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## Diploma in Pharmacy 1st Year
## Social Pharmacy
## Chapter 4 : Introduction to Microbiology and Common Microorganisms


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# Chapter 4

## Introduction to Microbiology and Common Microorganisms

### Microbiology and Communicable diseases

- The branch of life-sciences, involving the study of unicellular or cell-cluster microorganisms is termed is as microbiology, and the specialist of this branch is known as microbiologist. Thus, microbiology is the specific area, concerned with the study of microbes that are too small and cannot be seen without magnification.
- The term microbiology was introduced by Louis Pasteur (a French chemist).

### Scope of Microbiology

I. Production of Antibiotics
II. Production of Enzymes, Vaccines, Bio Surfactants, Alcoholic and Other Pharmaceutical Products
III. Diagnosis of Diseases and Treatment
IV. Identification of Microorganisms

### Microorganisms

- Microbes or microorganisms are microscopic (mikros small + scopein -to see) independently living cells that form colonies.
- Microorganisms include a large and diverse group of microscopic organisms that exıst as a single cell or clusters (e.g., bacteria. archaea, fungi, algae, protozoa, and helminths).
- Viruses are microscopic organisms but not cellular: while bacteria and archaea are classed as prokaryotes (pro-before+karyon-nucleus): the protozoa, and helminths are eukaryotes (eu - true or good+ karyon. They are extensivcly distributed in nature Some microbes are beneficial to life, but some are harmful.

### Classification

- Bacteria,
- Virus,
- Algae,
- Fungi,
- Protozoa

### Epidemiology

- This study of the distribution and determinants of health states or events in specified populations, and the application of to control health problems, is termed epidemiology.

### Applications of Epidemiology

i) To Study the History of Disease
ii) Community Diagnosis
iii) Look at Risks of Individuals as they Affect Groups or Populations
iv) Assessment, Evaluation, and Research
v) Completing the Clinical Picture
vi) Determine the Causes and Sources of Disease

## Introduction to Some Common Related Terms

1. **Enidemic :** It reters to an increase, often sudden. in the number of cases of a disease above what is normally expected in that population in that area.
2. **Pandemic :** It is a disease outbreak that spreads across countries or continents.It affects more people and takes more lives than an epidemic.
3. **Endemic :** In epidemiology. an infection is said to be endemic in a population when that infection is constantly maintained at a baseline level in a geographic area without external inputs.
4. **Mode of Transmission :** It refers to how an infectious agent, also called a pathogen, can be transferred from one person, object, or animal, to another.Viruses, bacteria, parasites, or fungi can spread infectious diseases.
5. **Quarantine :** It refers to a state, period, or place of isolation in which people or animals that have arrived from elsewhere or been exposed to infectious or contagious disease are placed.
6. **Isolation :** It refers to separating sick people with a contagious disease from those who are not sick. Hospitals use isolation for patients who have a known infectious disease that can be spread easily to others.
7. **Incubation Period :** It is the time from infection to illness onset. Incubation period of a directly transmitted infectious disease is essential to determine the time period required for monitoring and restricting the movement of healthy individuals (1.e., the quarantine period).
8. **Contract Tracking :** It is the Process of Identifying assessing, and managing people who have been exposed to a disease to prevent onward transmission.

## Communicable diseases

- Communicable diseases are also known as infectious diseases.
- They spread from one person to another, i.e., a healthy person may catch it from an infected person.
- A disease is said to be communicable if it spreads from one person to another.
- Communicable diseases spread through air, water, food, and direct contact.
- Communicable diseases are transmissible from one person or animal, to another.
- The disease may be spread directly via another species (vector) or Via the environment.

## Classification of Communicable Diseases

### Based on the causative agent,

Communicable diseases are of the following types

i) **Bacterial Diseases :** Diphtheria, tetanus, typhoid, tuberculosis, cholera, etc.
ii) **Viral Diseases :** Mumps, measles, polio, small pox, chicken pox, rabies, etc.
iii) **Protozoan Diseases :** Malaria, amoebiasis, kala- azar, sleeping sickness, etc.
iv) **Helminth Diseases :** filariasis, trichinosis, liver rot, Taeniasis, ascariasis, etc.
v) **Fungal Diseases :** Ring worm, athlete's foot, etc.
vi) **Rickettsial Diseases :** Typhus fever, trench fever, Q-fever, Rocky Mountain spotted fever, etc.
vii) **Spirochaetal Diseases :** Syphilis.

