Indira Gandhi National Open University
SCHOOL OF HEALTH SCIENCE

CHO-0001

Foundations of Community Health

NATIONAL HEALTH MISSION
राष्ट्रीय स्वास्थ्य मिशन
राजस्थान



Communicable Diseases and Management under National Health Programmes

3

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Block

3

COMMUNICABLE DISEASES AND MANAGEMENT UNDER NATIONAL HEALTH PROGRAMME

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Appreciation of Collaborative Efforts

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BLOCK INTRODUCTION

Communicable diseases continue to constitute major health problems despite remarkable improvement in health care delivery system. Ministry of Health & Family Welfare, Govt. of India has launched various national health programmes for prevention, control and management of various communicable diseases such as **National AIDS and STD Control Programme (NACP), National Tuberculosis Elimination Programme (NTEP)** - formerly RNTCP, National Vector Borne Disease Control Programme, Integrated Disease Surveillance Programme, National Leprosy Eradication Programme, **National Viral Hepatitis Control Programme (launched in 2018) and National Programme on Climate Change and Human Health** (air-quality link). etc. In order to participate effectively in prevention, control and management of communicable diseases at health and wellness centres, you need to update your knowledge and skills relating to communicable diseases and their management under National Health Programmes. This will enable you to deal with these problems more efficiently and effectively to prevent illness, promote health and manage the problems at sub centre level.

This block comprises of 4 Units as given below.

Unit 1 Epidemiology of Specific Communicable Diseases

Unit 2 Communicable Diseases 1-Vector Borne Diseases

Unit 3 Communicable Diseases 2 Infectious Diseases

Unit 4 Communicable Diseases 3-zoonotic Diseases

We hope you will enjoy reading this block.

UNIT 1 EPIDEMIOLOGY OF SPECIFIC COMMUNICABLE DISEASES

Structure

1.0 Introduction

1.1 Objectives

1.2 Vector Borne Diseases

- 1.2.1 Malaria
- 1.2.2 Filaria
- 1.2.3 Kala-azar
- 1.2.4 Japanese Encephalitis
- 1.2.5 Dengue
- 1.2.6 Chikungunya

1.3 Infectious Diseases

- 1.3.1 Leprosy
- 1.3.2 Tuberculosis
- 1.3.3 Vaccine Preventable Diseases
- 1.3.4 Enteric Fever (Typhoid and Para Typhoid)
- 1.3.5 Viral Hepatitis
- 1.3.6 HIV/AIDS
- 1.3.7 Sexually Transmitted Diseases
- 1.3.8 Diarrhoea
- 1.3.9 Respiratory Tract Infections
- 1.3.10 Scabies
- 1.3.11 Pediculosis

1.4 Zoonotic Disease–Rabies

1.5 Let Us Sum Up

1.6 Model Answer

1.7 References

1.0 INTRODUCTION

In the previous block of this course, you read in detail about nutritional requirement of various age groups, nutritional deficiency disorders, food borne diseases, food safety measures and rehabilitation. This unit would focus mainly on epidemiology of communicable diseases, transmission and burden of communicable diseases in India. The details of all the communicable diseases would be discussed in Unit 2, 3 and 4 of this Block. Let us read first of all vector borne diseases followed by infectious diseases and zoonotic diseases.

1.1 OBJECTIVES

After completing this unit, you will be able to :

- enumerate common communicable diseases;
- name causative organisms for communicable diseases;

- define communicable diseases; and
- explain the burden of communicable diseases in India.

1.2 VECTOR BORNE DISEASES

Let us read first of all vector borne diseases such as Malaria, Filaria, Kala-azar, Japanese Encephalitis, Dengue, Chikungunya etc.

1.2.1 Malaria

Malaria is a protozoal disease caused by Plasmodium and transmitted by female anopheles mosquito. Malaria is a common public health problem in India. Among the many species of *Plasmodium, Plasmodium vivax and Falciparum* are common causes of Malaria in India. According to the National Vector Borne Diseases Control Programme (NVBDCP), in 2015, ~2 million cases in 2023 (vs. 6.4 million in 2017, decreased 69%); deaths decreased from 11,100 (2017) to 3,500 (2023).

1.2.2 Filaria

Lymphatic Filariasis, commonly known as Filaria is caused by 3 nematode parasites– *Wucheria Bancrofti, Brugia Malayi and Brugia Timori*. Only *Wucheria Bancrofti and Brugia Malayi* are found in India. Predominantly, *Wucheria bancrofti* spread by *culex mosquito* causes– 99.4 % of the Filariasis in India. *Brugia malayi* infection has been reported earlier from some rural areas in seven States viz., Kerala, Odisha, Tamil Nadu, Andhra Pradesh, Madhya Pradesh, Assam and West Bengal, but now it is restricted to rural areas of Kerala. *Brugia Malayi* is spread through *Mansonia mosquito*. Filariasis affects 120 million people worldwide, with India, Indonesia, Nigeria and Bangladesh alone contributing to about 70% of the infection worldwide. Endemic in 345 districts (20 states/UTs); 619,000 lymphedema cases and 126,000 hydrocele cases reported in 2023; 90% burden in Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Uttar Pradesh, West Bengal.

1.2.3 Kala-Azar

Kala-azar or Indian Leishmaniasis is caused by the parasite – *Leishmania Donovani* and transmitted by Sandfly (*Phlebotomus argentipes*). 595 cases in 2023 (Decreased from 891 in 2022); 4 deaths (vs. 3 in 2022); elimination milestone (<1 case/10,000 all blocks); endemic in 54 districts (Bihar 33; Jharkhand 4; UP 6; WB 11).

1.2.4 Japanese Encephalitis

Japanese encephalitis (JE) is the leading cause of viral encephalitis in Asia, with up to 70,000 cases reported annually, caused by Japanese Encephalitis virus. The disease is transmitted by culex mosquito. Japanese Encephalitis is widespread in India, 1,548 cases in 2024 across 24 states/UTs; Assam 925 (~60% burden); seasonality peaks: monsoon (Jul–Aug) & post-monsoon (Oct–Nov).

1.2.5 Dengue

Dengue is a mosquito-borne viral infection transmitted by female mosquitoes mainly of the species *Aedes aegypti* and, to a lesser extent, Ae. *albopictus*. This is the same mosquito which transmits chikungunya, yellow fever and Zika infection.There are 4 distinct, but closely related, serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). According to the National Vector Borne Diseases Control Programme, 289,235 cases were reported in 2023 (vs. 28,066 in 2010).

1.2.6 Chikungunya

Chikungunya disease is a viral disease transmitted in humans by the bite of infected mosquitoes. Two types of Aedes species are implicated in causing this disease, *Ae. aegypti* and *Ae. albopictus.* Ae. aegypti mosquito (which you must be familiar from yellow fever section) is the primary transmission agent of Chikungunya Virus in Indian subcontinent. In 2015, a total of 27,553 cases of Chikungunya were reported in our country. 1,321 confirmed cases in 2024 (vs. 315 in 2023).

The causes of vector borne disease are summarised in the Table 1.1 as given below:

Table 1.1: Vector Borne Disease with their cause

Disease	Vector	Cause
Malaria	Anopheles	Plasmodium
Filaria	Culex	Wucheria Bancrofti
Kalaazar	Sandfly	Leishmania donovani
Japanese Encephalitis	Culex	Virus
Dengue	Aedes	Virus
Chikungunya	Aedes	Virus

Check Your Progress 1

1) Define Malaria.

.....

.....

2) Fill in the blanks.

i) Filaria is caused by .....

ii) Kala-azar is transmitted by .....

iii) Japanese encephalitis is transmitted by .....

iv) Dengue is.....viral infection.

v) Chikungunya disease is transmitted by..... mosquito.

1.3 INFECTIOUS DISEASES

After reading about the epidemiology of vector borne diseases, let us now discuss infectious disease as given below:

1.3.1 Leprosy

Leprosy or Hansen's disease is an infectious disease cause by Mycobacterium leprae. Leprosy is a chronic infection which is highly infectious, but has low pathogenicity. According to the National Leprosy Eradication Programme (NLEP), 0.86 lakh cases of Leprosy were reported in 2014, and 542 districts have eliminated leprosy. 75,394 new cases were reported in FY 2021–22 (53.6% of global new cases).

1.3.2 Tuberculosis

Tuberculosis is a social disease with a medical manifestation, caused by Mycobacterium tuberculae. The prevalence of Tuberculosis in India was 2.7 million new cases in 2023 (26% global burden); incidence ↓17.7% (237 → 195 per 100,000, 2015–2023).

HIV/AIDS: 2.5 million PLHIV in 2023; adult prevalence 0.2%; ~66,400 new infections.

1.3.3 Vaccine Preventable Diseases

Diphtheria, Whooping Cough, Tetanus Poliomyelitis, Measles.

a) **Diphtheria**

Diphtheria is caused by Corynebacterium diphtheria. 3,850 cases in 2023 (vs. 3,286 in 2022; 1,768 in 2021).

b) **Whooping cough (Pertussis)**

Whooping cough or pertussis is caused by Bordetella pertussis. 4,876 suspected cases in 2023 (63% <5 years; 2.7/million); 2024 mid-year: ~7,500 cases (↑30% YoY); UP >1,200 cases H1 2024.

c) **Tetanus**

Tetanus is caused by Clostridium tetani. In 2015, only 2268 cases of Tetanus were reported from our country and 62 cases in 2023 (vs. ~9,000 in 2000). In 2015, the World Health Organization congratulated India for its huge achievement– elimination of Maternal and Neonatal Tetanus, which means less than one case per 1000 live births.

d) **Poliomyelitis**

Poliomyelitis was one of the dreaded disease of the past. India has now achieved the formidable task of being Polio for since 2011. Correct phrasing around "Polio FREE" status.

e) **Measles**

Measles is caused by Measles virus and is a disease that is being targeted for elimination in India. In 2015, 4,388 cases in 2024 (significant ↓ vs. prior years).

1.3.4 Enteric Fever (Typhoid and Para Typhoid)

Enteric fever or Typhoid is caused by the bacteria Salmonella typhi. It occurs in all parts of the world specially in areas where quality of water supply is poor. This disease is endemic in India. Global GBD estimate 2021: >9 million cases & 100,000 deaths; India >50% cases & ~50% deaths

1.3.5 Viral Hepatitis

Hepatitis is an infectious disease of the liver caused by Hepatitis virus A, B, C, D and E. In 2014, 1.39 lakh cases of viral Hepatitis (all cause) were reported, with 407 deaths in India. 2022: >50,000 new Hep B; ~140,000 new Hep C; 11.6% of global burden; 35 million total cases; 123,000 deaths.

1.3.6 HIV/AIDS

AIDS or Acquired Immuno– Deficiency Syndrome is a fatal illness caused by HIV. About 8.4 lakh people were living with HIV/AIDS in India in January, 2015.

1.3.7 Sexually Transmitted Diseases

The sexually transmitted infections are managed through syndromic management and include urethral discharge, genital ulcers, inguinal bubo, vaginal discharge and cervical discharge. Urethral discharge and vaginal discharge are commonly caused by Neisseriae gonorrhoeae and Chlamydia trachomatis. About 37269 cases of Syphilis and 74390 cases of Gonococcal infections were reported in 2014, in India.

1.3.8 Diarrhoea

Diarrhoea is defined as passage of loose, watery or liquid stools, usually more than three times a day. Diarrhoea can be caused by viruses like Rotavirus, Adenovirus, Enterovirus or bacteria (E. coli, Shigella, Salmonella, Vibrio cholerae) and parasites like E. histolytica, Giardia, Trichuriasis etc. 2019: 632,345 deaths (all ages; 45.5/100,000); under-5: 55,310 deaths (47.2/100,000).

1.3.9 Respiratory Tract Infections

Respiratory tract infections may cause inflammation of respiratory tract anywhere from nose to alveoli and may be caused by bacteria like Hemophilus influenza, Klebsiella, Legionella, Staphylococcus etc. or viruses like Adenovirus, Enterovirus, Rhinovirus, Respiratory Syncytial virus etc. 2021: 78% of CD deaths (↑ from 68% in 2020); total CD deaths ↑86% to 12,598; pneumonia: 9,872 deaths; infants (1–12 mo) 11,497; children (1–5 yr) 4,571 (2022–23).

1.3.10 Scabies

Scabies is caused by infection with a mite Sarcoptes scabiei. It causes severe itching and pimple like rashes in the body. Scabies spreads rapidly in overcrowded places through skin to skin contact between people. It is identified with Rashes i.e. pimple like eruptions especially in the skin folds on wrist, elbows, knees, the penis, breast or shoulders. There is intense itching at night time all over the body. Diagnosis is made by looking at rashes. A skin scrap may be taken to look for mites, eggs to confirm the diagnosis.

Several lotions are available to treat scabies, i.e. Benzyl benzoate 25% is applied to clean body from the neck down to the toes and left for 72 hours. All clothes, bedding, and towels used by the infected person should be washed on hot water, dry in sunlight.

1.3.11 Pediculosis

Infestation by lice is called pediculosis. Pediculosis is an infestation of lice and divided into three types: 1. Pediculosis capitis (Head louse infestation), 2. Pediculosis corporis (Body louse), and, 3. Pediculosis pubis (Pubic/crab louse). Lice can be acquired by direct contact. Control of lice is achieved through the use of insecticides. E.g. washing with 1% DDT for head lice. Maintaining personal and environment hygiene is very important in prevention and control of lice infestation. Define capitis, corporis, pubis; transmission; treatment: 1% permethrin; hygiene + hot-wash; DDT not recommended.

Table 1 : Infectious Disease with their cause

Disease	Causative Organism	Type of Organism
Leprosy	*Mycobacterium leprae*	Bacteria
Tuberculosis	*Mycobacterium tuberculosis*	Bacteria
Diphtheria	*Corynebacterium diptheriae*	Bacteria
Whooping Cough	*Bordetella pertussis*	Bacteria
Tetanus	*Clostridium tetani*	Bacteria
Poliomyelitis	*Poliovirus*	Virus
Measles	*Measles virus*	Virus
Enteric Fever	*Salmonella typhi*	Bacteria
Viral Hepatitis	*Hepatitis virus*	Virus
HIV/AIDS	*HIV virus*	Virus
Diarrhoea	*Rotavirus, Adenovirus etc.*	Virus
	Vibrio cholera, Salmonella. Shigella etc.	Bacteria
	Entamoeba histolytica, Giardia, Trichuris etc.	Parasite
Respiratory Tract Infections	*Hemphilus influenza, Klebsiella, Legionella, Staphylococcus etc.*	Bacteria
	Adenovirus, Enterovirus, Rhinovirus, Respiratory Syncytial virus etc.	Virus
Scabies	*Sarcoptes scabiei*	Mite
Pediculosis	*Louse (Pediculus)*	Parasite

1.4 ZOONOTIC DISEASE– RABIES

Rabies, also known as hydrophobia is a fatal viral disease caused by Lyssa virus. It is a zoonotic disease, that is, a disease of animals that are transmitted to man. It is a disease of dogs, cats, jackals and wolves, which can be transmitted to man by lick/bite of rabid animals. A total of 104 cases of Rabies were reported in India, in 2014.

Rabies in World:

Worldwide the number of human rabies deaths is estimated to be between 35,000 and 50,000 annually. Rabies occurs in all continents except Australia and Antarctica. In Africa and Asia (with few important exceptions such as Japan and Singapore) rabies is prevalent in almost whole of the territory with a stable pattern. ~59,000 global deaths/yr (Africa & Asia); India ~36% (18,000–20,000); 2024: 2.2 million dog bites; 48 rabies deaths.

Rabies in India:

Rabies is responsible for extensive morbidity and mortality in India. The estimated number of deaths per year is, around 20,000. Almost 1.8 million people annually receive post exposure prophylaxis against rabies following bite or exposure to rabid or suspected rabid animal. With the exception of Andaman & Nicobar islands and Lakshadweep islands, human cases of rabies are reported from all over the country. The cases occur throughout the year. 96% of the mortality and morbidity is associated with dog bites. Cats, wolf, jackal, mongoose and monkeys are other important reservoirs of rabies in India. Bat rabies has not been conclusively reported from India.

Table 1.2 : Infectious Disease with National Programmes

Disease	National Programme	Drugs
Leprosy	NLEP	Rifampicin, Dapsone, Clofazimine
Tuberculosis	NTEP	Rifampicin, Isoniazid, Ethambutol, Pyrazinamide
Diphtheria	UIP	
Whooping	UIP	
Tetanus	UIP	
Poliomyelitis	Pulse Polio/ UIP/NPSP	
Measles	UIP	
Hepatitis B	UIP	
Enteric Fever	IDSP	Ciprofloxacin
Diarrhoea	IDSP	ORS
Respiratory Infection	IDSP	Amoxycillin
Scabies		Benzyl Benzoate
HIV/AIDS	NACO	ART

Check Your Progress 2

1) True/False

   i) Other name for leprosy is Hansen's disease. (True/False)

   ii) India has achieved the task of being measles' free for more than three years. (True/False)

   iii) Other name for diphtheria is whooping cough.

2) Fill in the blanks.

   i) Tetanus is caused by .....

   ii) Hepatitis is an..... disease of the liver.

   iii) AIDS stands for .....

3) Define Diarrhoea.

   .....

   .....

   .....

1.5 LET US SUM UP

In this unit we have mainly discussed the epidemiology of communicable diseases in India. The details about these diseases would be discussed in further units of this block. After going through this unit you can enumerate and classify various communicable diseases and have understanding of the causes of transmission etc.

1.6 MODEL ANSWERS

Check Your Progress 1

1) Malaria is a protozoal disease caused by Plasmodium and transmitted by female anopheles mosquito.

2) Fill in the blanks.

   i) Nematode parasite

   ii) Sandfly

   iii) Culex mosquito

   iv) Mosquito borne

   v) Aedes

Check Your Progress 2

1) True/False

   i) True ii) False iii) False

2) Fill in the blanks.

   i) Clostridium tetani

   ii) Infectious

   iii) Acquired immune deficiency virus

3) Diarrhoea is defined as passage of loose, watery or liquid stools, usually more than three times a day.

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UNIT 2 COMMUNICABLE DISEASES 1 – VECTOR BORNE DISEASES

Structure

2.0 Introduction

2.1 Objectives

2.2 Mosquito Borne Diseases

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2.4 Malaria

- 2.4.1 Clinical Symptoms and Diagnosis
- 2.4.2 Primary Management and Referral

2.5 Filaria

- 2.5.1 Clinical Symptoms and Diagnosis
- 2.5.2 Primary Management and Referral

2.6 Kala-Azar

- 2.6.1 Clinical Symptoms and Diagnosis
- 2.6.2 Primary Management and Referral

2.7 Japanese Encephalitis

- 2.7.1 Clinical Symptoms and Diagnosis
- 2.7.2 Primary Management and Referral

2.8 Dengue

- 2.8.1 Clinical Symptoms and Diagnosis
- 2.8.2 Primary Management and Referral

2.9 Chikungunya

- 2.9.1 Clinical Symptoms and Diagnosis
- 2.9.2 Primary Management and Referral

2.10 Let Us Sum Up

2.11 Model Answers

2.0 INTRODUCION

In the previous unit, you have read about epidemiology of communicable diseases, causative organisms for various communicable diseases. In this unit we will discuss symptoms, diagnosis, management and referral for vector borne diseases in details, and measures for mosquito control.

2.1 OBJECTIVES

After reading this unit, you will be able to identify the:

- symptoms, diagnosis, management and referral for Malaria;
- symptoms, diagnosis, management and referral for Filaria;
- symptoms, diagnosis, management and referral for Kala-azar;
- symptoms, diagnosis, management and referral for Japanese Encephalitis;

- symptoms, diagnosis, management and referral for Dengue;
- symptoms, diagnosis, management and referral for Chikungunya; and
- measures for mosquito control.

2.2 MOSQUITO BORNE DISEASES

As far as human health is concerned, mosquitoes are the most important among all the insects. Diseases occur due to three major types of mosquitoes in India are:

1) Anopheles
2) Culex, and
3) Aedes.

