:

- Which vaccine(s) was administered
- The disease (s) it protects against
- Which side effects to expect and what to do about them.
- The date of return
- Importance of taking care of the child health card and bringing it at every subsequent visit.

Target Groups

Some of the target groups that have been identified for social mobilization include:

- Women groups
- Men, especially fathers (in barazas)
- School children
- School teachers
- Administration personnel
- Politicians
- Extension workers
- Community health workers
- Traditional birth attendants
- Health workers
- Religious groups

Key Immunisation Messages

The following are some powerful immunisation messages that you could use in your immunisation campaigns:

- Immunisation – a chance for life for every child.
- An immunized child is a protected child.
- Immunizing your child saves time and money.
- Love them, protect them, immunize them.
- A good mother has her children immunized.
- Immunisation prevents disease – do not wait for your child to get sick..
- Has your brother/sister been immunized?
- Every healthy child must have an up to date immunisation card.
- If you love your children, have them immunized.
- Every child due for immunisation must be immunized even if unwell.

Channels of Communicating Messages

Some of the most effective channels of communicating your key messages and which reach a wide range of people are:

- The printed mass media.
- Electronic media.
- Radio, television.

Inter – personal channels include:

- Individual counselling,
- Group talks at the health facility
- Barazas, women groups meetings, workshops, adult education classes, schools and churches
- Use of school children – known as "child to child" project, children are asked to tell their parents and motivate them to take children for immunisation
- House to house visits by community health workers.

MISSED OPPORTUNITIES

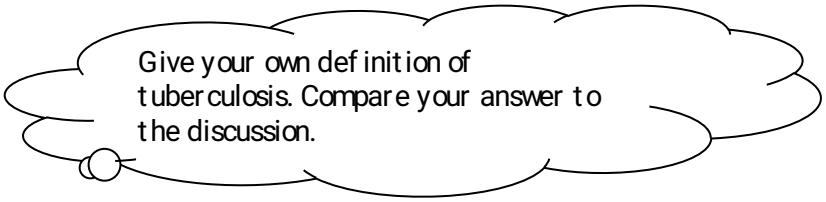
A missed opportunity for immunisation occurs when any eligible child or woman comes to a health facility and does not receive any or all of the vaccine doses for which he or she is eligible. The opportunity to immunize eligible children is missed when:

- The health facility does not offer immunization services.
- The health workers do not routinely screen children and women for their immunisation status and do not offer the recommended vaccines.
- The health workers do not give all the vaccines for which the children and women are eligible at the time of the visit.

Section 5: KEPI IMMUNIZABLE DISEASES

In this section we are going to look into the characteristics and immunisation schedules of some childhood diseases, all of which are covered by KEPI. We shall start with Tuberculosis.

TUBERCULOSIS



Tuberculosis (TB) is caused by the bacterium Mycobacterium tuberculosis which usually attacks the lungs but can also affect other parts of the body, including the bones, joints and brain.

The symptoms include:

- Persistent cough
- Coughing up of blood and chest pain
- General weakness
- Weight loss
- Fever and night sweats

In young children the symptoms include:

- Cough, usually for more than two weeks
- Fever, irregular and recurrent
- Loss of appetite
- Loss of weight

- Night sweats
- Lymphadenopathy

Prevention and Control of Tuberculosis

The control of tuberculosis depends on case finding, chemotherapy and immunisation.

Case Finding

This is based on detecting cases, who are infected and have the disease, through a clinical, radiological and laboratory evaluation.

Chemotherapy

Early diagnosis and treatment of those infected should be emphasized. Patients should be educated on the importance of completing the course of the anti –tuberculosis drugs even after the child has started feeling better..

Immunisations

The vaccine against Tuberculosis is BCG (Bacille Calmette –Guerin vaccine). It is a live attenuated vaccine developed from mycobacterium bovis. BCG can protect against TB meningitis and other forms of TB in children less than five years old.

Administration

The BCG vaccine comes in powder form. It must be reconstituted with diluents before use. The BCG vaccine should be kept at 2^0C - 8^0C. Any remaining reconstituted and unused vaccine must be discarded after six hours.
The dosage is 0.05 mls to newborns and infants. 0.01 mls is given to older children.
It should be given intradermally. In Kenya the BCG vaccine is given on the anterior – lateral aspect of the upper one third of the left forearm.