### Based on the transmission mode

Communicable diseases are of the following types :

- **Contagious Diseases :** In these diseases, the healthy person gets infected by physical contact with an infected person.
- Examples of contagious diseases are measles, chicken pox, small STDs, leprosy, etc.
- **Non-Contagious Diseases :** In these diseases, healthy person gets infected on coming in contact with infected food, water, or air (and not by physical contact with an infected person)
- Examples of such diseases include cholera, tuberculosis, etc

## Respiratory Infections

- Infections of the sinuses, throat, airways, or lungs are categorised under Respiratory Tract Infections (RTIs).
- These infections are mostly caused by viruses, and sometimes by bacteria.
- Common cold is the most widespread respiratory tract infection.

### Infections of respiratory tract are categorised into two types:

**1) Infections of Upper Respiratory Tract:** These infections affect the nose, sinuses, and throat. For example,

1. Common cold,
2. Influenza (deadly viral infection),
3. Whooping cough,
4. Tonsillitis (inflammation of the tonsils and tissues at the back of the throat)

**2) Infections of Lower Respiratory Tract:** These infections affect the airways and lungs. For example,

1. Tuberculosis (bacterial infection of the lungs),
2. Influenza,
3. Bronchitis (inflammation of the lining of bronchial tubes),
4. Pneumonia (inflammation of the air sacs as they fill with fluid),

## Chickenpox

→ Chickenpox, also known as varicella, is a viral infection in which extremely itchy blisters develop on the entire body.

→ Chickenpox is one of the definitive childhood infections, but after the development of chickenpox vaccine it has become less common.

### Causative Agent

- The causative agent of chickenpox is V-Z or Varicella Zoster virus.

### Epidemiology

- **Source of Infection :** The virus present in the nose and throat secretions, skin lesions, mucous membranes, and blood is the source of infection.
- **Period of Infectivity :** It is the duration of infection for a period of about one week, starting 1-2 days before the appearance of rash and 4-5 days thereafter.
- **Age :** Chickenpox mainly occurs in children below the age of 10 years; however, if there is no previous nmunity no age is exempted and second attack of chickenpox may also occur.
- **Incubation Period :** It is the period of 14-16 days but it may be as wide as 10-21 days

### Mode of Transmission

Chickenpox is spread by droplet infection and droplet nuclei. Most patients are infected by personal contact.

### Clinical Presentations

- Runny or stuffy nose,
- light cough,
- Sometimes severe headache also starts,
- Feeling tired, and Vomiting.

### Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should instruct the infected person to isolate for a week, as soon as the rashes appear.
- He/she should instruct the family to disinfect the articles contaminated by nasal and throat discharges.
- He/she should give Varicella zoster immunoglobin vaccine within 72 hours of exposure for prevention.

## Measles

→ Measles is an acute highly infectious viral disease, characterised by fever and small red spots on the entire body.

### Causative Agent

- causative agent of measles is RNA paramyxo virus.

### Epidemiology

- **Source of Infection :** When someone with measles coughs, sneezes or talks
- **Infection Period :** 4-5 days

- **Age :** 9 months – Adult age
- **Sex :** Both Male and Female
- **Incubation Period :** 10 – 14 days

## Mode of Transmission

Secretions from nose, throat, and respiratory tract are the main sources of infection.
The virus gets transmitted either by droplet infection or droplet nuclei or both: thus it enters the human body via respiratory tract.

## Clinical Presentations

- Rapid onset of high fever,
- Sneezing and nasal discharge,
- Photophobia,
- Reddened eyes.

## Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should instruct the infected person to isolate for a week after the rashes appear.
- He/she should immunise the healthy person who is in contact with the infected person within 48 days of exposure.
- He/she should conduct immunisation promptly, when the epidemic has just begun.

# Rubella /German Measles

→ Rubella (or German measles or three-day measles) is a contagious viral infection best known by its distinctive red rash.

## Causative Agent

- German measles is caused by Rubella virus.