2.3 MOSQUITO CONTROL MEASURES

An integrated approach of mosquito control is followed, which is highlighted in Fig. 2.1 below:

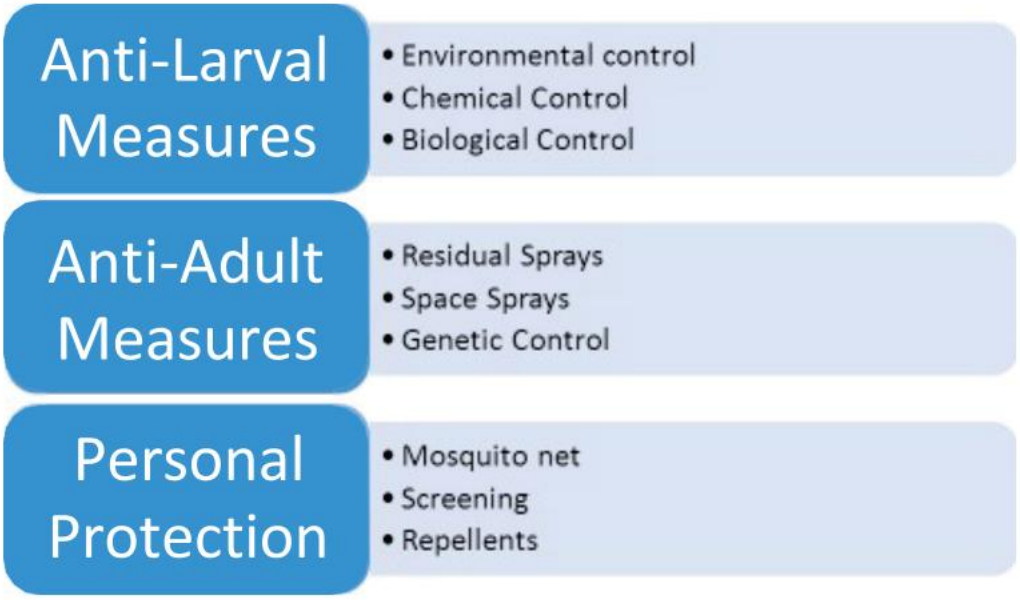


Fig. 2.1: Mosquito Control Measures

- **Anti-Larval Measures**- Environmental control measures are directed at reducing the mosquito breeding places by environmental manipulation and modification. Chemical control is done by the use of larvicides like Kerosene, Paris Green and synthetic insecticides. Biological control can be done by using a larvae eating fish known as Gambusia.
- **Anti-Adult Measures**- Insecticidal residual spray of DDT, Malathion and space spray (fogging) of pyrethrum extract.
- **Personal Protection**- Most of the mosquitoes except Aedes generally bite at night. Therefore, mosquito nets can offer protection during sleep. The mosquitoes net should be light coloured with the diameter of each hole less than 0.0475 inch. Screening of doors and windows with nets also prohibit the entry of mosquitoes inside the house.

Check Your Progress 1

i) Which of the following mosquito-borne disease is caused by virus?

A. Dengue B. Malaria C. Filaria D. None of the above

ii) Fogging is a method to kill the mosquito at which stage of its life cycle?

A. Larva B. Pupa C. Adult D. Egg

2.4 MALARIA

Malaria is a common disease in India. It is caused by Plasmodium and transmitted to man by infected female Anopheles mosquito. Malaria is commonly caused by Plasmodium vivax and Falciparum in India. Plasmodium falciparum has a higher mortality than Plasmodium vivax.

2.4.1 Clinical Symptoms and Diagnosis

Malaria is characterised by paroxysmal attacks of fever, every 3rd or 4th day. The fever attacks have three distinct stage:

1) **Cold Stage:** Headache, nausea, vomiting and chills with rigors. The temperature rises, and this stage lasts for an hour.
2) **Hot Stage:** The headache worsens and the body temperature is very hot. It lasts for 2–6 hours.
3) **Sweating Stage:** The temperature drops down to normal with profuse sweating.

Apart from the symptoms above, the patient may also have jaundice, anaemia and other complications that can occur in Malaria.

The diagnosis of malaria can be made by microscopy or rapid diagnostic tests. The microscopy to identify malarial parasites can be done by making 'Thick' and 'Thin' films, both on the single microscopic slide. The thick film is useful for diagnosis and the thin film for identification of the Malaria species.

Rapid diagnostic kits can also be used to make the diagnosis of malaria, but should be carefully used to avoid false negative results. **Please refer Practical Unit 3 of Practical Course 3, Block 2 for preparation of peripheral smear for malaria using Rapid kit in details.**

2.4.2 Primary Management and Referral

For any suspected case of Malaria– a blood test or rapid diagnostic testing should be done.

The medicine chosen will depend upon whether the patient has vivax or falciparum. The uncomplicated Malaria caused by Vivax can be treated with Chloroquine, 10 mg/kg, once a day for 3 days and Primaquine, 0.25 mg/kg, once a day for 14 days. Along with the antimalarials, fever should be treated with Paracetamol. Falciparum Malaria is treated with Artemesinin based combination therapy.

If the patient has altered level of consciousness, seizures, shortness of breath or severe malnutrition or any other signs of complicated Malaria, he/she should be referred to a Primary Health Centre.

2.4.3 IRS formulations and dosage

"For any further information regarding any product in this list, the CIB registration certificate for the product may be referred to"

S.No.	Name of Insecticide	Class of insecticide	Amount of Insecticide to prepare 10 litres of suspension	Dosage per sq.metre of active ingredient	Residual effect in weeks	Area (insq.m) to be covered by 10 litres of suspension	Requirement of insecticide per million population (in MT)
1	Deltamethrin2.5% WP	Synthetic pyrethroid	0.400Kg	20mg.	10-12	500	60.00
2	Cyfluthrin10%WP	Synthetic pyrethroid	0.125Kg	25mg.	10-12	500	18.75
3	Lambdacyhalothrin10%WP	Synthetic pyrethroid	0.125Kg	25mg.	10-12	500	18.75
4	Alphacypermethrin5%WP	Synthetic pyrethroid	0.250Kg	25mg.	10-12	500	37.50
5	Bifenthrin 10%WP	Synthetic pyrethroid	0.125Kg	25mg.	10-12	500	18.75

Any user should verify the details mentioned in the lists from the CIB certificate; and in case there is any difference in information available in the list and the CIB certificate, the information in the CIB certificate should be considered as the correct information

2.4.4 Indoor Space Spray

"For any further information regarding any product in this list, the CIB registration certificate for the product may be referred to"

S.No	Name of Insecticide	Class of insecticide	Commercial formulation	Preparation of formulation	Equipment required	Remarks
1	Pyrethrum Extract	Plant Extract	2.0% extract	1:19 i.e.1 part of 2% Pyrethrum Extract in 19 parts of Kerosene (50 mlin 1 litre K.Oil)	Pressurised Spray machine or fogging machine	Used for Indoor Space Spray
2	Cyphenothrin	Synthetic pyrethroid	5%EC	0.5mg a.i per sq.mt.(5ml in 200 ml kerosene oil for 500sq. mts. (Flow rate @ 20 ml per minute)		

Any user should verify the details mentioned in the lists from the CIB certificate; and in case there is any difference in information available in the list and the CIB certificate, the information in the CIB certificate should be considered as the correct information

2.4.5 Outdoor Fogging

"For any further information regarding any product in this list, the CIB registration certificate for the product may be referred to"

S.No	Name of Insecticide	Class of insecticide	Commercial formulation	Preparation of formulation	Equipment required	Remarks
1	Malathion	Organophosphate	Technical Malathion	1:19 i.e.1 part of Malathion Tech in 19 parts of Diesel (50 mlin 1litre diesel)	Shoulder mounted Fogging machine or Vehicle mounted thermal Fogging machine	Used for Outdoor Thermal Fogging
2	Cyphenothrin	Synthetic pyrethroid	5%EC	3.5ga.iper hactare (70ml in500 ml Diesel for 1 hectare (Flowrate@30mlper minute)		

Any user should verify the details mentioned in the lists from the CIB certificate; and in case there is any difference in information available in the list and the CIB certificate, the information in the CIB certificate should be considered as the correct information

2.4.6 Larvicide formulations and dosage

"For any further information regarding any product in this list, the CIB registration certificate for the product may be referred to"

S.No	Name of larvicide	Class of insecticide	Commercial formulation	Preparation of ready to spray formulation	Dosage of suspension made for per			Frequency of application	Equipment required	Remarks
					One sq. mtr.	50Linear meter	Hactare			
1	MLO		100% petroleum project product	Asitis	20c.c.	1Litre	200Litres	Weekly	Knapsack/ Hand compression Sprayer	To be applied along the shore of water body
2	Temephos (EC)	Organophosphate	50%EC	2.5 cc in 10 Litres of potable water	20c.c.	1 Litre	200Litres	-do-	Knapsack/Hand compression Sprayer	Can be applied in clean water
3	Bacillus thuringiensis varisraelensis5% WPStrain-164, Serotype H-14	Biolarvicide	5% Wet table Powder	5 Kg in 200 litres of Water *(250 gms in 10 litre of water)*	Do	Do	200litres	Fortnightly	Knapsack/Hand compression Sprayer	For both clean and non-potable polluted water
4	Bacillus thuringiensis varisraelensis5% WPStrain-ABIL, Serotype H-14AccessionNo. 01318	Biolarvicide	5% Wet table Powder	7.5 Kg in 200 litres of Water(375gms in10litre of water)	Do	Do	200litres	Weekly	Knapsack/Hand compression Sprayer	Clean Water
				10 Kg in 200 litres of Water(500gms in10litre of water)	Do	Do	200litres		Knapsack/Hand compression Sprayer	Polluted Water

5	Bacillus thuringiensis varisraelens is 12 Aqueous Suspension (12AS)	Biolarvicide	Aqueous Suspension	1 litre in 200 Litres of water *(50ccin10litre)*	Do	Do	200litres	Weekly	Knapsack/Hand compression Sprayer	Clean Water
				2 litre in 200Litres of water *(100 ccin10 litre)*	Do	Do	200litres		Knapsack/Hand compression Sprayer	Polluted Water
6	Bacillus thuringiensis varisraelensi s5%ASStrai n-ABIL-96, Accession No.NAIMC C-B-01318	Biolarvicide	5%Aqueous Suspension	5 litre in200 Litres of water *(250 cc in10 litre)*	Do	Do	200litres	Fortnightly	Knapsack/Hand compression Sprayer	Clean Water
				7.5litre in200 Litres of water *(375ccin10litre)*	Do	Do	200litres		Knapsack/Hand compression Sprayer	Polluted Water
7	Diflubenzuron25 %WP	Insect growth regulator	25%Wettable Powder	100gms(25gm a.i)in100Litresofwa ter *(10g in10litre)*	-	-	*100litre*	Weekly	Knapsack/Hand compression Sprayer	Clean Water
				200gms(50gm a.i)in100Litresofwa ter *(20g in10litre)*			*100litre*		Knapsack/Hand compression Sprayer	Polluted Water
8	Pyriproxyfen GR	Insect growth regulator	0.5% Granular	Ready-to-use	-	-	2kg.	3 Weekly	Manual	Clean Water
							4kg.			Polluted Water

Any user should verify the details mentioned in the lists from the CIB certificate; and in case there is any difference in information available in the list and the CIB certificate, the information in the CIB certificate should be considered as the correct information

2.4.7 Diagnosis and Treatment of Vivax Malaria

Diagnosis of vivax malaria may be made by the use of RDT (Bivalent) or microscopic examination of the blood smear. On confirmation following treatment is to be given:

Drug schedule for treatment of P vivax malaria:

1. Chloroquine: 25 mg/kg body weight divided over three days i.e.
10 mg/kg on day 1,
10 mg/kg on day 2 and
5 mg/kg on day 3.

2. Primaquine*: 0.25 mg/kg body weight daily for 14 days.

Primaquine is contraindicated in infants, pregnant women and individuals with G_6PD deficiency.
14 day regimen of Primaquine should be given under supervision.

Dosage Chart for Treatment of Vivax Malaria

Age	Day 1		Day 2		Day 3		Day 4 to 14
	CQ (150mg base)	PQ (2.5 mg)	CQ (150 mg base)	PQ (2.5 mg)	CQ (150mg base)	PQ (2.5 mg)	PQ (2.5 mg)
Less than 1 yr	½	0	½	0	¼	0	0
1-4 years	1	1	1	1	½	1	1
5-8 years	2	2	2	2	1	2	2
9-14 years	3	4	3	4	1½	4	4
15 yrs or more*	4	6	4	6	2	6	6
Pregnancy	4	0	4	0	2	0	0

Note: CQ 250mg tablet is having 150 mg base

With the introduction of different coloured Blister Packs for different age groups, treatment by the field level staff has been made easy. The colour code for different age groups for Packing of Tablet ACT+SP has been given as follows:

Dosage Chart for Treatment of falciparum Malaria with ACT-SP

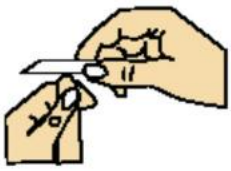
Age Group (Years)	1st day		2nd day		3rd day
	AS	SP	AS	PQ	AS
0-1* Pink Blister	1 (25 mg)	1 (250 +12.5 mg)	1 (25 mg)	Nil	1 (25 mg)
1-4 Yellow Blister	1 (50 mg)	1 (500+25 mg each)	1 (50 mg)	1 (7.5 mg base)	1 (50 mg)
5-8 Green Blister	1 (100 mg)	1 (750+37.5 mg each)	1 (100 mg)	2 (7.5 mg base each)	1 (100 mg)
9-14 Red Blister	1 (150 mg)	2 (500+25 mg each)	1 (150mg)	4 (7.5 mg base each)	1 (150 mg)
15 & Above White Blister	1 (200 mg)	2 (750+37.5 mg each)	1 (200 mg)	6 (7.5 mg base each)	1 (200 mg)

* SP is not to be prescribed for children <5 months of age and should be treated with alternate ACT

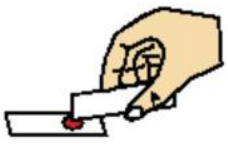
Drawing blood from a finger prick and preparation of blood smear

For preparation of blood smears the items required are clean glass slides, disposable lancet, spirit or cotton swab for cleaning the finger, cotton, clean piece of cotton cloth, slide box for 25 slides, lead pencil, register and MF form. After the patient information has been recorded on the appropriate form, the blood films are made as per the fo lowing steps:

Preparation of a thin and thick blood film on the same slide



1
Touch the blood drop with a clean slide.



2
Using the corner of another slide, spread the blood drop into the shape of a circle or square of ~1cm².



3
Gently squeeze the patient's finger again, and touch the edge of a clean slide to the newly formed blood drop.



4
Take this slide and hold the edge that has the blood drop at an ~45° angle against the surface of the first slide. Wait until the blood completely spreads along the edge of the second slide.



5
While holding the second slide at the same angle, rapidly and smoothly push the slide forward.



6
Write the identification number on the slide. Wait until the thick film is completely dry before staining it.

Check Your Progress 2

1) Which is the most common cause of Malaria in India?

A. Plasmodium ovale B. Plasmodium vivax

C. Plasmodium malariae D. None of the above

2) Explain the stages of malarial fever.

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2.5 FILARIA

'Filar' means thread-like. Lymphatic filariasis is infection with the filarial worms, *Wuchereria bancrofti, Brugia malayi* or *B. timori*, the former being the most widespread parasite. Therefore, the disease is also called 'Wuchereriasis" (Bancroftian filariasis).These parasites are transmitted to humans through the bite of an infected mosquito and develop into adult worms in the lymphatic vessels, causing severe damage and swelling (lymphoedema) shown in the Table 2.2 below:

Table 2.2

Parasites	Vectors (Mosquitoes)
Wuchereriabancrofti	Culex
Brugia malayi	Mansonia
Brugia timori	Mansonia/Anopheline

The adult worms, which usually stay in one tissue, release early larval forms known as microfilariae into the host's bloodstream. These circulating microfilariae can be taken up with a blood meal by the arthropod vector; in the vector, they develop into infective larvae that can be transmitted to a new host.

Repeated mosquito bites over several months to years are needed to get lymphatic filariasis. People living for a long time in tropical or sub-tropical areas where the disease is common are at the greatest risk for infection. Short-term tourists have a very low risk.

2.5.1 Clinical Symptoms and Diagnosis

Clinical spectrum of lymphatic filariasis are as follows:

1) **LYMPHATIC FILARIASIS**

a) **Asymptomatic amicrofilaraemia** which has following characteristics given below:

- Patients have had great exposure to the lymphatic filariasis vector, but still show no infection.
- These patients may have immunity to the disease, and could be of great use to medical researchers.
- They have an infection that is not detected by standard clinical tests, but may exhibit filarial antigens in their blood.

b) **Asymptomatic microfilaraemia**

- Show no overt symptoms of lymphatic filariasis, but have levels of microfilariae in their blood.

- Have an elevated risk of developing chronic symptoms such as lymphodema, hydrocoele or elephantiasis.

c) **Acute Symptoms**

- Most commonly exhibited as fever, lymphangitis and lymphadenitis.
- The fever, often called "filarial" or "elephantoid" fever, is immune-mediated and generally accompanies attacks of lymphangitis.
- Sites for lymphangitis are often limbs, but also very typically the scrotum.
- Clinical symptoms are tender and hot sensations along the lymphatic channel, and sometimes abscesses can develop.
- Lymphadenitis is the formation of firm nodules due to the collections of adult worms in the lymph vessels or nodes. In men, nodules tend to form around the scrotal area.

d) **Chronic Symptoms**

- Hydrocoele is the condition associated with severe and often permanent inflammation of the spermatic cord. It can occur due to the concentration of worms in lymph vessels around the scrotal area.
- If the hydrocoele is an extension of the lymph vessel, microfilariae are often found in hydrocoele fluid.
- If a hydrocoele or other swollen lymph breaks open into the urinary tract, patients exhibit the condition known as chyluria, patients who have chyluria have urine of milky appearance and consistency due to the high content of lymph in their urine. If not treated promptly and effectively, chyluria can result in loss of important nutrients.
- The most dramatic and debilitating result of lymphatic filariasis is elephantiasis.
- Elephantiasis is severe swelling in the limbs, scrotum, breasts and vulva due to blockage in the lymph vessels caused by nests of adult worms.

2) **OCCULT FILARIASIS**

- Classical manifestations are not present.
- Microfilariae are not found in the blood.
- Believed to result from a hypersensitivity reaction to filarial antigens derived from microfilariae. (Best known example is tropical pulmonary eosinophilia)

Diagnosis: Let us now read the diagnosis for microfilariae as given below:

Identification of microfilariae in a blood smear by microscopic examination:

- Standard method.
- The microfilariae that cause lymphatic filariasis circulate in the blood at night (called nocturnal periodicity).
- **Blood collection should be done at night** to coincide with the appearance of the microfilariae, and a thick smear should be made and stained with Giemsa or hematoxylin and eosin.

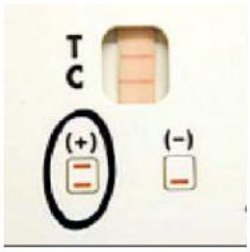
- For increased sensitivity, concentration techniques can be used.

Serologic techniques:

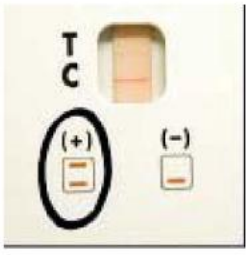
- Patients with active filarial infection typically have elevated levels of antifilarial IgG4 in the blood and these can be detected using routine assays.

Immunochromatographic Card Test (ICT):

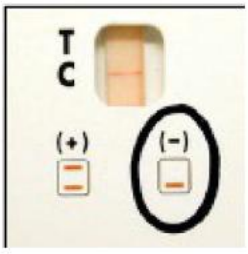
- High sensitivity and specificity.
- Detects *W. bancrofti* infection.
- Test kits are commercially available.
- The test requires 100 microlitre of finger-prick blood drawn at any time, day or night.



NEGATIVE



POSITIVE (Weak)



POSITIVE

2.5.2 Primary Management and Referral

Lymphedema management

The guidelines for the first level care worker developed by WHO to manage Acute Dermato-Lymphangioadenitis (ADLA) are as follows:

1) Treatment for Uncomplicated ADLA:

A) Give Analgesic such as paracetamol (1g given 3–4 times a day)

B) Give oral antibiotic such as amoxicillin (1.5 g in 3 divided doses or oral penicillin) for atleast 8 days. In case of allergy to penicillin, oral erythromycin (1g, given 3 times a day) can be used.

C) Clean the limb with antiseptic

D) Check for any wounds, cuts, abscesses and inter digital infection

E) Give advice about prevention of chronic lymphedema caused by lymphatic filariasis

F) Do not give anti-filarial medicine

G) Home management includes following measures:

- drinking plenty of water
- rest
- limb elevation
- wriggling of toes
- cooling the limb with cold water.

H) Follow-up after 2 days at home. If situation does not improve, then refer the patient to physician.