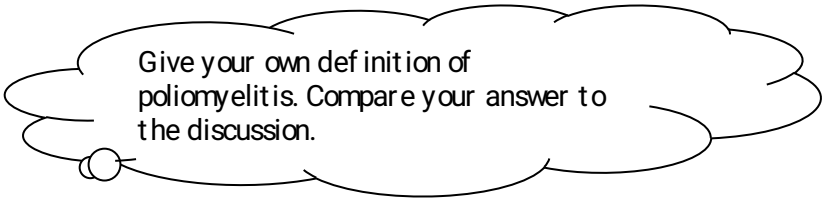
During the intradermal injection one should raise a weal of about 6mm – 10mm in diameter. This usually disappears within 30 minutes.

After about two weeks a red sore forms. The sore remains for another two weeks and then heals. A small scar, about 5 mm across, remains. This is a sign that the child has been effectively immunized.

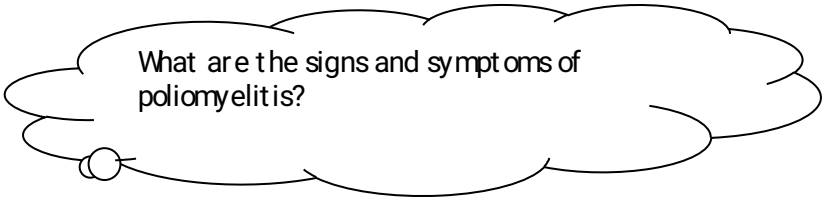
Table 5: Administration summary – BCG vaccine

Type of vaccine	Live of bacterial
Number of doses	One
Schedule	At or as soon as possible after birth
Booster	None
Contraindications	Symptomatic HIV infection
Adverse reactions	Local abscess, regional lymphadenitis rarely, distant spread to osteomyelitis, disseminated disease.
Special precautions	Correct, intradermal administration is essential A special syringe and needle is used for BCG vaccine administration
Dosage	0.05 mls
Injection site	Anterior – lateral aspect of the upper one third of the left forearm.
Injection type	Intradermal
Storage	Between 2^0C - 8^0C

POLIOMYELITIS (POLIO)



Poliomyelitis, or polio is an acute communicable and a crippling disease caused by any of the three polio virus types, namely type 1 (Brunhilde), type II (Lansing) and type III (Leon). It occurs sporadically or in epidemics, usually affecting children aged less than five years of age.



Most children infected by the polio virus never feel ill, but have general flu – like symptoms such as: -

- Fever
- Loose stool
- Sore throat
- Upset stomach
- Headache or stomach ache
- Paralytic polio with mild symptoms and fever
- Severe muscle pain and paralysis
- Difficulty in breathing due to respiratory muscle paralysis

Control and Prevention of Polio

Polio can be prevented through immunisation with oral polio vaccine (OPV) or inactivated polio vaccine (IPV).

OPV is recommended for both routine immunization and supplementary campaigns for polio eradication. IPV is also an effective vaccine. But OPV is less expensive, safe and easy for health workers and volunteers to administer.

IPV is killed, formalin – inactivated, injectable vaccine which was developed by an American virologist and physician Dr. Jonas Salk in 1954 and licensed in 1955.
OPV is the live attenuated oral Polio – vaccine developed by Dr. Albert Sabin of the US in 1957 and licensed in 1962. It is polyvalent, thus containing the attenuated strains derived from poliomyelitis types 1, 2 and 3.

Immunisations

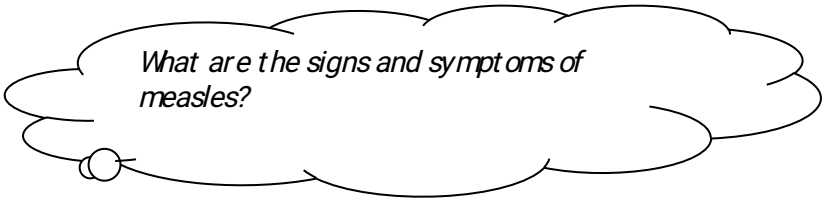
Oral polio vaccine (OPV) protects against the virus that causes polio. It is a liquid vaccine.

Table 6: Administration summary for OPV

Type of vaccine	Live oral polio vaccine (OPV)
Number of doses	Four in endemic countries (including birth dose)
Schedule	At birth, 6, 10, 14 weeks.
Booster	Supplementary does to be given during polio eradication activities.
Contraindications	None
Adverse reactions	Vaccine associated paralytic polio (VAPP) Very rarely (approximately 2 to 4 cases per million children vaccinated.
Special precautions	Children known to have rare congenital immune deficiency syndrome should receive IPV rather than OPV.
Dosage	2 drops
Injection site	-
Injection type	-
Storage	Store between 2^0C and 8^0C (may be frozen for long term storage)

MEASLES

Measles is a highly infectious disease caused by the measles virus. Measles kills more children than any other vaccine preventable disease.