## Epidemiology

- **Source of Infection :** Virus of paramyxovirus family causes measles and is passed via direct contact and through air.
- **Age and Sex :** 0 – 44 age mostly seen in female
- **Infective period :** 6 – 7 days
- **Incubation Period :** 12 – 23 days

## Mode of Transmission

- Rubella virus is a highly contagious and can spread through close contact with the infected or through the air.
- It may pass from person-to-person through contact with nasal and throat droplets released on sneezing and coughing.

## Clinical Presentations

- Mild fever of 102°F (38.9°C) or lower
- Headache
- Stuffy or runny nose
- Inflamed and red eyes

## Role of Pharmacist in Educating the Public in Prevention

- Vaccination is a safe and effective way of preventing rubella.
- Pharmacists combine the rubella vaccine with vaccines for measles and mumps, and also for varicella.
- These vaccinesare given to children between 12-15 months age.
- He/she should give a booster shot in children between 4-6 years age.
- Since the vaccines contain small doses of the virus, mild fevers and rashes may occur.

# Mumps

→ Mumps is a viral infection that mainly occurs in salivary glands present near the ears. It can cause swellling or both of these salivary glands. Hearing loss, are potentially serious but rare complication of the mumps. There is not any specific treatment for mumps.

## Causative Agent

- Mumps is a viral infection caused by the mumps Virus, belonging to the family of paramyxoviruses.
- These viruses are a common source of infection, especially in children.

## Epidemiology

- **Source of Infection :** Patients suffering from mumps, Sub-clinical cases
- **Infective period :** 5-6 days
- **Age :** 5-9 year
- **Sex :** Both male & Female
- **Incubation Period :** 2 – 3 Weeks

## Mode of Transmission

- Mumps spreads through direct contact with saliva or respiratory droplets from the mouth, nose, or throat of the infected person.
- Coughing, sneezing, or talking.
- Sharing items that may have saliva on them, such as water bottles or cups.

## Clinical Presentations

- Fever
- Muscle aches
- Headache
- Tiredness

## Role of Pharmacist in Educating the Public in Prevention

- **Vaccination :** Currently, a highly effective live attenuated vaccine is available for the prevention of mumps. A single intramuscular dose of 0.5ml produces detectable antibOdies in 95% of vaccines.
- **Immunoglobulin :** A specific immunoglobulin (IgM) is available; but its effectiveness has not been proved as antibody studies are still to be conducted on recipients.
- **Other Measure :** Pharmacist should ask the patient to immediately get isolated.

## Influenza

→ Influenza is an infectious disease caused by RNA virus belonging to Orthonmyxoviridae family.
→ It is generally referred to as flu.
→ Influenza is characterised by fever, pain, and general weakness.

### CausativeAgent

The causative agent of influenza is influenza virus which is of the following three types:

- **Influenza A :** virus infects the birds, human beings, and other mammals,
- **Influenza B :** virus infects only human beings, and
- **Influenza C :** virus also infects only human beings.

### Epidemiology

- **Source of Infection :** Cases, and Sub-clinical cases.
- **Infective Period :** 5-7 days
- **Age :** All ages
- **Sex :** In both male and Female
- **Incubation Period :** 18-72 hours.

### Mode of Transmission

➲ The infection spreads either by droplet infection or droplet nuclei, via sneezing, coughing, or talking. Virus enters the human body via respiratory tract.

### Clinical Presentations

- Fever,
- Headache,
- Soreness of throat
- Unproductive cough
- Congestion,
- Sneezing,

### Role of Pharmacist in Educating the Public in Prevention

Pharmacist should recommend administration of vaccines and drug given below to prevent the transmission of influenza virus:

1) Killed vaccine,
2) Live attenuated vaccine,
3) Split virus vaccine, etc.

## Avian-Flu (Bird Flu)

→ The diseases that occurs due to infection with avian (bird) influenza (flu) Type-A viruses is termed as avian influenza.
→ These viruses occur naturally among wild aquatic birds.
→ Domestic pouitry and other bird and animal species also get infected.
→ Humans are not generally affected by avian flu viruses; but, sporadic human infections with avian flu viruses have resulted.

## Causative Agent

- Bird flu is caused by a type of influenza virus that rarely infects humans.
- More than a dozen types of bird flu have been identified, involving the two strains, HSN1 and H7N9, which have recently infected humans.