2) Treatment of Severe ADLA:

A) Refer the patient to physician immediately to receive recommended antibiotic treatment

- Antibiotics: Inj. penicillin

B) Give analgesic/antipyretic such as paracetamol

C) Do not give anti-filarial medicine

Hydrocele management

- Individuals with scrotal swelling should be referred to a facility for diagnosis, and if necessary surgery

Check Your Progress 3

1) Which of the following mosquitoes cannot cause Filaria?

A. Mansonia B. Culex C. Aedes D. None of the above

2) List home management measures for filaria.

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2.6 KALA-AZAR (KA)

Kala-Azar is a parasitic disease caused by a protozoa named Leishmania, transmitted by the bite of infected female phlebotomine argentipes (sand fly).

The favourable transmission factors are:

- Rural areas where houses are frequently constructed with mud walls and earthen floors, and cattle and other livestock live close to humans
- Heavy annual rainfall
- Mean humidity above 70%
- Temperature range of 15–38°C
- Abundant vegetation, subsoil water and alluvial soil

Kala-azar is endemic in 54 districts in the country including districts of Bihar, Jharkhand and West Bengal besides sporadic cases in 6 districts of eastern Uttar Pradesh. The State of Bihar alone contributes to more than 70% of total KA reported from the four States.

2.6.1 Clinical Symptoms and Diagnosis

- Fever
- Splenomegaly and hepatomegaly
- Anaemia
- Weight loss
- Darkening of skin of face, hands, feet and abdomen
- Lymphadenopathy (atypical feature)

- Post kala-azar dermal leishmaniasis:
  - Several years after cure of disease
  - Multiple nodular infiltration of skin usually without ulceration
- Cutaneous leishmaniasis: painful ulcers in part of body exposed to sand fly.

Diagnosis:

- In blood examination- Progressive leucopenia and severe anaemia are striking features of Kala-Azar along with progressive decline in total leucocyte count (Leucopenia). Detection of the causative organism *(Leishmania Donovani)* is done through serological tests-like ELISA.
- Leishmanin/Montenegro test: Intra-dermal injection of 0.1 ml of leishmanin is injected on flexor aspect of forearm and induration measured after 48–72 hours.

2.6.2 Primary Management and Referral

The patients should be given Sodium stibogluconate at the dose of 20 mg/kg body weight (maximum 850 mg/day) by single injection, intramuscularly for 20–30 days depending on the response.The absence of parasitic load should be checked at the end of treatment through a splenic/bone marrow smear.

In case of resistance, the second line of management is Amphotericin B at 1 mg/kg on alternate day for 15–20 days.

Check Your Progress 4

1) Which of the following is a vector of Kala-Azar?

A) Culex mosquito B) Anopheles mosquito

C) Aedes mosquito D) Sandfly

2.7 JAPANESE ENCEPHALITIS (JE)

- Japanese encephalitis (JE) is the leading cause of viral encephalitis in Asia, with up to 70,000 cases reported annually.
- Case-fatality rates range from 0.3% to 60% and depend on the population and age.
- Residents of rural areas in endemic locations are at highest risk, JE does not usually occur in urban areas.
- JE viral activity has been widespread in India. The first evidence of presence of JE virus dates back to 1952.
- First case was reported in 1955.
- Outbreaks have been reported from different parts of the country.
- During recent past (1998–2004), 15 States and Union Territories have reported JE incidence.
- Annual incidence ranged between 1714 and 6594 and deaths between 367 and 1665.

- Mortality of this disease varies but is generally much higher in children.
- This disease is most prevalent in Southeast Asia and East Asia.
- It is transmitted by infective bites of female mosquitoes mainly belonging to *Culex tritaeniorhynchus, Culex vishnui and Culex pseudovishnui* group are the chief vectors of JE in different parts of India.
- Primarily affects central nervous system.
- JE transmission intensifies during rainy season.
- Domestic pigs and wild birds are reservoirs of the virus.
- Natural hosts of JE virus include water birds of Ardeidae family (mainly pond herons and cattle egrets).
- Pigs play an important role in the natural cycle and serve as an amplifier host since they allow manifold virus multiplication without suffering from disease and maintain prolonged viraemia.
- Due to prolonged viraemia, mosquitoes get opportunity to pick up infection from pigs easily.
- Man is an accidental and dead end host in transmission cycle due to low and short-lived viraemia.

2.7.1 Clinical Symptoms and Diagnosis

- Incubation period for Japanese encephalitis virus (JEV) is of 5 to 15 days.
- Majority of infections are asymptomatic. Only 1 in 250 infections develop into encephalitis.
- JE virus infection presents classical symptoms similar to any other viral encephalitis.
- JE virus infection may result in febrile illness of variable severity associated with neurological symptoms ranging from headache to meningitis or encephalitis.
- Severe rigors may mark the onset of this disease, headache, fever (38-41°C), meningeal signs, stupor, disorientation, coma, tremors, paralysis (generalised), hypertonia, loss of coordination etc.
- Prodromal stage may be abrupt (1–6 hours), acute (6–24 hours) or more commonly subacute (2–5 days).
- In acute encephalitic stage includes symptoms noted in prodromal phase, neck rigidity, convulsions, alteration of sensorium, behavioural changes, motor paralysis and involuntary movement supervene and focal neurological deficit is common. Usually lasts for a week but may prolong due to complications.
- Amongst patients who survive, some lead to full recovery through steady improvement and some suffer with stabilisation of neurological deficit such as deafness, emotional lability and hemiparesis may occur in those who have had central nervous system involvement. Mental retardation is usually developed.
- Convalescent phase is prolonged and vary from a few weeks to several months.

Diagnosis

A) **Clinical:**

Clinically JE cases present signs and symptoms similar to encephalitis of viral origin and cannot be distinguished for confirmation. However, JE can be suspected as the cause of encephalitis as a febrile illness of variable severity associated with neurological symptoms ranging from headache to meningitis or encephalitis. Symptoms can include headache, fever, meningeal signs, stupor, disorientation, coma, tremors, paralysis (generalised), hypertonia, loss of coordination etc.

B) **Laboratory:** Several laboratory tests are available for JE virus detection which include-

1) **Antibody detection:** Heamagglutination Inhibition Test (HI), Compliment Fixation Test (CF), Enzyme Linked Immuno-Sorbant Assay (ELISA) for IgG (paired) and IgM (MAC) antibodies, etc.
2) **Antigen Detection:** RPHA, IFA, Immunoperoxidase etc.
3) **Genome Detection :** RTPCR
4) **Virus Isolation :** Tissue culture, Infant mice, etc

Due to limitations associated with various tests, IgM ELISA is the method of choice provided samples are collected 3–5 days after the infection.

2.7.2 Primary Management and Referral

There is no specific anti-viral medicine or **treatment** available against JE virus.

The cases are managed symptomatologically.

A) Fever-tap water vigorous sponging, paracetamol
B) Convulsion- anti convulsants
C) Secretion- suction
D) Nil orally
E) Position of patient- prone with head on one side, oxygen if possible.

Danger signs are:
Lethargy,
Unconsciousness,
Convulsion,
other findings like paralysis, rashes and hepatosplenomegaly etc.

↓

If present- **Referral is done to nearest First Referral Unit (FRU)**

↓

Treatment-

- IV line
- Correction of blood sugar

- Suction- oxygen
- IV drugs i.e. anti-convulsant, if convulsion not controlled
- use of ambu bag if necessary
- Catheterization
- use of mannitol
- Inj. Paracetamol
- Input/Output charting
- Vitals- TPR & BP, monitoring.

↓

Further danger sign-

Shock, hypotension / low BP/ feeble thready pulse

Need of ventilator- poor respiratory efforts, cyanosis not managed by oxygen

↓

Referral is done to tertiary hospital

List the Danger sign of Japanese Encephalitis.

2.8 DENGUE

Dengue is a mosquito-borne viral infection transmitted by female mosquitoes mainly of the species Aedes aegypti and, to a lesser extent, Ae. albopictus. The same mosquito which transmits chikungunya, yellow fever and Zika infection.

There are 4 distinct, but closely related, serotypes of the virus that cause dengue (DEN-1, DEN-2, DEN-3 and DEN-4). However, cross-immunity to the other serotypes after recovery is only partial and temporary. Subsequent infections by other serotypes increase the risk of developing severe dengue.

- Infected symptomatic or asymptomatic humans are the main carriers and multipliers of the virus, serving as a source of the virus for uninfected mosquitoes.
- Patients who are already infected with the dengue virus can transmit the infection (for 4–5 days; maximum 12) via *Aedes* mosquitoes after their first symptoms appear.
- It is common in urban habitats due to improper water management facilities, water accumulation in non-degradable tyres, coolers, flower vases in the apartments etc.
- Overhead tanks, ground water storage tanks and septic tanks are usually the primary habitats. That is, Aedes aegypti breeds almost entirely in man-made water receptacles found in and around households, construction sites, factories.
- Unlike other mosquitoes Aedes aegypti is a day-time feeder; its peak biting periods are early in the morning and in the evening before dusk (sunset).

2.8.1 Clinical Symptoms and Diagnosis

Dengue Fever	Dengue Haemorrhagic Fever (DHF)	Dengue Shock Syndrome (DSS)
Flu-like symptoms and lasts for 2-7 days. Dengue fever usually occurs after an incubation period of 4-10 days after the bite of the infected mosquito. High Fever (40°C/104°F) is usually accompanied by atleast two of the following symptoms: • Headaches • Pain behind eyes • Nausea, vomiting • Swollen glands • Joint, bone or muscle pains • Rash	Fever and Haemorrhagic manifestation (positive tourniquet test) Evidence of plasma leakage Spontaneous bleeding Circulatory failure (weak pulse, narrow pulse pressure (20 mmHg), hypotension, restlessness). Profound shock with undetectable BP and pulse	Dengue Shock Syndrome is of short duration (12-24 hrs), but can be fatal. Usually Systolic BP falls late, but pulse pressure (Systolic BP-Diastolic BP) deteriorates much earlier 20 mmHg If prolonged, Shock causes metabolic acidosis and multi organ failure Hypovolemic shock due to plasma leakage Pleural effusion, Ascites (plasma leakage to pleural & peritoneal cavities) Hypothermia-Cold clammy skin Fulminant hepatic failure
Laboratory findings: Leucopenia (WBC ≤ 5000 cells/mm^3). Thrombocytopenia (Platelet count <150 000 cells/mm^3). Rising haematocrit (5%-10%). No evidence of plasma loss	**Laboratory findings:** Thrombocytopenia <100000 cells/ mm^3; Haematocrit rise 20%	**Laboratory findings:** Increased Packed Cell Volume - the earliest feature of Dengue Haemorrhagic Fever Decreased Platelet Decreased Total Leucocyte Count Decreased Serum Albumin Increased Liver Function Tests Serological Tests

2.8.2 Primary Management and Referral

- All dengue patients must be carefully observed for complications for atleast 2 days after recovery from fever. This is because life threatening complications often occur during this phase. Patients and households should be informed

that severe abdominal pain, passage of black stools, bleeding into the skin or from the nose or gums, sweating, and cold skin are danger signs.

- If any of these signs is noticed, the patient should be taken to the hospital. The patient who does not have any evidence of complications and who has been afebrile for 2–3 days does not need further observation.
- Fluid Intake- Oral or Intra venous (IV).
- ORS and fruit juices should be preferred over water
- Antipyretics- Paracetamol.
- Avoid Aspirin (may cause Reye's Syndrome) and other NSAIDS, e.g. Ibuprofen (these may cause gastric bleeding).
- Monitor for warning signs.
- Daily check packed cell volume from day 3 of fever till day 2 after fever.

Referral

- Patient should be referred for platelet transfusion; if platelets are below 10,000/cu.mm, but the patient should not be discharged unless the platelets are more than 50,000/cu.mm.
- Extremes of age, pregnancy, peptic ulcer disease, menstruation, haemolytic anaemia, G6PD deficiency, thalaessemic patient, patients on steroids, NSAIDs or chronic conditions like Diabetes, Hypertension, Asthma, Cirrhosis should be considered as high risk patients and should be referred as early as possible, of needed.

Check Your Progress 6

1) Which of the following is not found in Dengue?

   A) Decreasing WBC B) Decreasing Platelets C) Decreasing leucocytes D. Decreasing Liver function tests

2.9 CHIKUNGUNYA

You have learned in previous section regarding various other vector borne diseases. Chikungunya is one of them which is transmitted by a bite of infected mosquitoes. It is a viral disease, which was first reported from Africa from where it has derived its name Chikungunya, meaning "that which bends up". This is a reference to the Chikungunya symptom where patients walk in a bent posture due to joint pain.

Two types of Aedes species are implicated in causing this disease, Ae. aegypti and Ae. Albopictus. Ae. aegypti mosquito (which you must be familiar from yellow fever section) is the primary transmission agent of Chikungunya Virus in Indian subcontinent. Aedes aegypti bites during daytime and breed in stored water. Presence of stagnated water in and around human inhabitation is one of the main causes of increased Aedes mosquito population.

2.9.1 Clinical Symptoms and Diagnosis

Chikungunya typically starts with one or more of the following symptoms - chills, fever, vomiting, nausea, headache and joint pain. Symptoms usually begin 3–7 days after being bitten by an infected mosquito. The attack is sudden and sometimes it is accompanied with rashes. Severe joint pain is the main and the

most problematic symptom of Chikungunya. Other less commonly seen symptoms includes mouth ulcers, loss of taste and conjunctivitis. Initial symptoms are similar to dengue fever. It is usually NOT life threatening and most patients feel better within a week. But the joint pains can last for a long time and full recovery may take months. Chikungunya disease does not often result in death, but the symptoms can be severe and disabling. People at risk for more severe disease include newborns infected around the time of birth, older adults (≥65 years), and people with medical conditions such as high blood pressure, diabetes, or heart disease. Usually patient gets life long immunity from infection and hence re-infection is very rare.

Diagnosis

Diagnosis is based on serological test and virological methods done on patient suspected of having chikungunya. Serological test includes Enzyme-Linked Immunosorbent Assays (ELISA), which may confirm the presence of anti-chikungunya antibodies. ELISA test is very sensitive but antibody levels are not enough during the first week after the onset of symptoms to be detected. The virus may be isolated from the blood during the first few days of infection. Various reverse transcriptase-polymerase chain reaction (RT-PCR) methods are available but are of variable sensitivity, so only some are suited for diagnosis. So samples collected during the first week after the onset of symptoms should be tested by both serological and virological methods (RT- PCR).

2.9.2 Primary Management and Referral

There is no specific antiviral drug treatment for chikungunya. Treatment is directed primarily at relieving the symptoms, including the joint pain using anti-pyretics, optimal analgesics and fluids. There is no commercial chikungunya vaccine.

- Typical treatment includes
  - Get plenty of rest.
  - Drink fluids to prevent dehydration.
  - Take medicine such as paracetamol to reduce fever and pain.
  - Do not take aspirin and other non-steroidal anti-inflammatory drugs (NSAIDS until dengue can be ruled out to reduce the risk of bleeding).
- If the patient is a confirm case of chikungunya, then prevent mosquito bites for the first week of the illness.
  - During the first week of infection, chikungunya virus can be found in the blood and passed from an infected person to a mosquito through mosquito bites.
  - An infected mosquito can then spread the virus to other people.

Since chikungunya is cured by immune system in almost all cases there is no need to worry. Alternative medical systems such as ayurveda and homeopathy have specific treatments for Chikungunya. Many of these treatments are helpful in reducing the symptoms especially the joint pain.

Preventive measures against chikungunya:

The proximity of mosquito vector breeding sites to human habitation is a significant risk factor for chikungunya. Prevention and control relies heavily on reducing the number of natural and artificial water-filled container habitats that support breeding of the mosquitoes. During outbreaks, insecticides may

be sprayed to kill flying mosquitoes, applied to surfaces in and around containers where the mosquitoes land, and used to treat water in containers to kill the immature larvae.

For protection during outbreaks of chikungunya, clothing which minimises skin exposure to the day-biting vectors is advised. Repellents can be applied to exposed skin or to clothing in strict accordance with product label instructions. Repellents should contain DEET (N, N-diethyl-3-methylbenzamide), IR3535 (3-[N-acetyl-N-butyl]-aminopropionic acid ethyl ester) or icaridin (1-piperidinecarboxylic acid, 2-(2-hydroxyethyl)-1-methylpropylester). For those who sleep during the daytime, particularly young children, or sick or older people, insecticide-treated mosquito nets provides good protection. Mosquito coils or other insecticide vaporisers may also reduce indoor biting.

Basic precautions should be taken by people travelling to risk areas and these include use of repellents, wearing long sleeves and pants and ensuring rooms are fitted with screens to prevent mosquitoes from entering.

We are yet to find a vaccine for Chikungunya. The good news is that a number of Chikungunya vaccines are in experimental stage. Currently the only way to prevent Chikungunya disease to avoid mosquito bites! Chikungunya virus spreads from human to human only through mosquito carrier. Hence mosquito breeding control is the best way to fight Chikungunya.

Check Your Progress 7

1) List the vectors causing Chikungunya.

   .....

   .....

2) True / False

   i) Eating infected poultry transmits Chikungunya. (T/F)

   ii) Severe joint pain is the most problematic symptom of Chikungunya. (T/F)

   iii) If not treated on time, Chikungunya may be life threatening. (T/F)

   iv) Chikungunya is self-limiting disease. (T/F)

3) Fill in the blanks:

   i) Vector of Chikungunya bites during……..

   ii) The symptoms of..... resemble Chikungunya during initial days of infection.

4) .....control is the best way to fight Chikungunya.

2.10 LET US SUM UP

In this unit we have discussed in details regarding various vector borne diseases, their symptoms to identify the disease early and diagnose using appropriate diagnostic test to confirm the disease so that prompt treatment can be started and timely referral could be done in case of an emergency. We have also discussed preventive and control measures to reduce the burden of communicable disease in India.

2.11 MODEL ANSWERS

Check Your Progress 1

i) A ii) C

Check Your Progress 2

i) B

ii) The fever attacks have three distinct stage:

1) **Cold Stage:** Headache, nausea, vomiting and chills with rigors. The temperature rises, and this stage lasts for an hour.

2) **Hot Stage**: The headache worsens and the body temperature is very hot. It lasts for 2–6 hours.

3) **Sweating Stage:** The temperature drops down to normal with profuse sweating.

Check Your Progress 3

1) C

2) Home management includes following measures:
   - drinking plenty of water
   - rest
   - limb elevation
   - wriggling of toes
   - cooling the limb with cold water.

Check Your Progress 4

1) D

Check Your Progress 5

1) Lethargy, Unconsciousness, Convulsion,

Check Your Progress 6

1) C

Check Your Progress 7

1) Aedes aegypti and Aedes Albopictus

2) i) False, ii) True, iii) False, iv) True

3) i) day time, ii) Dengue, iii) mosquito breeding

UNIT 3 COMMUNICABLE DISEASES 2 – INFECTIOUS DISEASES

Structure

3.0 Introduction

3.1 Objectives

3.2 Tuberculosis

- 3.2.1 Mode of Spread
- 3.2.2 Symptoms and Signs
- 3.2.3 Prevention

3.3 Diphtheria

- 3.3.1 Mode of Spread
- 3.3.2 Symptoms and Signs
- 3.3.3 Prevention

3.4 Pertussis

- 3.4.1 Mode of Spread
- 3.4.2 Symptoms and Signs
- 3.4.3 Prevention

3.5 Tetanus

- 3.5.1 Mode of Spread
- 3.5.2 Symptoms and Signs
- 3.5.3 Prevention

3.6 Poliomyelitis

- 3.6.1 Mode of Spread
- 3.6.2 Symptoms and Signs
- 3.6.3 Prevention

3.7 Measles (Rubella)

- 3.7.1 Mode of Spread
- 3.7.2 Symptoms and Signs
- 3.7.3 Prevention

3.8 Hepatitis-B

- 3.8.1 Mode of Spread
- 3.8.2 Symptoms and Signs
- 3.8.3 Prevention

3.9 Japanese Encephalitis (JE)

- 3.9.1 Mode of Spread
- 3.9.2 Clinical Features
- 3.9.3 Control of JE

3.10 National Immunisation Schedule

3.11 Typhoid Fever

- 3.11.1 Mode of Spread
- 3.11.2 Clinical Features
- 3.11.3 Control of Typhoid Fever

3.12 Hepatitis-A

- 3.12.1 Mode of Transmission

3.12.2 Clinical Spectrum
3.12.3 Control of Transmission
3.13 Let Us Sum Up
3.14 Model Answers

3.0 INTRODUCTION

In the present unit we will outline the clinico-epidemiological features of Vaccine Preventable diseases; vaccines used against them; and the immunisation programme employing these vaccines.