The incubation period is 7 – 14 days. The disease is rare before 6 months due to immunity from maternal antibiotics.

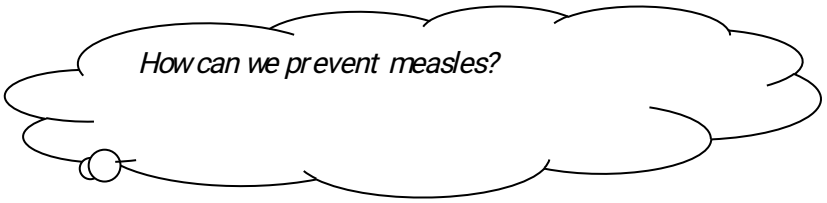
The prodromal phase usually lasts 3 – 5 days and is characterized by cough, runny nose, conjunctivitis and small white spots inside the cheeks. Koplik spots usually precede the onset of the typical maculo – papular rash which starts behind the ears and then spreads to the face and downward.

From the 3rd to the 4th day after onset, the measles rash fades away, leaving behind brown or dark staining on the skin.

General Measures

There is no specific drug treatment for measles infection. However, general nutritional support and the treatment of dehydration with oral rehydration solution are necessary. Other measures that need to be taken include:

- Give Antibiotics for ear infections and respiratory tract infections
- Isolate known cases
- Avoid overcrowding
- Ensure good house – hold ventilation
- Ensure immunisation of children at 9 months of age with live attenuated measles vaccine.
- All children diagnosed with measles should receive two doses of vitamin A supplement given 24 hours apart. Giving vitamin A can help prevent eye damage and blindness
- Vitamin A supplementation reduces the number of deaths from measles by 50%



Measles is prevented by immunisation with the measles vaccine. To reduce the risk of infection, all children between the ages of six and nine months who have not received measles vaccine and who are admitted to a hospital should be immunized against measles.

Strategies Recommended for Reducing Measles Deaths

In order to reduced deaths caused by measles, put in place the following strategies:

- Give a dose of measles vaccine to all children at 9 months.
- A second opportunity for measles immunisation is necessary to assure immunity and those who fail to develop immunity following the first vaccination. This is done during routine immunisations services or through National Immunisations Days.
- Measles surveillance should be strengthened through the integration of epidemiological and laboratory information.
- The clinical management of measles should be improved.

The Measles Vaccine

The Measles vaccine is provided as a powder with diluents in a separate vial. Before it can be used, it must be reconstituted with the specific diluents supplied with the vaccine.

Table 7: Administration summary for the Measles vaccine

Type of vaccine	Live attenuated viral.
Number of doses	One dose. Second opportunity, not less than one month after first dose.
Schedule	At 9 months
Booster	A second opportunity for measles immunisation in routine and campaigns.
Contraindications	Severe reaction to previous dose, pregnancy congenitis or acquired immune disorders (not HIV infection).
Adverse reactions	Malaise, fever, rash 5 – 12 days later, idiopathnic thrumbcytopenic purpura, reraly encephalitis, anaphylaxis.
Special precautions	None
Dose	0.05 mls

Injection site	Outer upper arm
Injection type	Subcutaneous
Storage	Store between 2^0C - 8^0C (vaccine may be frozen for long term storage but not the diluents)

Take Note

Infants at high risk (HIV- infected, in closed communities such as refugee camps, or in the presence of an outbreak) may receive a dose at 6 months of age, followed by an extra dose at 9 months.

TETANUS

How is tetanus acquired? Answer the question. Then compare with the discussion.

Tetanus is acquired through exposure to the spores of the bacterium ***clostridium tetanus***, which are universally present in the soil. It can penetrate the body through a cut, skin wounds, bites or any skin penetration with non- sterile materials e.g. during circumcision, or in the umbilicus following non- sterile delivery.

The bacteria secrete toxins that travel up the nerve sheaths to the central nervous system. This causes muscle rigidity starting from the mouth (lock jaw) and affecting the whole body. People of all ages can get tetanus, but the disease is particularly common and serious in newborn babies. This is called Neonatal Tetanus (NNT). It affects the babies through contamination of the umbilical cord by cutting with non- sterile instruments or by applying cow dung, mud, ash or plant powders unto it.

What are the signs and symptoms of tetanus?

Clinical Presentation

The incubation period lasts 1 week.