## Epidemiology

- **Source of Infection :** Bird flu occurs naturally in wild waterfowl and can spread into domestic poultry, like chickens, turkeys, ducks, and geese.
- **Infective Period :** 2 – 5 days
- **Incubation Period :** 2 – 17 days

## Mode of Transmission

- Bird flu spreads by close contact with a dead or alive infected bird.
- Touching infected birds
- Touching droppings or bedding
- Killing or preparing infected poultry for cooking

## Clinical Presentations

The following symptoms of bird flu appear very quickly:

- Extremely high temperature or feeling hot or shivery
- Muscle pain
- Headache
- Cough

## Role of Pharmacist in Educating the Public in Prevention

- The FDA has approved a vaccine to protect against infection with one strain of the HSN1 avian flu virus. Although this vaccine is not yet available to the general public, the US government is stockpiling it and will distribute it if an outbreak occurs.
- This vaccine could be administered early in an outbreak to provide limited protection; while another vaccine for a specific type of the virus causing the outbreak, is developed and manufactured. Other forms of avian flu vaccines are also being developed by researchers.

## HIN1 (Swine Flu)

→ Swine flu is a viral infection which infects the pigs. It is quite rare in people, but has not vanished. In 2009, a strain of swine flu, called HIN1, has infected many people worldwide.

## Causative Agent

- Swine influenza is caused by influenza A viruses of Orthomyxoviridae family.
- Influenza A viruses are further characterised by sub-type by two major surface of glycoproteins, i.e., haemagglutinin and neuraminidase.

## Epidemiology

- **Source of Infection :** Influenza viruses (HIN1) infect the cells lining the nose, throat and lungs in human body. The virus enters the body through inhalation of contaminated droplets or when the live virus is transferred to eyes, nose, or mouth from a contaminated surface

- **Infective Period :** 5 – 6 days
- **Incubation Period :** 1 to 4 days

## Mode of Transmission

➲ Swine flu viruses spread through pigs, generally due to close Contact or may be from contaminated objects between infected and uninfected pigs.

## Clinical Presentations

- Body aches
- Cough
- Sore throat
- Tiredness
- Chills
- Headache
- Fever
- Vomiting and diarrhoea

## Role of Pharmacistin Educating the Public in Prevention

- People should cover their nose and mouth with a tissue while coughing or sneezing, and should throw the tissue in trash after using it.
- People should wash their hands with soap and water, especially after coughing or sneezing. They should also use alcohol-based hand sanitizers.
- People should avoid touching their eyes, nose, or mouth to avoid spread of germs.
- People should avoid close contact with sick people.
- In case a person becomes sick, he/she should avoid going to work or school, should stay at home, and limit contact with others to protect them from getting and infected.

# SARS ( Severe Acute Respiratory Syndrome )

→ SARS is an example of communicable disease caused by a virus. SARS virus is a new strain of coronavirus, its genetic structure considerably differs from the known corona Virus. A patient of SARS may experienc symptoms like fever, malaise, chills, headache, dizziness, nose.

## Causative

- SARS is a communicable viral infection caused by virus belonging to the corona virus family of viruses (the same family of virus that causes common cold).

## Epidemiology

- **Source of Infection :** SARS virus gets transmittedd through respiratory droplets produced when an infected person coughs or sneezes.
- **Infective Period :** 5-7 days
- **Age :** All age
- **Sex :** In both male and Female
- **Incubation Period :** 10-14 days

## Mode of Transmission

- ➲ The infection spreads either by droplet infection or droplet nuclei, via sneezing, coughing, or talking. Virus enters the human body via respiratory tract.

## Clinical Presentations

The initial symptoms of SARS include:

- Cough,
- Difficulty in breathing,
- Fever greater than 100.4°F (38.0°C), and 3 4) Other breathing symptoms.
- Chills and shaking,
- Cough usually starting 2-3 days after other symptoms,

## Role of Pharmacist in Educating the Public in Prevention

- ➢ To identify the infected persons as early as possible, along with their movements and contacts.
- ➢ To guide the SARS patients to isolate in community and hospitals.
- ➢ To provide protection of medical staff treating these patients.
- ➢ To identify and isolate the persons suspected to be infected.
- ➢ To follow the basic hygienic practices, like washinng hands after touching the patients, using appropriate and well-fitted masks, and following infection Control measures.
- ➢ To provide timely and accurate report and to share other information with authorities and/or governments.