The Vaccine Preventable Diseases (VPDs) are the diseases which can be prevented by giving the vaccine. There are many such diseases, but under the UIP the major killer or disabling diseases of childhood are included. These are Tuberculosis, Diphtheria, Pertussis, Tetanus, Poliomyelitis and Measles. This unit describes the salient epidemiological features of these VPDs under the National Programme as well as how the disease could be prevented.

3.1 OBJECTIVES

After reading this unit, you will be able to:

- enumerate vaccine preventable diseases;
- explain mode of spread of infectious diseases;
- identify symptoms and signs of infectious diseases; and
- describe preventive measures for control of infectious diseases.

3.2 TUBERCULOSIS

Tuberculosis is a communicable disease caused by a bacterium *(Mycobacterium tuberculosis)*. It is one of the most frequent causes of death in the world. Global TB Report 2024: 10.6 million new cases; ~1.3 million HIV-negative deaths + 167,000 HIV-positive deaths; annual TB deaths ~1.3–1.5 million. It is highly prevalent in Asia and Africa. It usually attacks the lungs, but other parts of the body, including the bones, joints and brain might be affected.

3.2.1 Mode of Spread

Pulmonary tuberculosis is an air borne infection. When any infective case of tuberculosis coughs, large number of live bacilli is coughed in the air where they remain suspended for a variable period depending upon their size. A person inhaling air that containing TB bacilli becomes infected. Chance of spread of TB is more where people are living in overcrowded conditions, when they do not seek appropriate care in time and when a child is poorly nourished.

The risk of developing TB is highest in children under 3 years of age. Persons with weakened immune systems, such as those with HIV/AIDS, are most likely to develop the diseases than those with normal immune systems.

Incubation Period : The time from exposure to infection to the development of positive tuberculin test ranges from 3–6 weeks, and thereafter the development of disease depends upon

- Closeness and duration of contact
- Severity of disease in the index case
- Sputum positivity status of the index case

- Defense status of the host
- Precipitating factor(s) in host; such as an attack of measles or pertussis.

Thus, the incubation period may vary from weeks to years.

Infectivity

As long as bacteria is present in the infective material and environment.

3.2.2 Symptoms and Signs

Tuberculosis is suspected when an ill child has a history of chronic illness that includes cough and fever for 3–4 weeks or more, chest pain and hemoptysis, are considered as cardinal features of the disease. Weight loss, an inability to return to normal health after measles or whooping cough and history of contact with an adult case of pulmonary tuberculosis are the other features.

Extra-pulmonary disease may also be present, with manifestations suggestive of tuberculosis in other organs including the skeletal system, central nervous system, gastro-intestinal tract, genito-urinary system, eyes, ear, heart and skin.

In fact children are more likely to develop extra-pulmonary disease than adults. On examination there may be more than one symptoms, such as malnutrition, lymphadenopathy, chest pain, hepatomegaly and/or splenomegaly, meningeal signs and/or pleural effusion or ascites.

Among all forms of tuberculosis, Tubercular Meningitis (TBM), Miliary Tuberculosis and Disseminated Tuberculosis are the most dangerous forms. TBM is mostly seen in children between 6 months and 4 years of age and is characterised by signs of meningeal irritation, convulsions, cranial nerve paralysis and coma. In Miliary Tuberculosis, small discrete millet seed like shadows appear in all parts of the lungs. In Disseminated Tuberculosis, the bacilli spread to distant sites through lympho-haematogenous route and may reach liver, spleen, bones, joints etc.

3.2.3 Prevention

The best protection available for children against spread of tuberculosis infection is immunisation with BCG vaccine. Those having the disease should be promptly treated with appropriate anti-tubercular drugs. Early diagnosis and treatment under RNTCP will convert the patient to non-infectious type within 48 hours in majority of the cases and prevent further spread of the disease in the community.

BCG Vaccine

The letters B, C and G stand for Bacillus of Calmette and Guerin. "Bacillus" describes the shape of the bacterium. Calmette and Guerin are the names of the scientists who developed the vaccine. BCG vaccine comes in a powder form. Before use, it must be reconstituted with the accompanying diluent (Normal Saline). The reconstituted vaccine is even more sensitive to heat than the powder. Therefore, it must be used in the same session or within four hours whichever is earlier. During the session the vaccine should be kept in shadow or covered with black paper to prevent exposure to sunlight.

BCG vaccine protects the infants and young children against childhood tuberculosis. Its role in prevention of childhood miliary tuberculosis and tubercular meningitis is well documented.

Time of administration

BCG vaccine is given soon after birth, preferably, before the discharge of the patient from the hospital after delivery. As per UIP, it should be completed before the child

completes the first birthday. It should not be given to children who have signs and symptoms of AIDS. However, it is not contraindicated in HIV positive children.

Storage Temperature

BCG vaccine and diluent should be stored at a temperature between +2°C to +8°C in ILR.

BCG Administration Guidelines

	Recommendation	Comments
Age	At birth	If not given at birth, it can be given at 6 weeks of age with first dose of pentavalent and OPV, but at a different site.If missed at this age also, it must be given as a single dose any time before 12 months of age.
Dose amount	Newborn (upto 1 month of age): 0.05 ml Others (after 1 month): 0.1 ml	
Number of doses	One	
Injection site, route	Left upper arm at the insertion of deltoid, intra-dermal	The vaccine site is prepared by cleaning with sterile wet swab. But in no case should spirit or antiseptic be used.

Normal Reaction

After successful vaccination with the BCG vaccine, a small elevation (wheel of 5 mm) appears at the injection site. This usually disappears within 30 to 90 minutes. After approximately 3 to 4 weeks, an induration develops followed by a lump or papule of 5–8 mm in diameter. The papule ulcerates leaving a scar at the site of vaccination within 10–12 weeks. Nothing should be applied on it. Presence of scar tells you that the child has been successfully immunised.

Remember:

- Tuberculosis is one of the most frequent cause of death in the world.
- Annually 3–4 million people are dying, with up to 90% in developing countries.
- The annual TB death toll is around 1.3 to 1.5 million.
- Children are more likely to develop extra-pulmonary disease than adults.
- Immunising the child with the BCG vaccine at the right age, with the right dose and correct temperature prevents childhood tuberculosis.
- Reconstituted BCG should be used within 4 hours and should be protected from sunlight.
- Early diagnosis, prompt, appropriate and complete treatment under medical supervision makes the person bacteria free. Hence the patient becomes non-infectious to others.
- Defaulting in the treatment leads to multi-drug resistance cases which subsequently spread the resistant type of infection to others.

3.3 DIPHTHERIA

Diphtheria is a communicable disease caused by a bacterium known as Corynebacterium diphtheria. It tends to be a disease of the colder months and of temperate climatic zones. The bacteria produces a toxin, which causes local tissue necrosis. The bacteria and necrotic cells with serofibrinous material form a grayish white pseudomembrane. It bleeds when attempts are made to dislodge it. There is inflammation and oedema of the surrounding tissue. By its distal action, the toxin causes neuritis, myocarditis and renal damage. These complications have an important impact on the health of the affected individuals particularly myocarditis, which may lead to death.

3.3.1 Mode of Spread

The respiratory tract is the most common portal of entry. The secretions or discharge from an infected person/carrier is the source of infection. The disease spreads by droplet infection and direct contact as well as by fomites. The bacteria survive drying. Occasionally, vulva, conjunctiva, skin wound, internal ear are involved. People infected with diphtheria usually become ill within two to five days. Infected individuals can spread the disease to others for up to four weeks. During outbreaks and epidemics, some children may carry the germ without showing any signs or symptoms but can still spread the disease to other people (healthy carriers). The spread of the disease is facilitated in overcrowded and poor living conditions.

Incubation Period

The incubation period is 2–5 days.

Infectivity

The patient is infective till the virulent bacteria are present in the lesion which is usually 2–4 weeks.

3.3.2 Symptoms and Signs

The early symptoms are sore throat, loss of appetite, slight fever and cervical lymphadenitis when diphtheria affects the throat and tonsils. Within two to three days, a bluish-white or gray membrane forms in the throat and tonsils. If there is bleeding the membrane may become grayish-green or black. It sticks to the soft palate of the throat and bleeding may occur if attempts are made to remove it. In severe case, the membrane may obstruct airway. The patient may recover at this point or may develop severe weakness and die within six to ten days. Patients with severe disease may not necessarily develop high fever but may develop swelling of the neck and obstruction of the airway, which can cause death, if not managed properly.

In Laryngeal Diphtheria there is hoarseness of voice, croupy cough, inspiratory stridor with indrawing of chest, subcostal, suprasternal recession. Nasal diphtheria is characterised by serosanguinous/purulent rhinitis. It may be associated with shallow ulceration of nose and upper lip.

In cutaneous diphtheria, the lesions may be painful, red and swollen. Any chronic skin lesions may become infected with diphtheria.

Common Complications

- Myocarditis
- Toxic Neuropathy
- Palatal Palsy

- Facial or Laryngeal Nerve Palsy
- Polyneuritis
- Diaphragmatic Paralysis

3.3.3 Prevention

Early diagnosis and prompt treatment with antibiotic andAnti-diphtheria serum (ADS) may save the life and halt the spread of the disease.

The most effective way of preventing diphtheria is to actively immunise the child with the DPT containing "Pentavalent" Vaccine. Transplacentally acquired antibodies received from mother may protect the child for a short period (about six months maximum in majority of the cases).

Pentavalent vaccine is given at the age of 6 weeks, 10 weeks and 14 weeks followed by a DPT booster dose (First dose) at 16 months (16-24 months) under the Universal Immunisation Programme and a second booster dose is given at 5 years of age. The second dose is administered with a minimum gap of four weeks after the first dose.

How is it Stored?

Pentavalent and DPT vaccines should be stored at a temperature between +2° to +8°C. The diptheria and tetanus toxoid components and pertussis-killed bacilli of DPT vaccine are damaged by freezing and at a temperature above 8°C.

If DPT vaccine is kept for a long time, solid particles separate from the liquid and look like fine sand at the bottom of the vial. Shaking the vial mixes the vaccine and liquid again. However, if the vial was frozen any time, it will not mix-up and the floccules will be seen in the vaccine. This test is called the SHAKE TEST. A vial with positive Shake Test should not be used and should be discarded.

Adverse reaction of convulsion (though rare) is inherent in the 'Pertussis' component. Therefore, the DPT vaccine should NOT be given to children over 7 years of age or to the children who, suffered from convulsion in past following the dose of this vaccine.

Number and Amount of Doses

Three primary doses of Pentavalent vaccine at 6, 10 and 14 weeks and two booster doses are given, each containing 0.5 ml.

Where and How is it Given?

DPT is injected into the muscle (intra-muscular) on the antero-lateral side of thigh.

Side Effects: Reactions to DPT vaccine are usually mild which include:

- **Fever:** A child may have fever in the evening after receiving DPT vaccine. The fever should disappear within a day. Please note: fever that begins more than 24 hours after a DPT injection is unlikely to be a reaction due to the vaccine.
- **Soreness:** Some children may have pain, redness or swelling at the injection site.
- **Abscess:** An abscess may develop a week or more after a DPT injection. Please note that the abscess is not due to vaccine itself but due to error in technique of giving this vaccine. This is a programmatic error. Therefore, a close monitoring on the incidence of abscess is mandatory. The abscess can occur because:
  - An un-sterile needle or syringe was used
  - The vaccine was not injected into the muscle.

Abscess, following vaccination, is due to programmatic failure, which means due care is not taken at the time of sterilisation or due to faulty technique.

- **Convulsion** may occur rarely.

Pentavalent and DPT administration guidelines are given in the Box below:

	Recommendations	Comments
Age	**Pentavalent vaccine** 1st dose: 6 weeks 2nd dose: 10 weeks 3rd dose: 14 weeks **DPT vaccine** 1st booster: 16-24 months 2nd booster: 5 years	If a child is not given pentavalent vaccine at 6 weeks, it can be given as soon as possible thereafter. Wait 4 weeks between doses.
Dose amount	Usually 0.5 ml for each dose	
Number of doses	Three primary and two booster doses	
Injection site	Muscle of antero-lateral side of thigh	Never immunise in the buttock.

3.4 PERTUSSIS

A highly communicable disease caused by a bacteria known as Bordetella pertussis and occasionally by Bordetella parapertussis. Pertussis is a Latin word which means intense cough (Per = intense and tussis = cough). It occurs mostly in children upto 5 years of age. The children suffering from pertussis have bouts (paroxysms) of coughing spells, characterised by a typical whoop sound for which the disease is also called Whooping Cough. The word Pertussis is preferred to whooping cough as most of the infants do not have whoop.

The non-immunised children were attacked more. The incidence is more in areas with low coverage of Pentavalent/DPT vaccine. The disease is most dangerous in children under one year of age and leaves long-term respiratory disabilities.

3.4.1 Mode of Spread

The disease spreads by droplet infection with attack rate nearly 100%. It spreads very easily from person to person in droplets produced by coughing or sneezing. In many countries the disease occurs in regular epidemic cycles of three to five years.

Incubation Period

The incubation period is 3–12 days, and can be up to 21 days.

Infectivity

A week after the exposure to about 3 weeks after the onset of paroxysmal stage.

3.4.2 Symptoms and Signs

There are usually three distinct phases of the disease which are catarrhal, paraoxysmal and convalescence.

Catarrhal phase

- Common cold

- Running nose
- Watery eyes
- Sneezing
- Fever
- Mild cough

The catarrhal phase lasts for two weeks.

Paroxysmal Phase (2–4 weeks)

The cough gradually worsens and involves numerous bouts of rapid coughing. At the end of these bouts, the child takes in air with a high-pitched whoop. During the bout of cough, child may get sub-conjunctival haemorrhage. The child may turn blue because of lack of oxygen during long bouts of coughing. Vomiting and exhaustion often follow the coughing attacks, which are particularly frequent at night. The findings on physical examination between the paroxysms may be normal. This stage usually lasts for one to six weeks but may continue upon ten weeks. The attacks become milder with the passage of time.

Convalescence (2–4 weeks)

In this phase when recovery takes place, the number, severity and duration of attacks decrease to come to an end.

Complications

Complications are most common in young infants.

- Respiratory: Pneumonia, apnoea, laryngospasm, pneumothorax, emphysema and reactivation of tuberculosis are the most important respiratory complications. Most of the deaths are due to bacterial pneumonia.
- Subconjunctival haemorrhage, epistaxis.
- CNS: Cerebral hypoxia resulting into seizures. There are reports of intra-cranial haemorrhage also.
- Others: Poor intake, malnutrition, frenular ulcer, inguinal hernia, rectal prolapse.

3.4.3 Prevention

Whooping cough or pertussis is prevented by immunisation by killed bacterial vaccine, which is combined with diphtheria and tetanus toxoid. Primary immunisation with Pentavalent/DPT vaccine and booster doses as per UIP prevent pertussis. Though it is rare, it must be kept in mind that the DPT vaccine, because of its pertussis component, may cause convulsions. Therefore, the attendant of the child should be asked to wait for about half-an-hour after administration of DPT vaccine. It must also be kept in mind that if the child develops convulsions after the first dose of pentavalent vaccine, then next dose should be withheld.

Remember:

- Pertussis is a bacterial infection, which spreads from person to person by sneezing and coughing as well as through fomites.
- The disease is extremely contagious, especially where people live in crowded conditions with poor sanitation and nutrition.
- Infants and very young children are most vulnerable to infections that have serious complications and die from complications of the disease.

- The most effective way to prevent pertussis is to immunise all children below one year of age with 3 doses of pentavalent vaccine as well as administering two booster doses.

Check Your Progress 1

1) Fill in the blanks

   i) Causative organism for tuberculosis is.....

   ii) In Miliary tuberculosis small discrete millet seed like shadows appears in.....

   iii) BCG can be safely administered in ..... children also

   iv) A Pentavalent Vial with positive SHAKE TEST should be.....

   v) Route of administration for DPT is.....

2) True/False

   i) Lymphadenopathy is one of the Extra-pulmonary symptoms of Tuberculosis.

   ii) BCG vaccine must be reconstituted with distilled water.

   iii) Presence of scar after BCG administration means infant has been successfully immunised.

   iv) Pentavalent vaccine contains DPT and OPV.

   v) Causative organism for Tetanus is spread through soil.

3.5 TETANUS

It is a communicable disease caused by an anaerobic organism, Clostridium tetani. The organism is present in soil, dust and alimentary tract of various animals. The organism forms spores, which may survive boiling but not autoclaving. It produces a toxin tetanospasmin, which is responsible for the spasm of muscles in affected persons. Because of the spasms, the face and body assume an abnormal condition.

It can affect any age but the disease in newborn, known as Neonatal Tetanus (NNT), is very fatal. The tetanus occurs due to contamination of wound by soil and dirt. A child with otitis media is also vulnerable to develop tetanus. NNT can occur due to cutting of cord by un-sterilised blade or application of dirty substance on umbilical stump of the newborn baby of a mother who did not receive proper immunisation against tetanus during pregnancy.

Tetanus is an important endemic infection in India.The goal is to eliminate NNT to the level below 1 case per 10,000 live births in every district. For all deliveries to be conducted by trained personnel.

Districts are classified in India into 3 categories:

	Rate/1000 L B		TT_2 Coverage (%)		Attended Deliveries (%)
NT high risk	> 1	**OR**	< 70	**OR**	< 50
NT control	< 1	**AND**	> 70	**AND**	> 50
NT elimination	< 0.1	**AND**	> 90	**AND**	> 75

Maternal and neonatal tetanus have been eliminated from India and South East Asian Region (SEAR) in 2016.

3.5.1 Mode of Spread

Tetanus is not transmitted from person to person. A person may become infected if soil or dung enters a wound. Tetanus germs are likely to grow in deep puncture wounds caused by dirty nails, needles, barbed wire, thorns, wood splinters and animal bites.

A newborn baby may become infected if the knife, razor or other instrument used to cut the umbilical cord is dirty or rusted and contains germs. Infection may also occur if cow dung or ash is applied to dress the cord or if soil enters the baby's naval. Infants and children may also contract tetanus through dirty Instruments used for circumcision, scarification and skin piercing, tattooing and when dirt, charcoal or other unclean substances are rubbed into a wound.

Incubation Period

The NNT usually manifests between 3–12 days of birth. In older children and adults, the incubation period is usually between three to ten days, but may be as long as three weeks. The shorter the incubation period, more is the severity of disease and higher is the risk of death.

Infectivity

It is not transmitted from person to person.

3.5.2 Symptoms and Signs

In older children, there is masseter spasm leading to lockjaw (trismus) and difficulty in swallowing. This is followed by stiffness, difficulty in chewing, dysphagia, drooling of saliva and neck muscle spasm. There may be fever. Characteristically, the muscle spasm can be triggered by touch, light of sound. Sensorium remains normal. Newborn baby with tetanus (NNT) appears normal at birth but is unable to suck at the onset of disease after 3 days of birth. This is the presenting feature. Later, they develop typical face of tetanus (clenching of jaw, laterally drawn lips and raised eyebrows) with lockjaw; even contraction of muscles of the face is visible. The whole body becomes stiff, severe muscle contractions and convulsions occur, the body is bent backwards in a bow shape due to spasm of muscles of back and death follows in most cases.

3.5.3 Prevention

Neonatal Tetanus can be prevented by:

- Immunising pregnant women with two shots of Inj Current recommendation is to give two doses of Td vaccine (tetanus + reduced diphtheria toxoid) during pregnancy, which should be administered at the interval of 4 weeks each — 2nd dose/booster dose (in case two doses given in the earlier pregnancy) given atleast 4 weeks before delivery
- Deliveries by trained personnel and training Traditional Birth Attendants (TBA)
- Conducting deliveries by following 5 Cleans

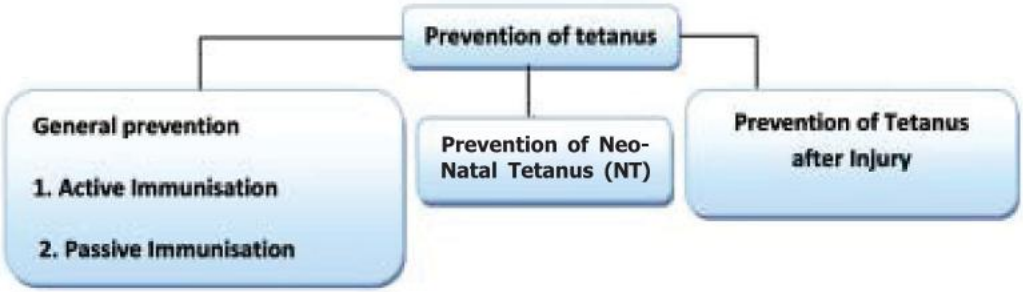
- Encouraging institutional deliveries

Please refer in details of Universal precautions in Practical Course 3, Block 2, Unit 1.