The first signs of tetanus are:

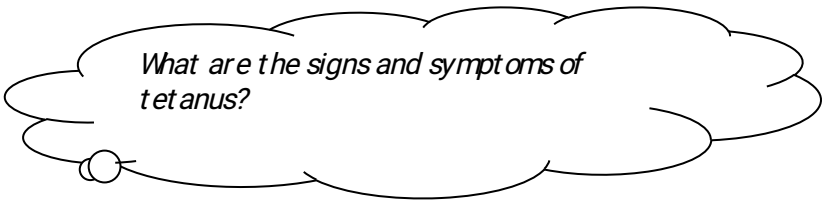
- Muscular stiffness in the jaw.
- Stiffness in the neck.
- Difficulty in swallowing
- Stiffness in the stomach muscles.
- Muscle spasms.
- Sweating and fever.

Prevention of Tetanus

There is no natural immunity to tetanus. The only way to protect the newborn baby is by:

- Immunizing the mother during pregnancy and to immunizing the baby from 6 weeks after birth for further protection.
- Clean practices like cleaning contaminated wounds thoroughly with antiseptic solution.
- Proper umbilicus cord handling at the time of delivery, aseptic cutting, ligaturing and avoidance of treating with contaminated materials.
- Immunisation of injured persons.

Tetanus Toxoid (TT) Vaccine



The Tetanus toxoid (TT) vaccine protects against tetanus. It is provided as a liquid in vials. It is available in a number of different formulations.

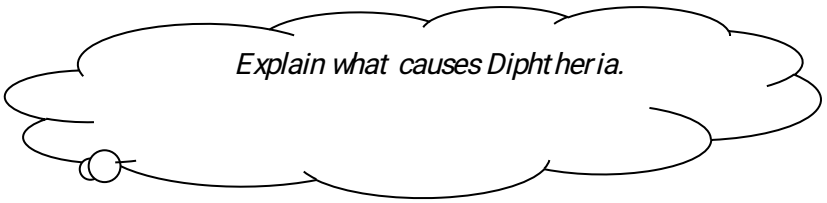
- TT vaccine protects only against Tetanus and neonatal tetanus.
- DPT vaccines protects against Diphtheria tetanus and pertusis.
- DT vaccine protects against Diphtheria and tetanus.
- Td vaccine is the same as DT, but with a lower diphtheria toxoid dose.

Table 8: Administration summary for the T.T. vaccine.

Type of vaccine	Toxoid as DT, TT, or Td
Number of doses	At least 5 doses.

Schedule	See schedule for pregnant mother and injuries
Booster	Supplementary doses given during NNT elimination activities.
Contraindications	Anaphylactic reaction to previous dose.
Adverse reactions	Mild pain, redness, warmth and swelling at the injection site. Fever.
Special precautions.	Reduced diphtheria (Td instead of DT) content as from seven years of age.
Dosage	0.5 mls
Injection site	Outer upper arm
Injection type	Intramuscular.
Storage	Store between 2^0C - 8^0C, never freeze.

DIPHTHERIA



Diphtheria is caused by the bacterium *Corynebacterium Diphtheriae*. This germ produces a toxin that can harm or destroy human body tissues and organs. It is an acute infectious disease of the respiratory tract. It affects mainly the throat and sometimes the tonsils.

Signs and Symptoms of Diphtheria

The incubation period lasts 2 – 7 days. The main symptoms are:.

- Sore throat and hoarse voice.
- Loss of appetite.
- Slight fever with swollen neck and obstructed airway.
- Grey white adherent membrane in the throat beyond the tonsils.
- Bloody nasal discharge.
- Sometimes ulcers of the skin.
- Poor vision.
- Laryngeal form is very serious in infants.

Prevention of Diphtheria

In order to prevent diphtheria, you need to observe the following:

- Avoid overcrowding.
- Give speedy treatment to acute respiratory tract infections.
- Ensure improved personal, domestic and community hygiene.
- Ensure universal infant immunisation by injecting three doses of DPT/ HEB B/ HIB at 6, 10 and 14 weeks (Diphtheria, pertusis, tetanus, Hepatitis (HEP B), Haemophilus influenzae type B (HIB).

WHOOPING COUGH (PERTUSSIS)

Pertussis or whooping cough is a disease of the respiratory tract caused by the *Bordetella pertussis* bacteria that live in the mouth, nose and throat.

The signs and symptoms of pertussis are:

- Incubation period 5 – 10 days.
- Infection of the airway is very severe for children under 1 year.
- Running nose, watery eyes, sneezing, fever.
- Irritation of the respiratory tract leads to repeated and prolonged bouts of coughing.
- Production of thick and sticky sputum often vomited after coughing.
- Swelling and spasms of the airway and glottis leading to breathlessness and a whooping noise, as inspired air passes through a narrow passage.

Prevention of Whooping Cough

The most effective way to prevent pertussis is to immunize all infants with three doses of DPT/ HEP B/ HIB at 6, 10 and 14 weeks.