## MERS (Middle East Respiratory syndrome)

→ MERS is a disease that affects the respiratory system, is caused by corona virus. Mild to moderate symtpoms appear due to these viruses; however in certain cases, severe symptoms appear that may even cause death,

## Causative Agent

- The causative agent of MERS is a strain of corona virus, known as MERS-CoV.

## Epidemiology

- ♦ **Source of Infection :** MERS-CoV is a zoonotic virus that transmits from animals to humans.
- ♦ **Infective Period :** 2-5 days
- ♦ **Age :** 30-59 years age
- ♦ **Sex :** Both male and female
- ♦ **Incubation Period :** 2-14 days

## Mode of Transmission

- ➲ MERS-CoV spread from an infected persons respiratory secretions (through coughing)

## Clinical Presentations

- Fever
- Coughing
- Runny nose
- Muscle ache

- Chills
- Sore throat
- Trouble breathing

## Role of Pharmacist in educating the public in prevention

- Hands should be washed with soap and water, or alcohol-based hand sanitizer should be used.
- Proper respiratory hygiene measures (covering mouth and nose while coughing or sneezing) should be followed.
- Nose, eyes, or mouth should not be touched without washing hands.
- Surfaces and objects should be cleaned and disinfected.
- Close personal contact with sick people should be avoided.

# COVID-19

→ Coronavirus disease 2019 (COVID-19) is caused by a novel coronavirus, now called Severe Acute Respiratory Syndrome Coronavirus 2 (S.A.R.S-CoV.2) formerly called 2019-nCoV).

→ It was first identified amid an outbreak of respiratory illness cases in Wuhan City, Hubei Province, China.

## Causative Agent

- The causative agent of COVID-19 is the highly contagious Severe Acute Respiratory Syndrome Coronavirus 2 (S.A.R.S-CoV-2 ).
- It is assumed that a beta coronavirus have originated in bats, and spread in humans by direct contact with respiratory droplets.

## Epidemiology

- **Source of Infection :** COVID-19 virus spreads via droplets of saliva or discharge from nose when an infected person coughs or sneezes.
- **Infective Period :** Not more than 10 days after symptoms start appearing.
- **Incubation Period :** The estimated incubation period is 1-14 days and the symptoms usually appear in about 4 to 5 days.
- **Age :** Older people and those with underlying medical problems (cardiovascular disease, diabetes, chronic respiratory disease, and cancer) are at more risk of developing this serious illness.

## Mode of Transmission

- The COVID-19 virus spreads by direct contact with respiratory droplets of an infected person (generated through coughing and sneezing).
- Person can also become infected by touching contaminated surfaces and the touching face (e.g-, eyes, nose, and mouth).

## Clinical Presentation

- Fever
- Dry cough
- Tiredness

- Aches and pains
- Sore throat
- Diarrhoea
- Conjunctivitis

## Role of Pharmacist in Educating the Public in Prevention

- Wear a Mask
- Stay 6 feet Away from other
- Get vaccinated
- Avoid crowds and Poorly Ventilated Spaces
- Wash Hands Often
- Cover Coughs Sneezes
- Clean and disinfect

# Diphtheria

→ Diphtheria is a disease of upper respiratory tract, and is characterised by Sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, and/or nose

→ It was a common diseases of children, but after the development of vaccines it has become less common in developed countries.

## Causative Agent

- The causative agent of diphtheriais Corynebacterium diphtheriae.
- It is a gram-positive rod-shaped bacterium which affects the school-going children.

## Epidemiology

- **Source of Infection :** The source of infection may be a patient or carrier. Most carriers are 5-8 years old.
- **Infective Material :** Nose and throat secretions contain the Diphtheria bacilli.
- **Infective Period :** 14-28 days
- **Age :** 1-5 years old. and Newborns
- **Incubation Period :** 2-5 days.

## Mode of Transmission

➲ It is also transmitted via fomites. The bacteria enter through respiratory tract.

## Clinical Presentations

- Fever accompanied with fatigue, and
- Characteristic grey or yellow coloured patches appear on the membrane of the upper respiratory tract (such as tonsils, larynx, and pharynx).

## Role of Pharmacist in Educating the Public in Prevention

- Diphtheria can be prevented by immunisation with DPT vaccine, which should be given to a child on reaching the age of 6, 10, and 14 months.
- At the age of 18 months, a booster dose is given, and DT vaccine is given at the age of 5 years.
- Pharmacist should guide the patient to isolate either be at home or at hospital.
- He/she should guide the infected child to be excluded from school for at least 15 days.