Five Cleans

- Clean surface
- Clean Hands
- Clean razor blade
- Clean cord tie
- Clean cord stump without any applicant

Other measures of prevention of tetanus include –



Passive Immunisation

- Surgical cleaning of wound/ removal of foreign body or necrotic tissue should be done under cover of antibiotic and TIG.
- Tetanus immunoglobulin (TIG) 250–500 units I.M. should be given in high risk cases before the onset of symptoms.

Active Immunisation

- Tetanus is best prevented by active immunisation with Td.
- All pregnant women should receive two doses of tetanus toxoid. The first dose is given as soon as the pregnancy is detected followed by a second dose after a minimum gap of 4 weeks.
- This protects both the mother and the newborn from tetanus.
- The routine immunisation with pentavalent, DPT and Td at appropriate age (6,10 and 14 weeks , 16–24 months, 5 , 10 and 16 years) as per UIP schedule protects the child against tetanus for lifelong.

Remember:

- Neonatal tetanus remains a serious health problem in areas with poor immunisation coverage and unclean delivery practices, which are followed during the childbirth.
- If untreated, tetanus is a very fatal disease at any age.
- The mortality is very high.
- Tetanus is caused by Clostridium tetani found in the natural environment.
- All pregnant women should receive atleast two doses of Td at the interval of 4 weeks each. The last one should be atleast 4 weeks before the expected date of delivery.

- Infection occurs due to injury by an unclean objects or cutting umbilical cord with un-sterile blade during unclean delivery practices.
- Remember 5 clean. i.e. clean surface, clean hands, clean blade, clean cord tie and clean umbilical cord.
- Majority of newborns with tetanus die i.e. NNT has nearly 100% mortality rate.

Td Vaccine

Td (Tetanus-diphtheria) vaccine is a toxoid vaccine protecting against tetanus and diphtheria. In pregnancy, maternal antibodies cross the placenta to protect newborns from NNT and mothers from tetanus.

How is it Stored?

Tetanus toxoid should be stored at a temperature between +2°C and +8°C. It should never be frozen or exposed to temperature above +8°C.

When is it Given?

Under the UIP, a pregnant woman is given two doses of Td. First dose is given as soon as pregnancy is detected and the second dose is given four weeks after the first dose. It should also he ensured that the last dose is given atleast 4 weeks before the expected date of delivery. If the woman has received two doses of TT within the last 3 years, then only one booster dose needs to be given during present pregnancy.

National Immunisation Schedule for Pregnant Women				
Vaccine	**When to give**	**Dose**	**Route**	**Site**
TT-1	Early in pregnancy- including first trimester	0.5 ml	IM	Upper arm
TT-2	After minimum 4 weeks of TT-1 but before 36 completed weeks	0.5 ml	IM	Upper arm
TT-Booster	If received 2 TT doses in last 3 years, then only a booster dose is required	0.5 ml	IM	Upper arm
TT	10 & 16 years	0.5 ml	IM	Upper arm

TT is also given to all children at 10 and 16 years of age under routine immunisation programme.

Number and Amount of doses

Two doses are given, each of 0.5 ml, given atleast 4 weeks apart.

TT – periods of protection

Beneficiary	**When given**	**Period of Protection**
Pregnant women	TT1 : as early as possible in pregnancy	

Beneficiary	When given	Period of Protection
	TT2 : atleast 4 weeks after TT1	
Children	At 10 years of age (2 doses if not given before) At 16 years of age (2 doses if not given earlier)	3 years 3 years
(5+2) doses schedule	Pentavalent at 6, 10 and 14 weeks DPT booster doses at 16-24 months and 5 years of age Td at 10 and 16 years of age	Long term immunity

Where and How is it Given?

TT is injected into the muscle of the upper arm.

Side Effects

After injection a woman may have mild pain, redness, warmth and swelling for one to three days at the injection site. This is very mild and does not require any treatment.

Prevention of Tetanus after Injury

	Surgical Toilet in all Wounds	
	Wounds < 6hrs, Clean, non-penetrating with negligible damage	**Other Wounds**
	Immunity category & Tx	**Immunity category & Tx**
A	Nothing more required	Nothing more required
B	Toxoid 1 dose	Toxoid 1 dose
C	Toxoid 1 dose	Toxoid 1 dose+Human Tet Ig
D	Toxoid complete course	Toxoid complete course +Human Tet Ig

A- Those who have completed the full course of Tetanus toxoid with in past 5 years

B- Those who have completed the full course of Tetanus toxoid >5 years but < 10 years ago

C- Those who have completed the full course of Tetanus toxoid > 10 years ago

D- Those who have not completed the full course of Tetanus toxoid or in whom the immunisation status is unknown

3.6 POLIOMYELITIS

Poliomyelitis is a communicable disease due to an acute viral infection caused by an RNA virus, known as Poliovirus. It has three sero-types — 1, 2 and 3. All of these sero-types can cause paralysis. However, most outbreaks of paralytic poliomyelitis are due to type-I virus. Paralytic poliomyelitis is the most common cause of acute

flaccid paralysis in the country. However, with the intensified pulse polio immunisation programme, its incidence rate has substantially declined.

The last case of Polio in India was reported in 2011 and finally in 2014 the SEAR was declared as "POLIO FREE". However, the present challenge in the post elimination era is to maintain the same status and to guard against importation of cases.

The poliomyelitis is a crippling disease, which can affect any age but was more common in children below 15 years of age. In India, the median age of onset of paralysis is 18 months with a range from 3 months to 5 years with maximum occurrence– between 6 months and 2 years of age. There is a seasonal variation. Maximum number of cases occurs in the hot and humid season.

Man is the only reservoir. Infection spreads from person to person. It is difficult to trace the source of a case, as there are a large number of inapparent infections. A long-term carrier state was not known to occur. Polio is a candidate for eradication.

3.6.1 Mode of Spread

Main route of transmission of virus is faeco-oral route. It is excreted in stool of patients for 6–8 weeks after illness and enters the body through the mouth with contaminated food and drinks as a result of poor personal hygiene, flies or filth. The disease may be waterborne due to sewage contamination of drinking water. Thus, the disease is most likely to spread in areas of poor sanitation. The virus enters the blood stream and invades anterior horn cells of Spinal Cord, bulbar nuclei and motor cortex. Hot humid climate, in summer months, helps viral proliferation while rainy season helps in its spread.

The disease spreads very easily. Nearly all children-living in households of index case get infected. Affected person can spread the virus seven to ten days before and after onset of symptoms.

Incubation Period

Incubation period is 7–10 days (ranges from 3 to 35 days)

Infectivity

In the faeces, the virus is excreted commonly for 6–8 weeks, sometimes longer up to 4 months. Infected persons, without any symptoms, can also spread the disease.

3.6.2 Symptoms and Signs

Some people infected with the virus may not show any sign or symptom while others may have influenze–like symptoms such as fever, loose stools, sore throat, stomach upset, or headache. Sometimes, there may be pain or stiffness in the neck, back and legs.

In the typical paralytic poliomyelitis, the child develops fever, which is soon followed by asymmetrical loser motor neuron flaccid paralysis. The muscles of one or more limbs may be paralysed. Sometimes, paralysis of the muscles of respiration makes breathing impossible without the help of a mechanical ventilator. Sensory loss does not occur. Diagnosis is confirmed by isolation of wild poliovirus from the stool specimen.

Complications

About 1% of the total infected children become paralysed and a larger percentage of these children have some permanent paralysis. Death may occur in case of bulbar poliomyelitis if the muscles used for breathing are paralysed.

3.6.3 Prevention

Polio prevention involves immunisation with Oral Polio Vaccine (OPV). Antibodies from the mother provide protection to the infant for two to three months or even less after birth. Infected people who recover can develop natural immunity against the particular type of poliovirus only.

Remember:

- Polio is caused by a virus and can lead to severe lifelong disability.
- It affects mainly children between 7 months to 2 years.
- Main route of transmission of virus is faeco-oral route.
- Most outbreaks of paralytic poliomyelitis are due to type-I virus.
- Many people who contract polio do not necessarily develop paralysis but may continue to spread infection.
- About one in every 100 to 1000 children, with symptoms, develops paralysis.
- In the faeces, the virus is excreted commonly for 6–8 weeks, sometimes longer up to 4 months.
- OPV is an effective vaccine for prevention of poliomyelitis provided cold chain is properly maintained at a temperature of +2° to +8°C.
- OPV is very heat sensitive vaccine.

Polio Vaccine

It is a live attenuated vaccine-containing 3 of sero-types of Poliovirus.Oral polio vaccine (OPV) gives protection against the three-serotypes of virus that cause poliomyelitis.

The colour of the vaccine may either be pink or yellow or colourless. All are good for use so long as the date of expiry has not passed and the Vaccine Vial Monitor (VVM) on the label of the vial shows it to be potent.

What Type of Immunity it Offers

OPV produces both local and circulating antibody while injectable polio vaccine offers only circulating antibody. In addition, it also multiplies in the gut and released in the environment as vaccine virus and community members through faeco-oral contamination.

Storage Temperature

OPV should be stored at a temperature of –20°C in the stores of manufacturers, MSDs, States and districts. It should be transported from manufacturers/MSD to State/ regional/ district stores preferably at this temperature. However with $MgCl_2$ as stabiliser it could be stored at +2 to +8°C for shorter period (120 days). But in no case, PHC should preserve this vaccine for more than one month.

When is it Given?

OPV should be given:

- At birth (ZERO DOSE) in case of institutional delivery
- 1st Dose at 6 weeks of age
- 2nd Dose at 10 weeks of age
- 3rd Dose at 14 weeks of age
- Booster Dose at 16 months (16 –24 months)

- In addition, It is also given to all children under 5 years of age on National Immunisation Days as PULSE POLIO Campaign.
- The interval between the doses must be at least four weeks.

Now also one dose of IPV has been included to be given along with third dose of OPV at 14 weeks of age.

Number and Amount of Doses?

Three primary doses and one booster dose are given each of two drops. If a child has diarrhoea, give OPV as usual but administer an extra dose i.e. a dose, atleast four weeks after he or she has received the last dose in the schedule.

One dose of IPV is given at 14 weeks along with third dose of OPV.

Where and How is it Given?

OPV is dropped in the mouth with the dropper that comes with the vaccine.

IPV is given intra muscular on the antero-lateral aspect of the thigh.

Side Effects

OPV has no side effects.

Remember:

- OPV is recommended for the eradication of polio under the UIP.
- It is cheap, easy to administer, highly effective and safe.
- The UIP schedule comprises of 3 doses, given at interval of 4 weeks, starting at 6 weeks of age. A dose at birth, if it is an institutional delivery is also recommended. This is known as the zero dose.
- IPV is also now recommended to be given as a single dose at 14 weeks along with the third dose of OPV.

Polio Eradication

Important strategies under the polio eradication programme are:

- **Supplementary Immunisation:** (Mass immunisation) through National Immunisation days (Pulse Polio Programme and Intensified Pulse Polio Programme) for the children aged 0–59 months and Sub-National Immunisation days (SNID) for the high-risk areas. Normally, two rounds targeting to cover 100% children of target age group and additional rounds varies from 2–4 rounds for SNIDs.
- **Strengthening routine Immunisations** so as to reach very high coverage among the target groups of beneficiaries as infant for primary immunisation and children in 1–2 year's age group for the booster.
- **Enhanced surveillance of Acute Flaccid Paralysis**: The reporting of the occurrence of Acute Flaccid Paralysis has been made mandatory by the government.

Remember:

All cases of ATP in children under 15 years of age are to be reported immediately and to be investigated within 48 years of reporting. Stool collected after 14 days has less chances of virus isolation though it could be collected up to 60 days. Sensitivity of AFP reporting means— rate of Non-polio AFP should be 1 case per 100,000 or more.

- Mopping Up
- Advocacy and Social Mobilisation

Check Your Progress 2

1) List symptoms and signs of Pertussis.

.....

.....

.....

2) Explain the causation of Neo-Natal Tetanus (NNT)

.....

.....

.....

3) Define Polio Myelitis and explain its mode of spread.

.....

.....

.....

3.7 MEASLES (RUBEOLA)

The word Rubeola means red spots. Measles is an acute infectious disease of childhood caused by a virus known as the Measles virus and characterised clinically by fever, cough, coryza, conjunctivitis and Koplik's spots followed by generalised skin rashes, which appear on the 4th day of the illness. It causes high morbidity and mortality in developing countries.

In India, measles remains a significant cause of childhood morbidity and mortality, though its burden has decreased due to MR vaccine scale-up. Hospitalized CFR is 4–8%, higher in areas of poor access or immunocompromised children. Historically, CFR ranged from 200–1,500/100,000 without vaccination; in developed countries it is <0.2/10,000. Recent immunization has drastically reduced under-5 prevalence, though outbreaks persist in low-coverage or vaccine-hesitant pockets.

It is a highly contagious disease. It spreads very easily, constantly present in some populations and often occur in epidemic proportions. In conditions of crowding and poverty, where large numbers of non-immunised people are in close contact, it is easy to have outbreaks. The disease is more common between 9 months to 3 years of age. Newborns and young infants are protected by maternal antibody transferred through placenta. Humans are the only reservoirs.

Measles vaccine coverage is comparatively poor amongst the UIP vaccines. Measles shows cyclic trend. After an attack of Measles, malnutrition of the child occurs and if Measles occurs in malnourished child, it will be very dangerous.

3.7.1 Mode of Spread

Measles is an airborne disease transmitted by droplet infection. When a patient suffering from measles sneezes or coughs, large numbers of airborne droplets are released in

the air. Inhalation of these droplets spreads disease to others. Such transmission by airborne droplets can occur even two hours after an infected person has left a room or closed area. The portal of entry is respiratory tract. The disease spreads easily wherever infants and children gather together.

Incubation Period is 10 days.

Period of Infectivity

An infected person can infect others from 4 days before onset of rash to 5 days after appearance of rash.

3.7.2 Symptoms and Signs

The incubation period is 10 days (ranges from 7 to 18 days). The first sign of infection is high fever lasting one to seven days. During this period there may be running nose, cough, red and watery eyes and also small white spots inside the cheeks (Koplik's spots). After a few days, usually 4th day, a slightly raised rash develops which spreads from the face and upper neck down to the body, then to the hands and feet over a period of about three days. It lasts for five to six days and fades successively from the same areas. There may also be loss of appetite and loose stools, especially in infants.

Need of Special Attention

The following points need special attention:

- Measles is notorious for its complications, which occur particularly in children under 5 years.
- Immediate post-measles complications are diarrhoea, pneumonia, malnutrition and signs of vitamin A deficiency (acute depletion may lead to keratomalacia and blindness), otitis media, encephalitis and deaths.
- Pneumonia is the commonest cause of death associated with measles. This is usually because the measles virus weakens the immune system. The pneumonia may be caused by the measles virus itself or by other germs.
- The most serious complications are the neurological complications, which include Febrile Convulsion, Encephalitis and Sub-acute Sclerosing Pan-encephalitis (SSPE).
- An attack of measles reactivates dormant tuberculosis.
- Measles is an important contributor to incidence of malnutrition.
- Measles is a major cause of blindness among children because of development of acute deficiency of VitaminA during an attack of Measles. Malnourished children are more prone to develop this complication.
- People who recover from measles are immune for the rest of their lives. Infants born to mothers, who have had measles, are usually immune for six to eight months.

If any parent reports with child with the above mentioned common complications, history of measles within last 2 months should be asked.

Management of a Case

- There is no specific anti-viral drug against measles virus.
- Patients are managed symptomatically with supportive measures only.
- Vitamin A, two lakh international units for > 1 year and one lakh international units for < 1 year, reduces severity of the disease and prevents further deficient of

Vitamin A. This helps in prevention of blindness. All children with measles should receive vitamin A supplementation as soon as they are seen at a health facility.

- Feeding should be continued as there is a tendency to withheld food during and after the attack of Measles.
- The treatment of dehydration with oral rehydration solution for diarrhoea is necessary.
- For pneumonia, antibiotics may be necessary.

3.7.3 Prevention

The prevention of measles involves immunisation with measles vaccine. Children should receive one dose of the vaccine at the age of 9 months (9–12 months).

Remember:

- Measles related illnesses are one of the main causes of death among young children.
- It kills about one million children a year worldwide.
- Infants and adults are especially likely to have severe complications resulting front measles.
- It is very important to encourage children with measles to eat and drink to prevent malnutrition.

Measles Vaccine

It is a live attenuated viral vaccine. Measles vaccine comes in powder form together with a diluent. Before it can be used, it must be reconstituted. Reconstituted measles vaccine must be used within four hours or disposed off.

Note: Vitamin A is given at the same time as measles vaccine.

How is it Stored?

Measles vaccine should be stored at a temperature between +2°C to 8°C. Freeze dried measles vaccine is not damaged by freezing, but damaged by temperature persistently above 8°C.

When is it Given?

Measles vaccine is usually given as soon as possible after completion of 9 months of age.

Maternal antibodies against measles last longer than other antibodies. So, immunisation with measles vaccine is often not effective before 9 months of age.

Number and Amount of Doses

One dose of 0.5 ml vaccine is given.

Where and How is it Given?

Measles vaccine is injected into the subcutaneous layer of skin, in the upper right arm (conventionally BCG is given in left arm).

Side Effects

A mild fever and rash lasting one to three days may occur approximately a week after immunisation.

Notes

- Measles vaccine is very safe if reconstituted vaccine is used within 4 hours and one sterilised syringe and needle is used for each injection. However, severe

complications like convulsions have occurred in 0.02 to 190 per 1 lakh vaccinated individuals, compared with 500 to 4,000 per 1 lakh measles cases. Similarly, encephalitis has been observed in 1 per 10 lakh vaccinated individuals, compared to 500 to 4.000 per 10 lakh measles cases.

- There is always risk of Toxic Shock Syndrome (TSS) due to growth of Staphylococcus aureus. If the process of sterilisation is not followed strictly during measles vaccination or if vaccine is used beyond 4 hours after reconstitution. This is a programmatic error. All efforts should be made to ensure that such programmatic errors do not occur. You should know that programmatic error is responsible for 58% of the adverse events following immunisation.

  For details please refer Practical Course 3, Block 6, Unit 6 about immunisation and safe injection practices.

3.8 HEPATITIS-B

There are different types of Hepatitis virus, namely, A, B, C, E & delta Hepatitis etc. These antigenically different viruses have different modes of transmission. The extent of complications and fatality are also different. Among these groups of virus, Hepatitis B needs special attention. It is different from Hepatitis A & E.

- A major public health problem
- 200 crore people exposed globally
- WHO recommends HB vaccine for all children, worldwide
- Hepatitis B is different from Hepatitis A and Hepatitis E
- Hepatitis B is also transmitted like HIV (blood, sex) but it is 100 times more infectious
- Virus can survive for weeks outside body.

Hepatitis B (also known as Serum Hepatitis) is an acute systemic infection with major pathology in the liver caused by Hepatitis B virus (HBV). The usual route of transmission is parenteral route. Usually it is an acute self-limiting infection, which may be either sub-clinical or symptomatic. In approximately 5 to 15 per cent of cases, HBV infection fails to resolve and the affected individuals then become persistent carriers of the virus. Persistent HBV infection may cause progressive liver disease including active hepatitis and primary liver cancer.

- Persons first infected as adults become ill, but seldom become chronic carriers (less than 15%)
- Infants infected may not show symptoms, but high risk of chronic carriage (more than 90%)
- Chronic carriers at high risk of deadly liver disease later in life, including liver cancer.

Hepatitis B is a major public health problem in India. Out of the total burden of viral hepatitis, 30–40% is because of Hepatitis B. Since many cases go unreported or unrecognised, the actual number of Hepatitis B cases would be difficult to ascertain.

The chronic carrier rate in India is ≈296 million living with chronic hepatitis B worldwide.

3.8.1 Mode of Spread

The Hepatitis B is present in high concentration in blood, serum, serous exudates, saliva, semen, vaginal fluids and most other body fluids. However, it is usually spread by contact in the following ways:

- Perinatal transmission from carrier mother to newborn.
- Cracked nipples of carrier mother may help to spread infection during feeding by ingestion of contaminated blood.
- Transfusion of infected blood or blood products.
- Injections with un-sterilised needles or syringes containing Hepatitis-B virus from an infected person.
- Transmission between children during social contact through cuts, scrapes and scratches.
- Transmission during sexual intercourse with infected person or carrier.