HEPATITIS B DISEASE

The Hepatitis B disease is caused by a virus that affects the liver. Adults who get hepatitis B usually recover. Most infants infected at birth become chronic carriers and can spread the infection to others.

Normally the incubation period of Hepatitis B is 6 weeks but it may be as long as 6 months.. The ususal signs and symptoms are:

- Infection in young children is asymptomatic.
- Stomach upset.
- Flu – like symptoms.
- Passing dark urine or very pale stools.
- Jaundice most common (yellow skin or a yellow colour in the whites of the eye).

Prevention of Hepatitis B

In order to prevent the occurrence of Hepatitis B:

- It is recommended that all infants receive three doses of DPT/ HEP B/ HIB at 6, 10, and 14 weeks of life.
- Health education aimed at change of behaviour patterns that spread the disease such as sharing of razors and tooth brushes and the use of un- sterilized needles and syringes.
- Immunization with HBV which protects development of acute infection to progress to a chronic carrier state.

Hepatitis B (Hep B) vaccine

The Hepatitis B (Hep B) vaccine is a cloudy liquid that is provided in single or multi dose vials. It is available as monovalent vaccine (only one antigen) and in combination DPT/ HEP B/ HIB.
Dosage: 0.5 mls intramuscularly.
Storage: between 2^0C to 8C, never freeze.

HAEMOPHILUS INFLUENZAE TYPE B (HIB)

Haemophilus influenzae type B (HIB) is one of six related types of bacterium H. Influenzae type B causes pneumonia and meningitis in young children.

Hib disease should be suspected in the case of any child with signs and symptoms of meningitis or pneumonia.

Prevention of Hib

Hib can be prevented through immunisation of children at 6, 10, 14 weeks with DPT/ HEP B/ Hib vaccine given in three doses.

Haemophilus Influenzae type B (Hib) Vaccine

The Haemophilus influenzae type B vaccine prevents meningitis, pneumonia and other serious infections caused by the *haemophilus influenzae,* type B bacteria. The vaccine will not protect against other conditions if they are caused by other agents.

The vaccine is available in two forms: liquid or freeze – dried. It can be monovalent vaccine or combination with other vaccines (DPT/ HEP B/ HIB. The vaccine is very safe. No serious reactions to the vaccine have been recorded.

Mild Reactions

Some mild reactions might include:

- Soreness, redness, swelling, or mild pain at the injection site.
- Fever.
- Dosage 0.5 mls intramuscular.
- Storage between 2^0C to 8^0C.

YELLOWFEVER

Yellow fever is caused by the yellow fever virus, which is carried by mosquitoes. It is endemic in some African countries.

The signs and symptoms of yellow fever include:

- Three to six days after a person is infected, there develop fever, chills, headache, backache, general muscle pain, upset stomach and vomiting.
- There may be bleeding from the gums and blood in the urine.
- Jaundice
- Black vomiting.

Prevention and Control of Yellow Fever

Immunisation is the single most important measure to prevent yellow fever. Prevention strategies include:

- Administering yellow fever vaccine as part of routine infant immunisation.
- Preventing outbreaks in high – risk areas through mass immunisation campaigns.
- Control of *Aedes aegypti* in urban centres.

Control strategies include:

- Instituting a sensitive and reliable yellow fever surveillance system including laboratory capacity to analyse samples and confirm suspected cases.
- Emergency responses to outbreaks through mass campaigns and vaccinations

Yellow Fever Vaccine

Yellow fever vaccine is recommended as part of the routine national immunization programme in countries where the disease is endemic. The vaccine is a powder that must be reconstituted with diluents provided. The vaccine is discarded after six hours or at the end of the immunisation session after reconstitution.

Table 9: Administration summary for the yellow fever vaccine

Type of vaccine	Live viral
Number of doses	One dose
Schedule	9 months of age.
Booster	International health regulation requires a booster every 10 years.
Contraindications	e.g. allergy, immune deficiency from medication or disease, symptomatic HIV infection, hypersensitivity to previous dose.
Adverse reaction	Hypersensitivity to egg, rarely encephalitis in the very young, hepatic failure.
Special precautions	Do not give before six months of age, avoid during pregnancy.
Dosage.	0.5 mls.
Injection site	Upper right arm.
Injection type	Subcutaneous
Storage	Store between 2^0C to 8^0C.

VITAMIN A DEFICIENCY

Vitamin A supplementation intervention is integrated with the immunisation services.
Vitamin A is a substance that is required by the human body. Vitamin A:

- Strengthens resistance to infection.
- Increases a child's chance of surviving an infection.
- Promotes growth.
- Protects the transparent part of the eye called cornea. A person who does not have enough vitamin A, may have difficulty seeing in dim light.