## Whooping Cough/Pertussis

→ Whooping cough is a highly infectious bacterial disease, characterised by uncontrollable and violent coughing. It mainly affects children,

### Causative Agent

- The causative agent of whooping cough is a gram negative pleomorphic bacillus, Bordetella pertussis

### Epidemiology

- **Source of Infection :** The source of infection is nose and throat secretions.
- **Infective Period :** 2 – 3 Weeks
- **Age :** mostly <5 years of age. However, the disease may affect all ages if there is no previous immunity.
- **Incubation Period :** 7-14 days.

### Mode of Transmission

- The infected person is the major source of this disease which spread through droplet infection and fomites.
- The disease may also spread indirectly by touching articles contaminated with the discharge of infected person.

### Clinical Presentations

- Mild fever,
- Irritating cough

### Role of Pharmacist in Educating the Public in Prevention

- Early diagnosis through bacteriological examination of nose and throat secretions
- Isolating contacts and cases,
- Treating with erythromycin,
- Active immunisation with pertussis vaccine or DPT vaccine, and
- Passive immunisation with hyper-immune-gamma globulin.

## Acute Respiratory Infections (ARI)

→ Acute Respiratory Infections (ARI) may cause inflammation in any part of the respiratory tract, starting from nos to alveoli. It also results in a wide range of signs and symptoms, ARI is classified into Acute Upper Respiratory Infection (AURI) or Acute LowerRespiratory Infection (ALRI) clinical syndromes,

### Causative Agent

- Viral pathogens are the most common cause of respiratory infection in travelers. Causative agents include rhinoviruses, respiratory syncytial virus, influenza virus, parainfluenza virus, human metapneumovirus, measles, mumps, adenovirus, and corona viruses. Adenoviruses are a class of microorganisms that can cause acute respiratory infection. Adenoviruses comprises of more than 50 different types of viruses that lead to common cold, bronchitis, and pneumonia.

## Epidemiology

- **Source of Infection :** Airborne route,
- **Infective Period :** 3-4 Days
- **Sex :** Females are more likely to get affected with upper respiratory tract infections, specifically sinusitis, tonsillitis, and otitis externa.
- **Incubation Period :** 2 to 14 days.

## Mode of Transmission

➲ All he causative organisms of acute respiratory infections the are transmitted through airborne route. Most of the causative viruses do not survive for extended time period outside the respiratory tract, and the chain of transmission is maintained by direct person-to-person contact.

## Clinical Presentations

- Running Nose,
- Cough,
- Sore throat,
- Difficulty in breathing,
- Fever,
- And Ear problem,

## Role of Pharmacist in Educating the Public in Prevention

➢ Under standing the risk factors of respiratory tract infections in childhood indicates several approaches for primary prevention.

➢ In developing countries, improved living conditions, better nutrition, reduced indoor smoke pollution, and better maternal and child

# Tuberculosis

→ Tuberculosis (TB) is a highly infectious disease, characterised by inflammation in the lungs and other body parts, as the bacteria can attack lungs (most the commonly) and sometimes other body parts. The disease gets transmitted when a healthy individual inhales the Secretions (on coughing, sneezing, and talking) of an individual with tuberculosis of lungs.

## Causative Agent

- The causative agent of tuberculosis is Mycobacterium tuberculosis.

## Epidemiology

- **Source of Infection :** Person to person, Object to person,
- **Infective Period :** 4-5 Days.
- **Age :** 15-54 years old.
- **Sex :** Tuberculosis is more prevalent in males than in females.
- **Incubation period :** few months to 2 years

## Mode of Transmission

- The sputum spitted out from TB infected person, acts as the major source of infection. It is an air-borne diseases transmitted via droplet infection or droplet nuclei, or both

## Clinical Presentations

- Long episodes of coughing.
- Fever in the evening,
- Weight loss, and
- Anorexia.

## Role of Pharmacist in Educating the Public in Prevention

- Survey and case-finding programmes should be conducted for cases from the general population.
- Selected groups and contacts of the patients are suspected cases, and should be examined and diagnosed periodically.
- People should be educated regarding the risks of tuberculosis and the preventive and control measures need to be taken.