> **Remember:**
>
> It is not spread by air, food or water. It is not transmitted through breast milk, tears, sweat, urine, stool and droplet nuclei.

The disease occurs all over the world and can affect all age groups. Most chronic carriers are in China, South-East Asia and Africa.

Incubation Period

The incubation period varies between 6 weeks to 6 months.

Period of Infectivity

Between one and two months before and after the detection of symptoms.

3.8.2 Symptoms and Signs

- **Asymptomatic:** Sufferers of chronic carriers of HBV infections are often asymptomatic.
- **Acute Viral Hepatitis:** Features are same as in other forms of viral hepatitis—i.e. Fever, Abdominal discomfort, vomiting, passing of high colour urine, pain abdomen, hepatomegaly etc. The duration of jaundice is usually longer than in other viral hepatitis (> 14 days).

Chronic Viral Hepatitis

- **Chronic Persistent Hepatitis:** Liver enlargement and elevation of SGPT. It can progress to Chronic Active Hepatitis. Diagnosis is confirmed by liver biopsy.
- **Chronic Active Hepatitis:** Variable constitutional symptoms especially fatigue, persistent or intermittent jaundice, arthralgia, arthritis, purpura, nephritis and generalised vasculitis (polyarteritisnodosa). SGPT level is high. Like Chronic Persistent Hepatitis, the diagnosis is confirmed by liver biopsy.

Complications

The consequences of acute infection can be severe. Death occurs in a small percentage of adults. In most serious complications, including chronic hepatitis, liver failure and liver cancer occur in persons with chronic infection.

3.8.3 Prevention

There is no treatment for Hepatitis B.

- By following the measures of Universal Precautions like hand washing, wearing gloves etc. For details please refer Practical Course 3, Block 2, Unit 1 about Universal Precautions.

Further, occurrence of Hepatitis B could be brought down by:

- Universal immunisation of infants with Hepatitis B vaccine: In India, 9th Five Year Plan approach paper recommended introduction of Hepatitis B immunisation in UIP.
- Universal screening of pregnant mothers for HbsAg and appropriate management of newborns.
- Use of safe blood and blood products.
- Use of sterile separate needle and syringe for each injection, For details please refer Practical Course 3, Block 6, Unit 6 about safe injection practices.
- Prevent drug addiction and sexual promiscuity.
- Use of condoms.
- Careful handling of blood and blood products by health care personnel.
- Careful handling of secretions of patients while nursing or examining a patient.

Remember:

- Hepatitis B is a viral infection
- Globally, there are about 2,000 million people who are exposed to the risk of Hepatitis B
- One in every 20 Indian is a carrier of Hepatitis B
- Children below seven years have the highest infection rates
- Most babies born to mothers who are carriers also become carriers
- About 25% of babies who are infected with Hepatitis B virus subsequently develop severe chronic liver disease or even liver cancer
- One per cent of the total deaths in India is due to Hepatitis B virus

Hepatitis-B Vaccine

The Hepatitis B vaccine is available in two varieties:

- Plasma derived
- Recombinant vaccine

It is given as a birth dose and it is also a component of the Pentavalent vaccine for which 3 doses are given at 6, 10 and 14 weeks. For details please refer Practical Course 3, Block 6, Unit 6 about immunisation and safe injection practices.

Hepatitis B Vaccine is a cloudy liquid that comes in a ten-dose vial. If Hepatitis B Vaccine kept stationary for a long time it separates front the liquid and looks like fine sand particle at the bottom of the vial.

Storage Temperature

Hepatitis B Vaccine should be stored at a temperature between +2°C and +8°C. Both

heat and freezing damage Hepatitis B Vaccine. Use the shake test to find out if it has been frozen as in case of DPT and TT.

When is it Given?

Government of India, at present, follows this schedule

- Zero dose given at birth
- At 6 weeks – dose 1 of the pentavalent vaccine
- At 10 weeks – dose 2 of the pentavalent vaccine
- At 14 weeks – dose 3 of the pentavalent vaccine.

Where and How is it Given?

Hepatitis B vaccine is injected in the muscle of the antero-lateral side of the upper thigh.

Hepatitis B immunoglobulin (HBIG)

For immediate protection, HBIG is used for those acutely exposed to HBsAg-positive blood, for example (a) surgeons, nurses or laboratory workers (b) newborn infants of carrier mothers (c) sexual contacts of acute hepatitis B patients, etc. The HBIG should be given as soon as possible after an accidental inoculation (ideally within 6 hours and preferably not later than 48 hours).

National Viral Hepatitis Control Program (NVHCP)

The GOI has decided to launched NVHCP for preventive and control of viral hepatitis with a view to provide free of charge screening, diagnosis, treatment and counselling service to all, and specially to people belonging to risk groups.

AIM-

1.Combat hepatitis and achieve country wide elimination of hepatitis C by 2030

2.Achieve significant reduction in the infected population, morbidity and mortality associated with hepatitis B and C viz cirrhosis and hepatocellular carcinoma.

3.Reduces the risk, morbidity and mortality due to hepatitis A and E.

COMPONENTS

1.Preventive component-

A) Awareness Generation.
B) Immunization of Hepatitis-B (Birth Dose, High Risk Group, Health Care Worker).
C) Safety of Blood and Blood Products.
D) Injection Safety, Safe Socio Cultural Practices.
E) Safe Drink Water, Hygiene and Sanitary Toilets.

2.Diagnosis and Treatment

a) Screening of pregnant women for HBsAg, there referral for institutional delivery for birth dose hepatitis B vaccination and Hepatitis B Immunoglobine.
b) Free screening ,diagnosis, and treatment for both hepatitis B and C.

c) Engagement with community/Peer support to enhance and ensure adherence to treatment and demand generation.

3 Monitoring and Surveillance

a) Monitoring by hepatitis information and management portal (NVHCP MIS portal)
b) Surveillance of acute viral hepatitis , chronic viral hepatitis and its sequalae.

Service Delivery Component: - 2 Aspects

1. Synergies with existing programs and relevant Ministry of Government of India.
2. Diagnosis and Management of Viral Hepatitis with focus on treatment of Hepatitis B & C.

Synergies with existing programs: - UIP, NACP, safety of blood products, harm reduction in key population (FSW), MSM, transgender, PWID, Injection safety and Infection control, IDSP Swachh Bharat Mission-Rural and Urban Ministry of drinking water and sanitation food safety and standards authority of India (FSSAI)

Diagnosis and Management:- CHO at HWC- rapid diagnostic test for HBV & HCV, referred for confirmation.

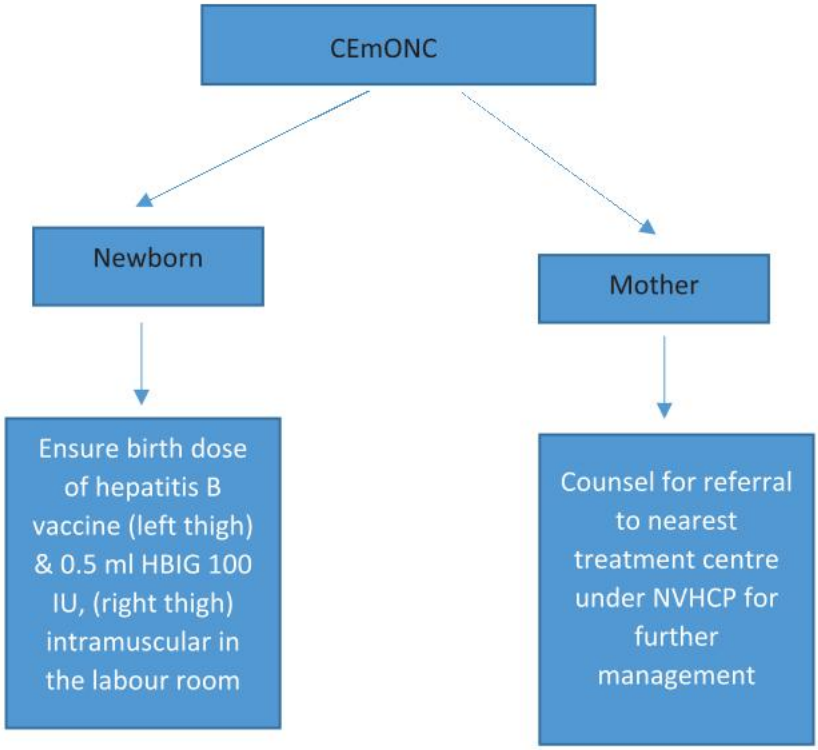
Approach to diagnosis of viral hepatitis

A patient with acute or viral hepatitis may present at a health care setting with or without jaundice the patient may be referred by health worker for investigation after taking a written informed consent with a complete test requisition form.

Self-presenting asymptomatic individual at high risk may be provided access to testing by CHO.

Testing for HBV in Pregnant Women (Prevention of mother to child transmission of hepatitis B virus)

- Hepatitis B is most commonly transmitted for mother to child. It is a vaccine preventable disease.
- Screen All Pregnant women in the first antenatal visit for hepatitis B virus HBV infection by detecting HBsAg in serum/plasma whole blood specimen using rapid tests.
- Categorize HBV positive pregnant women as high risk pregnancy.
- Counsel the pregnant women for institutional delivery and promote screening of her first degree relatives for HBV infection.
- Screening facilities to share tha line list of screened positive pregnant women with the district nodal officer (NVHCP) to track the positive women for ensuring institutional delivery (monthly).
- Ensure referral of these women for institutional delivery at designated Comprehensive Emergency and Newborn Care (CEmONC) centre where birth dose hepatitis B vaccine and Hepatitis B immunoglobulin (HBIG) is available.
- Ensure availability of hepatitis B vaccine and HBIG in the labour room tray.
- Ensure universal precaution during delivery to protect healthcare provider.



Treatment Site:-

1. Model Treatment Centre
2. Treatment Centre

Model Treatment Centre-

- To ensure screening/diagnosis in suspected cases of hepatitis B and C infection.
- Treatment and management of viral hepatitis and adhere to national guidelines and protocols.
- Manage the complicated cases referred from treatment centers.
- Maintained the data base and ensure timely reporting.

Treatment Centre-

- To ensure screening/diagnosis in suspected cases of hepatitis B and C infection.
- Management of uncomplicated cases and adhere to national guidelines and protocols.
- Referral for complicated case to MTC.
- Maintained the data base and ensure timely reporting.

Patient entry and service register

Level	Patient entry	Diagnostics			Management	
		Screening (RDT)	Diagnosis ELISA/ CLIA;LFT molecular	Advanced diagnostics/ Quality Control	Uncomplicated	Complicated
	HWC					
	PHC					

3.9 JAPANESE ENCEPHALITIS (JE)

JE is a viral zoonotic disease **Agent**: group B arbovirus (Flavivirus). Several extrahuman hosts, e.g., animals and birds.

3.9.1 Mode of Spread

Basic cycles of transmission are:

(a) Pig - Mosquito - Pig

(b) The Ardeid bird - Mosquito - Ardeid bird

Man is an incidental "dead-end" host and **Pig** is amplifier host.

- Horse is the only animal to manifest the disease.
- **Extrinsic Incubation Period** in vector mosquitoes: 9–12 days
- **Incubation Period :** about 5–15 days.
- Primarily a disease of rural, semi urban, agricultural areas.

3.9.2 Clinical Features

- Majority infections are in-apparent (only 1 in 250 infections are symptomatic)
- Young children (under 10 years) are more likely to die.

3.9.3 Control of JE

- Early Case Detection and Treatment
- Vector Control – using ULV insecticides e.g. Malathion, fenitrothion etc.

JE vaccination: This vaccination is available in three types:

a) Mouse brain derived (Nakyama or Beijing starin)

- **Dose:** 2 doses (4 weeks apart), 0.5 ml among children < 3yr while 1 ml to those above 3 years, Booster after 1 year and subsequently every 3 year interval until the age of 10–15 years
- **Route:** Subcutaneously
- Best used in Inter-epidemic period
- **Immunity** - 1 month after 2nd dose

b) Cell culture derived inactivated vaccine (Beijing P3 strain)

c) Live attenuated vaccine SA 14-14-2: Single dose followed by a single booster at an interval of 1 year. Now available in India.

- JE is reconstituted with manufacturer-provided diluent. It should be used within 2 hours of reconstitution.
- If a child 16-24 months of age has been already immunised with JE vaccine during an Supplementary immunisation activity (SIA), it should not be repeated. Currently this is a single dose vaccine and should not be repeated.
- If a child above 2 years of age has not received the JE vaccine through either routine immunisation (RI) or an SIA. The child is eligible to receive a dose of the JE vaccine, through RI, till the age of 15 years.

3.10 NATIONAL IMMUNISATION SCHEDULE

National Immunisation Schedule for Infants and Children				
Dose	**When to give**	**Dose**	**Route**	**Site**
BCG	At birth- within 1 year	0.05 ml till 1 year of age 0.1 ml thereafter	Intra-dermal	Left upper arm
Hepatitis B	At birth- within 24 hours	0.5 ml	Intra-muscular	Right thigh
OPV-0	At birth- within 15 days	2 drops	Oral	Oral
OPV – 1,2,3	6,10,14 weeks	2 drops	Oral	Oral
Pentavalent – 1,2,3	6,10,14 weeks	0.5 ml	Intra-muscular	Left thigh
Measles	9 months	0.5 ml	Sub-cutaneous	Right upper arm
DPT Booster	16 months	0.5 ml	Intra-muscular	Left thigh
Measles 2nd dose	16 months	0.5 ml	Sub-cutaneous	Right upper arm
DPT Booster	16 months	0.5 ml	Intra-muscular	Left Thigh
OPV Booster	16 months	2 drops	Oral	Oral
Japanese encephalitis	16 months	0.5 ml	Sub-cutaneous	Left upper arm
DPT Booster	5 years	0.5 ml	Intra-muscular	upper arm

ALL VACCINES

- **If a child who has never been vaccinated** is brought at 9 months of age, all the due vaccines can be given during the same session but at different injection sites using separate syringes. It is safe and effective to give BCG, DPT, Hepatitis B, OPV and Measles vaccines and Vitamin A at the same time to a 9 months old child who has never been vaccinated.
- **A child between 1–5 years of age, who has never been vaccinated,** should be given DPT1, OPV-1, Measles and 2 ml of Vitamin A solution. It should then be given the second and third doses of DPT and OPV at one-month intervals. Measles second dose is also to be given as per the schedule. The Booster dose of OPV/DPT can be given at a minimum of 6 months after administering OPV3/DPT3.
- **A child between 5–7 years of age, who has never been vaccinated**, should be given first, second and third doses of DPT at one-month intervals. The booster dose of DPT can be given at a minimum of 6 months after administering DPT3 up to 7 years of age.

Ages by which vaccines should be administered under National Immunisation schedule is given in the Bow below:

Vaccine	Age
BCG	1 year
Hepatitis B	1 year
OPV	5 years
Measles / MMR	5 years; Measles is given up to 10 years under catch-up phase of Measles Elimination campaign
DPT	7 years
Japanese Encephalitis	15 years

Vaccine	Heat and Light Sensitivity	Freezing	Storage Temperature
BCG	Light sensitive, not so heat sensitive	No effect of freezing	2-8°C
OPV, Measles	Sensitive to heat and light	No effect of freezing	2-8°C
DPT, Hepatitis B, DT, TT	Not sensitive to heat and light	Freezing decreases efficiency	2-8°C

In the order of most sensitive to least sensitive

Heat-sensitive Vaccines	Freeze Sensitive Vaccines
OPV	Hepatitis B
Measles	DPT
BCG	DT
	TT

Vaccine Vial Monitor

- VVM may be present on the vial label (on Hepatitis B) or cap BCG Measles.
- It indicates exposure to high temperature by change in the colour of the indicator.

Symbol	Explanation	Stage
	The inner square is lighter than the outer circle. If the expiry date has not passed, **USE** the vaccine.	I
	As time passes the inner square is still lighter than the outer circle. If the expiry date has not passed, **USE** the vaccine.	II
	**Discard point:** the color of the inner square matches that of the outer circle. **DO NOT** USE the vaccine.	III
	Beyond the discard point: inner square is darker than the outer circle. **DO NOT** USE the vaccine.	IV

3.11 TYPHOID FEVER

Typhoid fever is the result of systemic infection mainly by S. typhi found only in man. The disease is clinically characterised by a typical continuous fever for 3 to 4 weeks, relative bradycardia with involvement of lymphoid tissues and considerable constitutional symptoms. The term "enteric fever" includes both typhoid and paratyphoid fevers.

Typhoid fever is endemic in India. Reported data for the year 2013 shows 1.53 million cases and 361 deaths. S. typhi is the major cause of enteric fever. The factors which influence the onset of typhoid fever in man are the infecting dose and virulence of the organism.

Man is the only known reservoir of infection, viz cases and carriers. The case may be mild, moderate or severe. The primary sources of infection are faeces and urine of cases or carriers; the secondary sources contaminated water, food, fingers and flies. There is no evidence that typhoid bacilli are excreted in sputum or milk.

3.11.1 Mode of Spread

Typhoid fever is transmitted via the faecal – oral route or urine – oral routes. This may take place directly through soiled hands contaminated with faeces or urine of cases or carriers, or indirectly by the ingestion of contaminated water, milk and/or food, or through flies.

Incubation period

Usually 10–14 days. But it may be as short as 3 days or as long as three weeks depending upon the dose of the bacilli ingested.

3.11.2 Clinical Features

- The onset is usually insidious but in children may be abrupt, with chills and high fever. During the prodromal stage, there is malaise, headache, cough and sore throat, often with abdominal pain and constipation.
- The fever ascends (rise) in a step ladder fashion. After about 7–10 days, the fever reaches a plateau and the patient looks toxic, appearing exhausted and often prostrated. (Note: Check it)
- There may be marked constipation, especially in early stage or "pea soup" diarrhoea.
- The rash (rose spots) commonly appears during the second week of disease. The individual spot, found principally on the trunk, is a pink papule 2–3 mm in diameter that fades on pressure. It disappears in 3–4 days.
- Serious complications occur in up to 10 percent of typhoid fever patients, especially in those who have been ill longer than 2 weeks, and who have not received proper treatment. Intestinal haemorrhage is manifested by a sudden drop in temperature and signs of shock, followed by dark or fresh blood in the stool.

Remember:

Man is the only known reservoir of infection, viz cases and carriers.

3.11.3 Control of Typhoid Fever

Early diagnosis : This is of vital importance as the early symptoms are non-specific. Culture of blood and stools are important. Please refer Practical Course 3, Block 2, Unit 2 for stool sample collection procedure.

Treatment

Fluoroquinolones (e.g., ciprofloxacin) were once first-line but rising resistance has shifted first-line to cephalosporins (e.g., ceftriaxone) for MDR typhoid. Always tailor antibiotic choice to local resistance patterns.

Immunisation

While ultimately, control of typhoid fever must take the form of improved sanitation and domestic and personal hygiene; these are long-term objectives in many developing countries. A complementary approach to prevention is immunisation, which is the only specific preventive measure, likely to yield the highest benefit for the money spent.

Anti- typhoid Vaccine

The old parenteral killed whole-cell vaccine was effective but produced strong side-effects. Two safe and effective vaccines are now licensed and available. One is based on defined subunit antigens, the other on whole-cell live attenuated bacteria.

The Vi polysaccharide vaccine

It is composed of purified Vi capsular polysaccharide from the Ty2 S. The vaccine is administered subcutaneously or intramuscularly.

Schedule

The vaccine is licensed for individuals aged > 2 years. Only 1 dose is required, and the vaccine confers protection 7 days after injection. To maintain protection, revaccination is recommended every 3 years.

The Ty21a vaccine

This vaccine, which was first licensed in Europe in 1983 and in the USA in 1989, is an orally administered, live-attenuated Ty2 strain of S. Typhi in which multiple genes, including the genes responsible for the production of this vaccine.

Schedule

The vaccine is administered every other day; on 1, 3, and 5th day; a 3-dose regimen is recommended. The recommendation is to repeat this series every 3 years for people living in endemic areas.

3.12 HEPATITIS-A

The causative agent, the hepatitis A virus, is an enterovirus. Faecal shedding of the virus is at its highest during the later part of the incubation period and early acute phase of illness. Only one serotype is known.

The virus is fairly resistant to low pH, heat and chemicals. Formalin is stated to be an effective disinfectant. The virus is inactivated by ultraviolet rays and by boiling for 5 minutes or autoclaving.

Reservoir of Infection: The human cases are the only reservoir of infection. The cases range from asymptomatic infections to severe infections.