The body cannot make vitamin A, so all of the Vitamin A we need must come from the food we eat. Vitamin A is present in the following foods.

- Breast milk.
- Liver, eggs, meat, fish.
- Milk, cheese and other dairy products.
- Yellow and orange fruits such as mangoes and papayas.
- Yellow and orange vegetables such as pumpkins and carrots.
- Dark green, leafy vegetables.
- Red palm oil.

Vitamin A can be added to foods, such as sugar, vegetable oil, wheat flour. This is called food fortification.

Vitamin A deficiency occurs when a person does not eat enough food containing vitamin A or when it is used up too fast by the body; especially during an illness, pregnancy, lactation and when children's growth is most rapid, that is, from age six months to five years.

Signs and Symptoms of VAD

The following signs and symptoms are normally observed:

- Eye damage, such as corneal lesion which can lead to blindness.
- Night blindness (impaired vision in dim light)
- Reduced body resistance to infection.
- Aneamia.
- Children with vitamin A deficiency are more likely to get measles, diarrhoea and fevers.

Vitamin A Supplementation

Vitamin A supplementation is combined with immunisation services for children. In addition, vitamin A supplements are also given for treatment of measles and eye damage (xerophthalmia).

Vitamin A is given as follows:

Infants 6 – 11 months. - Vitamin A dose – 100,0001u

12 Months and older. - Vitamin A dose – 200,0001u

Give vitamin A every six months from 6 months of age to 5 years old.

> **Take Note**
>
> The optimal interval between doses is 4 – 6 months. However, the interval between doses can be reduced to treat clinical vitamin A deficiency and measles cases.

MUMPS

Mumps is an infection caused by a virus. It is sometimes called infectious parotitis and it primarily affects the salivary gland. Mumps is mostly a childhood disease, affecting children between five and nine years old.

The signs and symptoms of mumps usually appear between 14 to 21 days after a person is infected and include:

- Swelling in the salivary glands.
- Painful chewing or swallowing.
- Fever.
- Weakness.
- Tenderness and swelling of the testicles.

Control and Prevention of Mumps

People who get mumps and recover are thought to have life long protection against the virus. Mumps vaccines are also highly effective and safe. The Mumps vaccine should be given in combination with measles and rubella vaccines (MMR).

The Measles – Mumps – Rubella (MMR) Vaccine

The MMR vaccines are provided in powder form with diluents and must be reconstituted before use. It should be discarded 6 hours after reconstitution if not used.

Table 10: Administration summary for the MMR vaccine

Type of vaccine	Live attenuated viral.
Number of doses	One dose
Schedule	Generally 12 – 15 months
Booster	A second opportunity for immunisation is recommended (routine or campaign)
Contraindications	Severe reaction to previous dose, pregnancy, congenital or acquired immune disorders (not HIV infection)
Adverse reactions	Same as measles vaccine
Special precautions	None
Dosage	0.5 mls
Injection site	Outer mid – thigh/ upper arm depending on the age.
Injection type	Subcutaneous.
Storage	2^0C to 8^0C (vaccine may be frozen for long – term storage but not the diluents).

RUBELLA AND CONGENITAL RUBELLA SYNDROME

Rubella is an infection caused by a virus. The congenital rubella syndrome (CRS) is an

important cause of severe birth defects. When a pregnant woman is infected with the rubella virus, she has 90% chance of passing the virus on to her foetus. It can cause death to the foetus or CRS. Deafness is the most common, but CRS can also cause defects in the eyes, heart and brain.

Signs and Symptoms of Rubella

From the first contact with the virus to the first sign of rubella there is a period of about 14 days. The usual signs and symptoms are:

- Rash in children, starting from the face to the head and then spreading to the feet.
- Swollen lymph nodes in the neck.
- Infants who are born with CRS usually show symptoms such as cataracts and loss of hearing in infancy, but they may not show symptoms for two to four years.

Prevention and Control of Rubella

MMR vaccines are safe and effective for infant immunisation. For the prevention of CRS, women of child- bearing age should be immunized and this will reduce the incidence of CRS without affecting childhood transmission of the rubella virus.

MENINGOCOCCAL MENINGITIS

Meningococcal meningitis is an infection of the brain and spinal cord. It is caused by the bacterium *Neisseria meningitidis* (the meningococcus). The disease is divided into several types. Types A, B, C, Y, and W135 cause most cases of meningococcal meningities.

The disease occurs globally but in sub- Saharan Africa meningitis epidemics occur every two to three years. The disease is most common in young children and even in adults living in crowded conditions, such as institutions or barracks.

The signs and symptoms of mengicoccal meningitis normally include:

- Sudden onset of intense headache, fever, nausea, vomiting, sensitivity to light and stiff neck.
- Lethargy, delirium, coma and convulsions.
- Appearance of rash composed of small spots of bleeding into the skin.
- Infants appear to be slow or inactive, irritable to vomits, poor feeding.

Prevention and Control of Meningococcal Meningitis

Vaccines are available to give protection against types A, C, Y and W135. Epidemics control relies on good surveillance with early detection and treatment.
Mass immunisation with types A and C vaccine can prevent an epidemic.

The Meningococcal Vaccine

There are two vaccines widely available that protect against different types of meningococcal meningitis. One of them protects against types A, C, Y and W–135 of the disease, while the second one protects against types A and C only.

The vaccines are packaged as a powder with diluents in single and multi- dose vials.

Table 11: Administration summary for the Meningococcal vaccine

Types of vaccine	Purified bacterial capsular polysaccharide AC, AC/W135, Y)
Number of doses	One
Schedule	Not less than three months, older than three years recommended.
Booster	Every three to five years.
Contraindications	Severe adverse reaction to previous dose.
Adverse reaction	Occasional mild local reaction, mild fever.
Special precautions	Children aged under two years of age are not protected by the vaccine
Dosage.	0.5 mls
Injection site	Upper arm
Injection type	Subcutaneous.
Storage	Store between 2^0C to 8^0C

Name the KEPI immunizable diseases.
Choose any four of the diseases and explain the following:

a) *causes*
b) *signs and symptoms*
c) *preventive measures*
d) *vaccination schedules*

What is the prevalence of the KEPI immunizable diseases in your locality? If you do not know, please try to find out.

Section 6: International Travel And Health

Vaccines – Preventable Diseases

Vaccination is a highly effective method of preventing certain infectious diseases.
For the individual, and for the society, prevention is better and more cost – effective than cure. Routine immunisation programmes protect most of the World's children from a number

of infectious diseases. For travellers, vaccination offers the possibility of avoiding a number of dangerous infections that may be encountered abroad. However, vaccines have not yet been developed against several of the most life-threatening infections, including malaria and HIV/ AIDS.

Planning before Travel

The protective effect of vaccines takes some time to develop following vaccination. The immune response of the vaccinated individual will become fully effective within a period of time that varies according to the vaccine, the number of doses required and whether the individual has previously been vaccinated against the same disease.
Travellers are advised to consult a travel medicine clinic or physician 4 – 6 weeks before departure if the travel destination is one where exposure to any vaccine – preventable disease may occur.

Choice of Vaccine for Travel

Vaccines for travellers include:

- Those that are used routinely, particularly in children.
- Others that may be advised before travel.
- Some are mandatory.

Mandatory Vaccinations

Mandatory vaccination, as authorised by the International Health Regulations, nowadays concerns only Yellow fever. Yellow Fever vaccination is carried out for two different reasons.

- To protect the individual in areas where there is a risk of yellow fever infection.
- To protect vulnerable countries from importation of the yellow fever.

Table 12: Vaccines for travellers

CATEGORY	VACCINE
1. Routine vaccination	B.C.G.
	Polio
	Measles
	Diphtheria
	Whooping cough
	Tetanus

	Hepatitis B
	HIB Meningitis/ Pneumonia
	Yellow fever
	Vitamin A
2. Selective use of travellers	Cholera
	Influenza
	Hepatitis A / HAV
	Japanese encephalitis
	Lyme disease
	Meningococcal disease
	Pneumococcal disease
	Rabies
	Tick – borne encephalitis
	Tuberculosis BCG
	Typhoid fever
	Yellow fever (individual protection)
3. Mandatory vaccination	Yellow fever (for protection of vulnerable countries).
	Meningococcal disease (required by Saudi Arabia for pilgrims visiting Mecca for the Hajj (annual pilgrimage or for the Umrah).

Travellers should be provided with a written record of all vaccines administered (patient – retained record), preferably using the International Vaccination Certificate (which is required in the case of yellow fever vaccination).

This was just a summary of the most important points on immunisation for travellers. For more detailed discussion, refer to Unit 3 which is entirely on travel medicine and vaccinations for travellers.

You have now come to the end of this unit on Immunisation. I hope you found it useful and informative. Here is a brief test, to see how well you have understood it.

Self Test

1. What led to the expanded programs on immunisation by WHO?
2. Describe the requirements for a vaccination services facility in Kenya.
3. Indicate the vaccinations that a child should be given if they come to the clinic

a. At birth
b. For the first visit at the age of six months
c. During the third visit but they are suffering from mild fever.