3.12.1 Modes of Transmission

Fecal- oral route : This is the major route of transmission. It may occur by direct (person-to-person) contact or indirectly by way of contaminated water, food or milk.

INFECTIVE MATERIAL: Mainly man's faeces. Blood, serum and other fluids are infective during the brief stage of viraemia.

PERIOD OF INFECTIVITY:

The risk of transmitting HAV is greatest from 2 weeks before to 1 week after the onset of jaundice. Infectivity falls rapidly with the onset of jaundice. Infection with HAV is more frequent among children than in adults. However, people from all ages may be infected if susceptible.

3.12.2 Clinical Spectrum

The onset of jaundice is often preceded by gastrointestinal symptoms such as nausea, vomiting, anorexia, and mild fever. Jaundice may appear within a few days of the prodromal period, but anicteric hepatitis is more common. Hepatitis A resolves completely in 98 per cent of cases but relapse of symptoms are noted in 3–20 per cent cases

3.12.3 Control of Transmission

The best means of reducing the spread of infection is by promoting simple measures of personal and community hygiene, e.g., hand washing before eating and after toilet.

Vaccines: Two types of hepatitis A vaccines are currently used worldwide:

a) Formaldehyde inactivated vaccines — produced in several countries and which are most commonly used worldwide.

b) Live attenuated vaccinces — which are manufactured in China and are available in several countries.

Inactivated hepatitis A vaccines are licensed for use in persons 2 ½ months of age. The complete vaccination schedule consists of 2 dose administration into the deltoid muscle. The interval between the first (primary) dose and second (booster) dose is commonly 6–12 months; however, the interval between the doses is flexible and can be extended to 18–36 months. It can be administered simultaneously with other vaccines. Following 2 doses of vaccine the protective efficacy is about 94 per cent.

3.13 LET US SUM UP

In this unit we have discussed , the infectious diseases , their mode of spread, incubation period, symptoms and signs, prevention and control measures. After reading in detail about each of the infectious disease, you must have realised that these diseases are mostly preventable with vaccination available. We have also discussed the National Immunisation schedule for each vaccine, when and how to administered, where to store the vaccine, its preparation and route of injecting. You must read carefully the management of cases also as discussed with each of the infectious disease.

3.14 MODEL ANSWERS

Check Your Progress 1

1) i) mycobacterium tuberculosis
   ii) lungs
   iii) HIV+ve
   iv) Discarded
   v) Intra muscular

2) i) True
ii) False
iii) True
iv) False
v) True

Check Your Progress 2

1) Symptoms and Signs of Pertussis

There are usually three distinct phases of the disease 1) catarrhal, 2) paraoxysmal and 3) convalescence.

1) **Catarrhal phase**

- Common cold
- Running nose
- Watery eyes
- Sneezing
- Fever
- Mild cough

The catarrhal phase lasts for two weeks.

2) **Paroxysmal Phase (2–4 weeks)**

The cough gradually worsens and involves numerous bouts of rapid coughing. At the end of these bouts, the child takes in air with a high-pitched whoop. During the bout of cough, child may get sub-conjunctival haemorrhage.

The child may turn blue because of lack of oxygen during long bouts of coughing.

Vomiting and exhaustion often follow the coughing attacks, which are particularly frequent at night. This stage usually lasts for one to six weeks but may continue upon ten weeks.

The attacks become milder with the passage of time.

3) **Convalescence (2–4 weeks)**

In this phase when recovery takes place, the number, severity and duration of attacks decrease to come to an end.

2) Newborn baby with tetanus (NNT) appears normal at birth but is unable to suck at the onset of disease after 3 days of birth. This is the presenting feature. Later, they develop typical face of tetanus (clenching of jaw, laterally drawn lips and raised eyebrows) with lockjaw; even contraction of muscles of the face is visible. The whole body becomes stiff, severe muscle contractions and convulsions occur, the body is bent backwards in a bow shape due to spasm of muscles of back and death follows in most cases.

3) Poliomyelitis is a communicable disease due to an acute viral infection caused by an RNA virus, known as Poliovirus. It has three sero-types –1, 2 and 3. All of these sero-types can cause paralysis. However, most outbreaks of paralytic poliomyelitis are due to type-I virus. Paralytic poliomyelitis is the most common cause of acute flaccid paralysis in the country.

Mode of Spread of Polio

Main route of transmission of virus is faeco-oral route. It is excreted in stool of patients

for 6–8 weeks after illness and enters the body through the mouth with contaminated food and drinks as a result of poor personal hygiene, flies or filth.

The disease may be waterborne due to sewage contamination of drinking water. Hot humid climate, in summer months, helps viral proliferation while rainy season helps in its spread.

The disease spreads very easily. Nearly all children-living in households of index case get infected. Affected person can spread the virus seven to ten days before and after onset of symptoms.

Check Your Progress 3

1) Symptoms and Signs of Measles

The first sign of infection is high fever lasting one to seven days. During this period there may be running nose, cough, red and watery eyes and also small white spots inside the cheeks (Koplik's spots).

After a few days, usually 4th day, a slightly raised rash develops which spreads from the face and upper neck down to the body, then to the hands and feet over a period of about three days. It lasts for five to six days and fades successively from the same areas. There may also be loss of appetite and loose stools, especially in infants.

2) Management of a Case of Measles

- There is no specific anti-viral drug against measles virus.
- Patients are managed symptomatically with supportive measures only.
- VitaminA, two lakh international units for >1 year and one lakh international units for <1 year, reduces severity of the disease and prevents further deficient of Vitamin A. This helps in prevention of blindness. All children with measles should receive vitamin A supplementation as soon as they are seen at a health facility.
- Feeding should be continued as there is a tendency to withheld food during and after the attack of Measles.
- The treatment of dehydration with oral rehydration solution for diarrhoea is necessary.
- For pneumonia, antibiotics may be necessary.

3) **Hepatitis B Prevention :**There is no treatment for Hepatitis B. By following the measures of Universal Precautions like hand washing, wearing gloves etc. For details please refer Practical Course 3, Block 2, Unit 1about Universal Precautions.

Further, occurrence of Hepatitis B could be brought down by:

- Universal immunisation of infants with Hepatitis B vaccine: In India, 9th Five Year Plan approach paper recommended introduction of Hepatitis B immunisation in UIP.
- Universal screening of pregnant mothers for HbsAg and appropriate management of newborns.
- Use of safe blood and blood products.
- Use of sterile separate needle and syringe for each injection.
- Prevent drug addiction and sexual promiscuity.

- Use of condoms.
- Careful handling of blood and blood products by health care personnel.
- Careful handling of secretions of patients while nursing or examining a patient.

4) i) vitamin A

ii) 9 months

iii) sub-cutaneous

iv) parenteral route

UNIT 4 COMMUNICABLE DISEASES 3 – ZOONOTIC DISEASES

Structure

4.0 Introduction

4.1 Objectives

4.2 HIV/AIDS/RT Infections

- 4.2.1 Reproductive Tract Infections/Sexually Transmitted Infections (RTI/STIs)
- 4.2.2 HIV and AIDS
- 4.2.3 Risk Factors of STI/ RTIs and Routes of Transmission
- 4.2.4 Symptoms and Signs of STI/RTI
- 4.2.5 Prevention and Control of STI/RTI

4.3 Soil Transmitted Helminths

- 4.3.1 Effect of Soil transmitted Helminthes Infections
- 4.3.2 Mode of Spread of Intestinal worms and Risk Factors for Transmission of Helminths
- 4.3.3 Symptoms, Signs, Diagnosis and Treatment of Worm Infections
- 4.3.4 De-worming and Prevention
- 4.3.5 Food Borne Helminths

4.4 Rabies

- 4.4.1 Susceptibility to Physical and Chemical Agents (Characteristics of Rabies Virus)
- 4.4.2 Epidemiology - Rabies in World and in India
- 4.4.3 Pathogenesis
- 4.4.4 Clinical Features in Man and in Animals
- 4.4.5 Treatment of Rabies in Humans
- 4.4.6 Prevention and Control of Rabies

4.5 Let Us Sum Up

4.6 Model Answers

4.7 References

4.0 INTRODUCION

In this unit, we will be discussing about Reproductive Tract/ Sexually Transmitted Infections (RTI/STIs) including Human Immunodeficiency Virus/ Acquired Immunodeficiency Diseases (HIV/AIDS), soil transmitted heminthic infections, and rabies.

Reproductive tract infections (RTIs) including sexually transmitted infections (STIs) present a huge burden of disease and adversely impacts the reproductive health of people. Community based surveys have shown that about 6% of adult Indian population suffers from sexually transmitted infections and reproductive tract infections. The prevalence of these infections is considerably higher among high risk groups ranging from 20–30%.

It has been observed that in the community, 4% – 9% men and 23% – 43% women were having symptoms of STI/RTI. STI clinic based data indicates STI/RTI among men has been reported to be as follows: Syphilis (13% – 57%), Chlamydia (20% – 30%), Chancroid (10% – 35%), and Gonorrhoea (8% – 26%).

The common parasitic intestinal worms, also known as soil transmitted helminths in India are round worms [*Ascaris Lumbricoides (AL)*], hookworms [*Ankylostoma duodenale (AD)]* and [*Necator americanus (NA*)] and the whipworms [*Trichuris*

trichuria (TT)].World Health Organization (WHO) estimates more than 1.5 billion people or 24% of the world's population are infected with soil transmitted helminths. Asia alone accounts for 70% of this burden where population prevalence is 21% higher in rural population as compared to urban population. The prevalence of round worm (AL), Hook worm (AD) and whipworm (TT) has been reported to be ranging between 0.4 and 71.8%, 0.14 and 42.0% and 0.3 and 29.3% in various regions of India respectively.

Rabies is an important zoonotic infection in which man is dead end of the infection and hence does not play any role in its spread to new hosts. In most of the developing countries, dogs are the principal reservoirs of rabies. It has terrified man since old times since the disease is invariably fatal, painful and horrible because the sick person has thirst and fear of water (hydrophobia). Till date, no treatment has succeeded in curing hydrophobia and in spite of great strides in the prevention of rabies, it is still a global problem.

4.1 OBJECTIVES

After completion of this unit, you will be able to:

- enumerate RTI/STI;
- describe the magnitude of STI/RTI including HIV/AIDS, rabies, soil transmitted helminths;
- identify risk factors, symptoms and signs of STI/RTI including HIV/AIDS, rabies, soil transmitted helminths;
- enumerate treatment measures, prevention and control of STI/RTI including HIV/AIDS, rabies, soil transmitted helminths; and
- describe the steps for patient referral.

4.2 HIV/AIDS/RTI INFECTIONS

These infections causes huge suffering for both men and women around the world, but their effects are far more dangerous among women than men. Many a times RTI are not diagnosed and not treated. When left untreated, they lead to complications such as infertility; ectopic pregnancy and cervical cancer. Pelvic inflammatory disease arising from STI/RTI poses a major public health problem and adversely affects the reproductive health of poor and untreated women. Due to the emergence of HIV/AIDS problem and identification of STI as a co-factor for its causation, each untreated infection also increases the chances of further spread in the community.

4.2.1 Reproductive Tract Infections / Sexually Transmitted Infections (RTI/STIs)

Reproductive tract infection is a broad term that includes sexually transmitted infections as well as other infections of the reproductive tract that are not transmitted through sexual route. In women, this includes infections of the outer and inner genitals (vagina, cervix, uterus, fallopian tubes, or ovaries). In men too, RTI involve the outer and inner genitals (penis, testes and prostate)

RTI in women also include:

- Fungal and bacterial infections (candida and bacterial vaginosis)
- Postpartum and post abortion infections
- Infections following procedures (e.g. IUCD insertion)

They are transmitted mainly due to unsafe deliveries, abortions and procedures.

Sexually Transmitted Infections (STI)

STI are infections caused by microbes such as bacteria, viruses, or protozoa that are passed from one person to another mostly through sexual contact.

4.2.2 HIV and AIDS

HIV stands for Human Immunodeficiency Virus, a virus transmitted from an infected person through unprotected sexual intercourse, or by exchange of infected body fluids such as blood, or from an infected mother to her infant. AIDS stands for Acquired Immunodeficiency Syndrome. AIDS is the stage of HIV infection that develops some years after a person is infected with HIV. Since HIV is a STI and is transmitted through the same routes that transmits other STIs, whenever there is risk of STI, there is concomitant risk of HIV infection as well.

Note: In India majority of HIV is sexually transmitted (86%), HIV and AIDS are always included when we discuss STIs.

4.2.3 Risk Factors and Routes of Transmission of RTI/ STIs

- Poor general health
- Poor genital hygiene
- Poor menstrual hygiene
- Unhygienic practices by service providers during delivery, abortion, and IUCD insertion in women
- Unsafe blood transfusions
- Unprotected sex
- Multiple partners
- Sex with partner having sore on the genital region
- Urethral discharge or infected vaginal discharge
- Previous STI infection(s) in the past
- Women have a greater risk of RTI than men due to physiological, social, cultural, and economic factors. Because women are biologically more susceptible than men; more likely to suffer from complications; limited in their ability to protect themselves from high-risk sex or to negotiate condom use; more likely to suffer from asymptomatic infections, remain untreated and, less likely to seek treatment, even for symptomatic infections.
- Adolescent girls and boys who are sexually active and practicing unsafe sex
- Female and male sex workers and their clients
- Men and women whose jobs force them to be away from their families or regular sexual partners are away for long periods of time.
- Men having sex with men including transgenders
- Street children, prison inmates, etc.

STI/RTI and its links to HIV/AIDS

The STI/RTIs are identified as co-factor for the causation of HIV infection. So STI treatment and prevention can be an important tool in limiting the spread of HIV infection since:

- A person with STI has a much higher risk of acquiring HIV from an infected partner.
- A person infected with both HIV and another STI has a much higher risk of transmitting HIV to an uninfected partner. Both ulcerative and non-ulcerative STI increase the risk of HIV transmission per exposure. However, an ulcerative lesion increases the risk more than a non-ulcerative STI.

Different sites of occurrence of STI/RTI in males

Penis- Glans penis, Scrotum, Urethra, Epididymis, Testes

Other sites- Seminal vesicles, vas deferens, Prostate gland, pharynx, Ano-rectal regions

Types of STI/RTI

Most common **STI/RTI** are Bacterial Vaginosis and Vaginal fungal infection (candida).

There are over 20 Stis. But 11 most common are Syphilis, Gonorrhoea, Chlamydia, Trichomoniasis, Chancroid, Herpes Simplex Virus (HSV), Genital And Cervical Warts or Human Papilloma Virus (HPV), Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Genital Scabies and Pubic Lice.

Diseases or Syndromes	Infectious Agent/s	Type of InfectiousAgent/s
Syphilis	*Treponema pallidum*	Bacteria
Herpes	*Herpes simplex virus*	Virus
Chancroid	*Haemophilus ducreyi*	Bacteria
Chlamydialinfection	*Chlamydia trachomatis*	Bacteria
Gonorrhoea	*Neisseria gonorrhoea*	Bacteria
Trichomonasinfection	*Trichomonas vaginalis*	Protozoa
Yeastinfection	*Candida albicans*	Fungus
BacterialVaginosis(BV)	*Mixed infection by Gardnerella vaginalis, Mycoplasma hominis, Vaginal anaerobes*	Bacteria
PelvicInflammatory Disease (PID)	*Mixed infection by Neisseria gonorrhoea, Chlamydiatrachomatis, and/orvaginalanaerobic bacteria infection*	Bacterial/ Protozoal
HepatitisB	*HepatitisB virus*	Virus
AIDS	*Human Immunodeficiency Virus (HIV)*	Virus
Genitaland anal warts	*Human Papilloma Virus (HPV)*	Virus
GenitalScabies	*Sarcoptes scabiei*	Metazoa
Pubiclice	*Phthirus pubis*	Metazoa

4.2.4 Symptoms and Signs of STI/RTIs

Let us now read signs and symptom of STI/RTIs.

Both men and women: Genital ulcers (sores), Burning sensation while passing urine, Swelling in the groin, and Itching in the genital region.

For women: Unusual vaginal discharge with or without bleeding, Pain in lower abdomen, lower backache, and Pain/bleeding during sexual intercourse.

For men: Discharge from the penis, Scrotal swelling and/or swollen and painful testicles.

Major complications of STI/RTI in men, women and newborn babies:

- **Complications in men** include, Phimosis, paraphimosis and urethral stricture, Inflammation of testes, Infertility, Carcinoma of the penis.
- **Complications in women:** Pelvic Inflammatory Disease (PID), Chronic pelvic pain, Infertility, adverse outcomes of pregnancy-Ectopic pregnancy, early labour and delivery, Low birth weight due to premature delivery or intra-uterine growth retardation, Stillbirths, Spontaneous abortions, Cervical cancer.
- **Complications in newborn babies** include (1) Perinatal and Neonatal infections: Congenital syphilis, Gonorrhoea – Opthalmia neonatorum, Chlamydia – eye and lung infections, HIV, Herpes simplex viruses 1 & 2 (HSV1 & HSV2), Hepatitis - B virus, (2) Prematurity and (3) Low Birth weight.

Future implications:

STIs are a major public health problem because of the potentially serious complications of untreated STI and the relationship between STI and increased HIV transmission. In women of childbearing age, STIs are second only to maternal factors as causes of disease and death. By far, the greatest burden of STI is borne by women and adolescents.

4.2.5 Prevention and Control of STI/RTI

Primary Prevention

- Creating awareness and imparting knowledge about safer sex
- Advising on practicing safe sex
- Correct and consistent use of Condom
- Having single partner
- Avoiding multiple partners
- Maintaining sexual hygiene, removing stigma and bias in the community and the health care provider for improving the treatment seeking behaviour, improving access to safe delivery and safe abortion services, screening of every pregnant woman for syphilis.

Secondary Prevention

Early diagnosis and prompt treatment by trained health care worker, correct and adequate treatment, treatment of both the partners simultaneously, strengthening the referral system, providing accessible and affordable STI/RTI services in locality.

Tertiary Prevention

Prevention of late complications, complications of infertility and children.

The syndromic case management approach to STI/RTI and its advantages

Syndromic management: The patient is diagnosed and treated based on groups of symptoms or syndromes, rather than for specific STI/RTI. All possible STI/RTI that can cause those symptoms are treated at the same time.

Advantages

The patient is diagnosed and treated in one visit. Treatment is highly effective for selected STI/RTI syndromes and relatively inexpensive since it avoids use of laboratory. There is no need for patient to return for lab results. It avoids the wrong treatment since all possible STI/RTIs causing signs and symptoms are treated at once. It can be used by health care providers at all levels.

Whenever any case suggestive of STI/RTI comes to doctor, how does health professional manage a case of STI/RTI?

- By taking a history and doing a physical examination
- S/he arrives at a diagnosis of STI/RTI
- S/he treats STI/RTI case by providing medicines/drugs and information on how to take them
- S/he tries to prevent another STI/RTI by educating the patient about disease and transmission
- Promotes and provides condoms
- S/he ensures the patient cured by offering partner treatment and asks them to follow up. If patient is not responding s/he asks them to follow up and refers to higher center
- Referring patients who are having clinical history suggests symptoms of STI/RTI, or clients who are having risk of STI/RTI but they are not having any symptoms suggestive of STI/RTI or screening asymptomatic clients
- In client education, counselling, condom promotion, for treatment compliance and follow up
- Partner management by motivating them for treatment and follow up and creating awareness in community Men and women are unaware of the consequences of STI/RTI problem. They are shy and do not come out with their problem especially adolescent and youth. It is difficult to elicit the sexual health related information from them. They believe in privacy and confidentiality.

Check Your Progress 1

i) What are reproductive tract infections (RTI)?

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ii) List the routes of transmission of STI/RTI.

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iii) List the risk factors of RTI/STI/HIV/AIDS.

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iv) Explain symptoms and signs of commonly found STI/RTI?

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v) List primary prevention for STI/RTI.

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4.3 SOIL TRANSMITTED HELMINTHS

Let us now read the parasitic intestinal worms also known as soil transmitted helminths.

In India they are mostly round worms (Ascaris lumbricoides), Hookworms (Ankylostoma duodenale and Necator americanus) and the whipworms (Trichuris trichuria).

World Health Organisation (WHO) estimates more than 1.5 billion people or 24% of the world's population are infected with soil transmitted helminths. Asia alone accounts for 70% of this burden where national population prevalence is 21% being higher in rural population as compared that in urban population the prevalence of Round worm, Hook worm and whipworm has been reported to be ranging between 0.4 and 71.8%, 0.14 and 42.0% and 0.3 and 29.3% in various regions of India respectively.