4. If your catchments area has a total population of 328,000 people and you discover that at the end of the year you have immunized 72,160 children only;

a) What percentage of the target population have you immunized?
b) What percentage have you missed to immunize based on the national policy minimum coverage?
c) What might have led to the facility missing the target?
d) What measures would you suggest to ensure improvement of the immunisation coverage in this community?

5. If you are informed that there will be an electricity failure in your facility throughout the day; how will you manage the vaccines to maintain the cold chain requirements?

You have now come to the end of this unit. You can go back to the objectives and see if you have achieved them. If you have achieved the objectives, you are then ready to do your tutor marked assignment. Good luck! ☺

DIRECTORATE OF LEARNING SYSTEMS
DISTANCE EDUCATION COURSES

Student Number: _____

Name: _____

Address: _____
_____

COMMUNICABLE DISEASES COURSE
Tutor Marked Assignment
Unit 4: Immunization

Instructions: Answer all the questions in this assignment.

1. Match the following terminologies to their corresponding definitions.

Terminology	Definition
i..... Passive immunity	**a)** Immunity that is generated when the body produces antibodies to fight antigens following an infection.
ii.....Hard immunity	**b)** Immunity that offers temporary protection from antibodies that have been "borrowed" (e.g. a newborn) before they process their own.
iii..... Artificial immunity	**c)** Immunity that develops when a high proportion of the community, 80% or more, have been immunized. It protects the few who have not been immunized in this community
iv..... Natural immunity	**d)** Immunity given through vaccine administration.

2. List any six KEPI immunizable diseases.
   i. 1)…….
   ii. 2)……
   iii. 3)…….
   iv. 4)…….
   v. 5)…….
   vi. 6)……

3. Describe any six operational components of KEPI.

   a. ……
   ……
   b. ……
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   c. ……
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   d. ……
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   e. ……
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   f. ……
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   ……

4. Indicate weather True or False about the following statements with regard to Kenya's National Policy on Immunisation.

   I. _____ Integrate immunisation activities into the MCH/FP PHC framework.
   II. _____Use one sterile syringe and needle per injection to prevent cross – infection.
   III. _____Use potent vaccines kept at - 2^0C to +8^0C.
   IV. _____Maintain cold chain at all times – monitor the refrigerators, four times in the day.

V. _____Discard all opened BCG vaccines after 7- 8 hours.

VI. _____Immunise children on selected days when clinics have many clients.

5. Complete the chart below on the KEPI immunisation schedule.

AGE OF CHILD	VACCINE	DOSAGE	ROUTE
At birth or before two weeks			
At 6 weeks (1 ½ month) or soon after			
At 10weeks(2½ months or soon after			
At 14 weeks (3½ months) or soon after			
At 9 months or soon after			

Q6. According to the Ministry of Health regulations

a) At what age should a child be given Vitamin A?

b) What is the routine frequency of Vitamin A administration to a child?

c) What dose of Vitamin A should a child receive routinely?

d) Which is the most appropriate route of routine childhood Vitamin A administration?

a)…….

b)…….

c)…….

d)…….

Q7. The Fulani health centre's catchments area has a total population of 96,000 people.

a. What is a catchments area?
b. What is an immunisation target population?
c. In Kenya what is the estimated percentage of the target population from the total population?
d. Calculate the target population for Fulani Health Centre.

a)……
……
b)……
c)……
d)……
……

Q 8. List the three essential elements required for effective cold chain maintenance.
a)……
b)……
c)……

Q9. Place the vaccines in the appropriate storage order for maintenance of potency

Storage conditions	Vaccines	Potency test
Freezer compartment		
Not to be frozen		

Q10. If you were to address a community on issues regarding immunisation, state any six issues you would emphasise on.

a)……b)……
……c)……d)….
……e)……
……f)……
……

Q11. What are missed opportunities?

……

……

……

Q12. What leads to missed opportunities?

……

……

A course on Communicable Diseases (by distance learning)

In this series:

Unit 1: Introduction to Communicable Diseases

Unit 2: Principles of Infections Prevention and Control

Unit 3: Travel Medicine in Relation to Communicable Diseases

Unit 4: Immunisation

Unit 5: Contact Diseases

Unit 6: Sexually Transmitted Diseases

Unit 7: HIV/AIDS

Unit 8: Vector Borne Diseases

Unit 9: Malaria

Unit 10: Emerging and Re- emerging Diseases

Unit 11: Diseases Caused by Faecal- oral Contamination

Unit 12: Helminthic Diseases

Unit 13: Acute Respiratory Infections

Unit 14: Bacterial and Fungal Meningitis