People of all age groups and both sexes suffer from soil transmitted helminths. However children and adolescents are the most sufferers having overall prevalence rate ranging between 7.6 and 78.3 %. WHO estimates that approximately 241 million children between the ages of 1 and 14 year are at risk of soil transmitted helminths. In India which represent 68% of children in this age group and approximately 28% of all children at risk of soil transmitted helminthes globally.

4.3.1 Effect of Soil Transmitted Helminths Infections

- Worm infestation affects human body in several ways e.g. Worms feed on host tissue including blood which leads to a loss of iron and protein and thus often contribute to anaemia.
- Worms can increase the mal absorption of nutrients.
- Worms can decrease vitamin- A availability in Intestine. Round worm specially when increase in large number they may cause loss of appetite reduce nutrition intake and physical fitness and sometimes may block intestinal passage. Some worms can cause diarrhoea and dysentery.
- The worms have negative effects on physical and mental development of children. Children often remain under weight and have and stunted growth due to anaemia caused by decrease in nutrition intake due following worm infestations. Children with heavy worm infestation become too sick or two tired to concentrate at school or even to attend school. Subsequently these children have poor educational and lower lifetime income outputs. Women with worms have poor pregnancy outcomes. Worms also increase child mortality.

4.3.2 Mode of Spread of Intestinal Worms and Risk Factors for Transmission of Helminths

Soil transmitted worms are transmitted by eggs present in human faeces which contaminated soil in areas with poor sanitation e.g. Through open field defecation. Adult worms live in human intestine for food and survival where they produce thousands of eggs each day. When infected people defecate in outdoors (fields) these eggs come

out with faeces and contaminate soil. Transmission occurs when (i) eggs that are attached to vegetables are ingested without being carefully washed; peeled or cooked, (ii) eggs are ingested through contaminated water e.g. Pond water (iii) eggs are ingested through soil if children play in contaminated soil and put their hand in mouth without washing (iv) However the larvae directly enter through skin who do not put on footwear.

Risk factors responsible for transmission

People those who are:

- illiterate
- socioeconomically backward classes
- open field defecation
- work with bare feet in fields
- poor personal hygiene
- unhygienic feeding habits and
- unsafe drinking water.

4.3.3 Symptoms and Signs, Diagnosis and Treatment of Worm Infestations

People with mild infection usually have no symptoms. When worm infestation become heavy, the symptoms and signs start becoming prominent which include diarrhoea abdominal pain, weakness easy fatigue and loss of appetite may times patient or child may complain of passing worms in the faeces.

Diagnosis of worm infestations

Presence of worms in the intestine is confirmed either by seeing live/dead worm in the feaces or by identifying the ova and cyst of worms present in the samples of faeces (stool) with the help of microscope in the laboratory of the hospital.

Treatment of worm infestations

In the community, Albendazole has been considered safe de-worming drug presently being made available by the Government of India for treatment of persons with worm infestation under National De-worming Programme. For children between ages of 2 and 19 years 1 tablet (400 mg) and half tablet for children of age 1–2 years is recommended. For younger children should be broken into half and crushed and then administered with water under supervision of health worker. All adults are administered one full tablet each.

Note: Sick child should not be given tablet. Every child should first chew the tablet then swallow. Do not allow the child to take tablet at home.

Who should be given treatment

WHO recommends prevention and control of soil transmitted worms related morbidity through periodic treatment of at risk populations living in endemic countries like India particularly pre school and school age children and women of child bearing age (including pregnant women in second and third trimester and breastfeeding women).

The de-worming treatment is to be given without previous individual diagnosis to all at risk people in endemic areas once a year where prevalence of worm infection is over 20% and twice a year when prevalence is more than 50% for this celebration of National De-worming Day (NDD) has also been recommended.

In India NDD is been observed on 10th Feb. every year since 2015.

Side effects of De-worming treatment

The De-worming treatment has very few side effects. There may be some mild side effects like dizziness, nausea, headache and vomiting and abdominal pain all likely due to worms being passed. However these side effects disappear after some time and hospitalisation is not required.

Severe side effects are fatal, life threatening, disabling or incapacitating e.g. Choking hazard/asphyxia. The patient needs to be taken immediately to the nearest health facility for quick treatment. While doing so health worker should stop de-worming of others and stay calm, should call helpline no. try to arrange vehicle /ambulance. He / She should inform attendance of the patient / child about condition and need of emergency treatment. Soil transmitted infections can be eliminated from country as observed in several countries e.g. US, South Korea.

Note: Albendazole tablet can be administered with IFA tablet & Vitamin- A

4.3.4 De-worming and Prevention

The spread of soil transmitted infections can be prevented by taking precautions such as using sanitary toilet and not defecating in open field, washing hands particularly before eating and after using toilet, wearing slippers and shoes, drinking safe and clean water, keeping nails short and clean, eating properly cooked food and storing it safely, washing fruits and vegetables in safe and clean water.

Advantages of de-worming

- Child grows faster and remain healthier
- He/she becomes more resistant to infections
- He/she learns better and remain more active in school
- He/she attends school more regularly
- Anaemia decreases and nutrition improve, and better pregnancy outcome for pregnant women .

Calculation of albendazole tablets (400 mg) for one de-worming round:

You can calculate the demand for albendazole tablets (400 mg) required for one de-worming round using the formula given below:

1 × No. of children (1–19 years in the area) + 10% of total requirement as buffer (for wastage and spoilage)

Check Your Progress 2

1) List the Common Soil Transmitted Helminths (Worms) in India.

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2) What are the effects of soil transmitted helminthic infections on health ?

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3) Explain how does the intestinal worms spread.

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4) Explain Symptoms and signs of worm infestation.

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5) Describe prevention and control of worm infestations.

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6) List the side effects of De-worming treatment.

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7) List the advantages of de-worming.

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8) Calculate the requirement of albendazole tablets (400 mg) for one de-worming round in your area.

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4.3.5 Food Borne Helminths

Food borne helminths commonly includes the following:

a) Taenia Solium – Found in pork

b) Taenia Saginata – Found in cattle

Mode of transmission

Eggs or segments pass out with faeces to the ground. They live here for months or years till ingested by cattle or pigs while grazing. When ingested in raw or uncooked meat this form infects humans. The embryo released after ingestion gets transformed into cysticercus.

Signs and Symptoms:

Visible in passage of stools

Vague addominal pain

Distension of abdomen

Nausea

Anorexia

Weight loss

For Pork Tabeworm

- All the above
- Cysticercosis of brain may present with seizures, increased intracranial pressure, hydrocephalus, chronic meningitis

Treatment- Praziquantel single oral dose of 5–10 mg/kg body weight is preferred.

4.4 RABIES

Rabies is an acute viral disease, which causes encephalomyelitis in virtually all the warm blooded animals including man. The causative agent is RNA virus which is bullet shaped, round at one end and flat at the other. It is found in domestic and wild animals. It is transmitted to other animals and to humans through close contacts with their saliva (i.e. bites, scratches, licks on broken skin and mucous membranes).It is present in the saliva of the dogs for 2–3 days before the appearance of clinical features. It remains in the saliva till the animal dies. Death usually occurs within one week of onset of clinical manifestations.

4.4.1 Susceptibility to Physical and Chemical Agents (Characteristics of Rabies Virus)

The rabies virus is highly resistant against cold, dryness and decay. In cadavers, it remains infectious for weeks. This virus is highly thermo labile with a half-life of approximately 4 hours at 40°C and 35 seconds at 60°C. Serum proteins and other chelating agents diminish thermal inactivation. In brain tissue at room temperature it can survive up to 1–2 weeks.

It is also susceptible to the action of oxidising agents, most organic solvents, surface acting agents, and quaternary ammonium compounds. Proteiolytic enzymes, ultraviolet rays and X-rays rapidly inactivate rabies virus. Soaps and detergents are effective against rabies virus because of their lipid eliminating property, which destroys the outer covering of the virus.

4.4.2 Epidemiology - Rabies in World and in India

Rabies virus is predominantly the nervous system and kills the host in short period after it has entered the nervous system . Before death, from the brain virus reaches salivary glands and is excreted in saliva. The saliva gains entry into another host through a pre existing breach in skin when mere licking or contamination is adequate or the bite of the rabid animal creates a mechanical breach of skin through which the rabies virus gains entry. Virus may be present in the saliva for many days before clinical signs appear and it may be steadily or intermittently secreted until just before death. Report of pre clinical periods of virus secretion in saliva range from 3 days in cats, 14 days in dogs. Infection has been documented in personnel receiving corneal grafts and organs from rabies cases.

4.4.3 Pathogenesis

On entering into human body, rabies virus multiplies at local site of inoculation prior to its spread towards brain via the nerves. Within the brain, virus spreads from infected to contagious cells. There may be regional differences in the intensity with which areas of brain become infected. The main areas affected are usually the cerebellum, hypothalamus, hippocampus and scattered neurons in the reticular formation. The movement of the virus is extremely slow which results into a long incubation period. This fact helps in initiating immune prophylaxis even after the causative agent has invaded the body.

Incubation period

The average incubation period is between 30–90 days. Factors which may influence the length of the incubation period include the site of bite, the amount of virus in saliva of the biting animal, the virus strain, and the age and immune status of the victim. It is shorter in case the bite is closer to brain and massive dose of virus has

been inoculated. Incubation period as short as 10 days and as long as 2 years have been reported.

4.4.4 Clinical Features in Man and in Animals

Let us now read about the clinical features in man and animals.

The first symptom to appear may be pain and tingling in the affected limb, especially around the site of bite. **Hydrophobia** is the best known symptom of this disease and is path gnomonic for rabies. Hydrophobia is usually the only neurologic abnormality found in patient presenting with furious rabies. It is due to a violent jerky contraction of the diaphragm and accessory muscles of inspiration that is triggered by the patient's attempts to swallow liquid and by a variety of other stimuli such as strong current of air, loud noise and bright light. Hydrophobia is usually not associated with pain in neck or throat. It is also not a conditioned reflex caused by aspiration of liquid into trachea.

Before the appearance of hydrophobia rabies needs to be differentiated from other clinical conditions. Initially patient may have symptoms such as:

- Lockjaw
- Encephalitis
- Hysteria

Later patient develops

- **Paralytic phase** which includes Acute polyneuritis
- Differential diagnosis
- Delirium, tremors
- Rabies post vaccination encephalomyelitis

Rabies in animals

a) **Clinical features in dogs**

After an incubation period of around 3 months (range 10 days to 6 months), Dog may manifest one or more of the following clinical features given below:

- change in behaviour of dog, change in bark tone, change in feeding habits,
- animals may go off feed and eat abnormal objects,
- may develop fever, vomiting, excessive salivation, paralysis of lower jaw, anxiety, restlessness, convulsions,
- paralysis leading to death with in 5–7 days of onset of disease,
- There is no hydrophobia in animals.

b) **Clinical features in cats and cattle**

Rabid cats show extreme aggressiveness, great sensitivity to touch/voice, profuse salivation and may attempt to attack dog or man. In cattle, rabies is manifested as abnormal movements of posterior extremity, foamy yellow froth from mouth and decrease in yield of milk. Milk of rabid cattle has been shown to have viable rabies virus and its ingestion in raw form may require post exposure treatment in those individuals who have ulcers or abrasions in mouth or pharynx. Otherwise the gastric juice destroys the rabies virus. **Pasteurisation and cooking also kill the virus.**

4.4.5 Treatment of Rabies in Humans

Because of long incubation period, which is typical of most cases of human rabies, it is possible to institute prophylactic post exposure treatment. This must be started at the earliest to ensure that the individual will be immunised before the rabies virus reaches the Central Nervous System.

a) **Decision to treat**

In rabies endemic country like India, where every animal bite is potentially suspected as a rabid animal bite the treatment should be started immediately. To bring out uniformity globally, the WHO recommended classification of animal bite for post-exposure treatment should be followed which is made available in the anti-rabies Clinic or hospital.

b) **Treatment of animals**

Although unvaccinated animals are more likely to transmit rabies, vaccinated animals can also do so if the vaccination of the biting animal was ineffective for any reason. The risk of dog being infected with rabies is greatly reduced when it appears healthy and there is confirmed history of vaccination with minimum of two immunisations with potent rabies vaccine in last two years. The treatment should be started immediately after the bite. The treatment may be discontinued if animal involved (dog or cat) remains healthy throughout an observation period of 10 days. The observation period is valid for dogs and cats only. Bite by all wild animals should be treated as category III exposure. It should be noted that bites by rats, mice, squirrel, hare and rabbits seldom require treatment. Bat rabies has not been conclusively proved in India and hence exposure does not warrant treatment. It is re-emphasised that the treatment should be started as early as possible after exposure, but it should not be denied to person reporting late for treatment.

c) **Management of wound**

Since the rabies virus enters the human body through a bite or scratch, it is imperative to remove as much saliva, and thereby the virus, from the wound. It is possible by an efficient wound toilet that should not involve additional trauma. Since the rabies virus can persist and even multiply at the site of bite for a long time, wound toilet must be performed even if the patient reports late.

This can be done by prompt and gentle thorough washing with soap or detergent and flushing the wound with running water for 10 minutes. If soap and detergent are not immediately available wash with running water for atleast 10 minutes. Avoid direct touching of wounds with bare hands. Considering the importance of this step the anti rabies clinics should have wound washing facilities.

> **Remember:**
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> The application of soil, chillies, oil etc. is unnecessary and damaging. If they have been applied on the wound, enough gentle washing with soap or detergent to remove the extraneous material especially oil should be done followed by flushing with copious amount of water for 10 minutes immediately. Immediate washing of the wound is a priority.

The maximum benefit of the wound washing is obtained when fresh wound is cleaned immediately. **Suturing** of wound should be avoided as far as possible. If unavoidable, minimum loose sutures should be applied after adequate local treatment along with proper infiltration of anti rabies serum.

- Cauterisation of wound is no longer recommended as it leaves very bad scar, and does not confer any additional advantage over washing the wound with water and soap.
- Inj. tetanus toxoid should be given to the unimmunised individual.
- To prevent sepsis in the wound, a suitable course of an antibiotic may be recommended.

d) **Application of antiseptic**

After thorough washing and drying the wound, any one of the available chemical agents should be applied: (in appropriate recommended dilution), Povidone (in appropriate chlorhexidine recommended dilution), Povidone iodine, alcohol etc. For further treatment and necessary immunisation patient should be brought to the Anti-Rabies Clinic of the nearest hospital.

e) **Management of animal bite exposure to pregnant women and lactating mothers**

Pregnancy and lactation are no contraindications for rabies vaccination. Post-exposure prophylaxis against rabies takes preference over any other consideration since it is a life saving procedure. Moreover, rabies vaccine does not have any adverse effect on fetus, mother-to-be and the course of pregnancy. Hence complete post-exposure treatment should be given depending on the category of the exposure.

f) **Pre-exposure prophylaxis**

Pre-exposure prophylaxis may be offered to high risk group like laboratory staff handling the virus and infected material, clinicians and para-medicals attending to hydrophobia cases, veterinarians, animal handlers and catchers, wildlife wardens, quarantine officers and travellers from rabies free areas to rabies endemic areas.

4.4.6 Prevention and Control of Rabies

Rabies is primarily a disease of animals and control measures have to be directed towards the natural reservoir of the disease. Wild animals act as important and frequent reservoirs of disease in developed countries whereas developing countries still have canine rabies as their major problem. For control of Rabies, notable progress has been made in the direction of developing suitable vaccines and appropriate delivery systems . Any strategy for control of rabies in developing countries shall have following four components:(i) Epidemiological surveillance (ii) Dog population management (iii) Mass vaccination and (iv) Community participation. The community health nursing workers have to play crucial role in spreading awareness about the disease and its prevention and control along with mobilising of people for early treatment and vaccination.

Check Your Progress 3

1) What is Rabies ?

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2) How much rabies virus is susceptibility to physical and chemical agents?

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3) What is the prevalence of Rabies ?

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4) What does Rabies cause in human body ?

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5) What is the incubation period of Rabies?

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6) What are the clinical features of Rabies in man and animals?

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7) How a case of animal/dog bite should be treated ?

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8) When should the case of animal bite/dog bite be brought to dog bite clinic for further treatment and vaccination ?

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9) What should be done in case of pregnant woman bitten by animal/dog?

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10) How can Rabies be prevented and controlled in the community ?

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4.5 LET US SUM UP

In this unit you have learnt about RTI/STI and HIV/AIDS, routes of transmission, factors, symptoms and prevention and control. The complications of STI/RTI in men, women and newborn basis along with future implications are also covered. It is important to create awareness and impart knowledge about safer sex.

In second section of the unit, you have come to know about the prevalence of the worm infestation in the women and children, the common soil transmitted helminthes (worms), their mode of transmission, effects on human health, signs and symptoms, diagnosis and treatment and the measures to prevent and control of soil transmitted helminths in the community.

In the end session of the unit, you have come to know about the rabies, its prevalence in the country and world, the incubation period and signs and symptoms, treatment and vaccination, management of animal/dog bite, and prevention and control of Rabies in the community.

4.6 MODEL ANSWERS

Check Your Progress 1

1) **Reproductive tract infections (RTI)** Reproductive tract infection is a broad term that includes sexually transmitted infections as well as other infections of the reproductive tract that are not transmitted through sexual intercourse.

2) **Route of transmission of STIs are:**

- Poor general health
- Poor genital hygiene
- Poor menstrual hygiene
- Unhygienic practices by service providers during delivery, abortion and IUCD insertion in women
- Unsafe blood transfusions
- Unprotected sex
- Multiple Partners
- Sex with Partner having sore on the genital region
- urethral discharge or infected vaginal discharge
- Previous STI infection(s) in the past year

3) **Risk groups are:**

- Women have a greater risk of RTI than men due to physiological, social, cultural and economic factors;
- Biologically more susceptible than men;
- More likely to suffer from complications;
- Limited in their ability to protect themselves from high-risk sex or to negotiate condom use;
- More likely to suffer from asymptomatic infections and remain untreated and, less likely to seek treatment, even for symptomatic infections

4) (1) Adolescent girls and boys who are sexually active and practicing unsafe sex. (2) Female and male sex workers and their clients.(3) Men and women whose jobs force them to be away from their families or regular Sexual Partners are away for long periods of time.(4) Men having sex with men including transgenders. (5) Street children, prison inmates, etc.

5) **Primary prevention for RTI/STIs.**

- Creating awareness and imparting knowledge about safer sex
- Advising on practicing safe sex
- Correct and consistent use of Condom
- Having single partner
- Avoiding multiple Partners
- Maintaining sexual hygiene, Removing stigma and bias in the community and the health care provider for improving the treatment seeking behaviour, Improving access to safe delivery and safe abortion services, Screening of each and every pregnant woman for syphilis

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NOTE

Certificate in Community Health for Nurses (BPCCHN) Theory Course

CHO - 0001 Foundations of Community Health

Block-1 Introduction to Public Health and Epidemiology

Unit 1 : Concepts of Community Health
Unit 2 : Health Care Planning and Organization of Health Care at Various Levels
Unit 3 : Environmental Health and Sanitation
Unit 4 : Introduction to Epidemiology, Epidemiological Approaches and Processes
Unit 5 : Demography, Surveillance and Interpretation of Data
Unit 6 : Bio-Medical Waste Management and Infection Control

Block – 2 Nutrition

Unit 1 : Introduction to Nutrition and Nutritional Assessment
Unit 2 : Nutrition During Pregnancy and Lactation
Unit 3 : Nutrition for Infant, Child, Adolescent and Elderly
Unit 4 : Nutritional Deficiency Disorders
Unit 5 : Food Borne Diseases Food Safety

Block – 3 Communicable Diseases and Management under National Health Programmes

Unit 1 : Epidemiology of Specific Communicable Diseases
Unit 2 : Communicable Diseases -1 Vector Borne Diseases
Unit 3 : Communicable Diseases -2 Infectious Diseases
Unit 4 : Communicable Diseases -3 Zoonotic Diseases

Block – 4 Non-Communicable Diseases and Management under National Health Programmes

Unit1 : Epidemiology of Specific Non-communicable Diseases
Unit 2 : Non-Communicable Diseases – 1
Unit 3 : Non-Communicable Diseases – 2
Unit 4 : Occupational Diseases
Unit 5 : Mental Health and Substance Abuse Disorders
Unit 6 : Elderly Care

Block – 5 Communication Management and Supervision

Unit 1 : Social and Behaviour Change Communication skills and other Soft Skills
Unit 2 : Work Management and Administration
Unit 3 : Leadership, Supervision and Monitoring
Unit 4 : Health Management Information System
Unit 5 : Financial Management, Accounts and Computing at Sub-Centre
Unit 6 : Records and Reports