# Ebola Virus

→ Ebola is a rare but a deadly viral infection. Its common syptoms are fever, body aches, diarrhoea, and bleeding inside and outside the body (in cases of severe infection).

→ Ebola virus damages the immune system and organs, thus spreads through the body and ultimately reduces the levels of blood-clotting cells; this in turn leads to severe and uncontrollable bleeding.

## Causative Agent

Ebola Virus Disease (EVD) is an infection caused by a group of viruses within the Ebola virus genus:

- Ebola virus (Zaire ebolavirus species).
- Sudan virus (Sudan ebolavirus species).

## Epidemiology

- **Source of Infection :** Infected animals can transmit the virus to other animals (apes, monkeys, duikers. and humans).
- **Infective Period :** 3-5 Days
- **Age :** 2 – 35 years of age.
- **Sex :** In Both Male and Female
- **Incubation Period :** 2 – 21 days

## Mode of Transmission

Ebola virus gets transmitted by direct contact through broken skin or mucous membranes of the eyes, nose, or mouth with:

- The blood or body fluids (e.g., urine, saliva, sweat, faeces, vomit, breast milk, and semen) of an infected person or a person who died from EVD.
- The objects (e.g., clohes bedding. needles, and medical equipment) contaminated with body fluids of Le intected person or the person who died from EVD.
- The infected fruit bats or non-human primates (e.g.. apes and monkeys)

## Clinical Presentations

- Fatigue,
- Muscle pain,
- Fever,
- Headache,
- Sore throat,
- Vomiting,
- Diarrhoea,
- Rashes,

## Role of Pharmacist in Educating the Public in Prevention

- To Reduce the Risk of Wildlife -to-Human Transmission:
- To Reduce , the Risk of Human-to-Human Transmission
- Outbreak Containment Measures

# Meningococcal Meningitis

→ Meningococcal meningitis is a bacterial form of meningitis. It is a serious infection of the thin lining surrounding the brain and spinal cord.

→ Meningococcal meningitis is related to high fatality (50% when untreated) and high frequency (10-20%) of severe long-term sequelae

## Causative Agent

- Meninggococcal disease is caused by Neisseria meningitidis

## Epidemiology

- **Source of Infection :** Inhalation of respiratory or throat secretions (saliva or spit) spread meningococcal bacteria.
- **Infective Period :** 7 – 14 days
- **Age :** 1 year age and Adolescence 16 – 23 Years age
- **Sex :** Both male and Female
- **Incubation Period :** 6 – 10 days

## Clinical Presentations

- General poor feeling
- Sudden high fever
- Severe. persistent headache
- Neck stiffness
- Nausea or vomiting

## Role of Pharmacist in Educating Prevention

- A pharmacist is an integral part of a patient's healthcare team.
- Bacterial Meningitis can be treated with a variety or antibiotics, but there is currently no specific treatment for viral meningitis; and most people recover on their own.

## Intestinal Infections

- Infections of the gastrointestinal tract and mainly characterised by diarrhoea are categorised under by intestinal infections. It transmits through the contaminated food, water, or faecal matter. Diarrhoea, abdominal pain, cramps, nausea, and vomiting are the most common symptoms of an intestinal infection.
- These infections are caused by viruses, bacteria, parasites, Or other organisms.
- Examples of some common intestinal infections are:

❖ **Bacterial Infection :** These infections are caused on consuming food contaminated with the pathogenic Bacterial infections mostly occur if the food is not properly cooked or has been handled under unhygienic conditions.

Examples of some common bacterial intestinal infections are:

i) Cholera caused by Vibrio cholerae,
ii) Typhoid caused by Salmonella enteritis,
iii) Parathyroid infections,
iv) E. coli infections,

❖ **Viral Infections :** Stomach infections are also caused by viruses. These infections spread very rapidly. Intestinal infection caused by the rota virus is a major cause of death of children below 5 years of age.

Examples of some common viral intestinal infections are:

i) Rotavirus infections,
ii) Norovirus infections,
iii) Adenovirus infections, and Astrovirus infections.

❖ **Parasites and Protozoans :** Many intestinal infections are caused by parasites and protozoas. These pathogens are not self-limiting and are killed by various medications.

Examples of some common parasitic and protozoal intestinal infections are:

i) Amoebiasis caused by Entamoeba hystolytica,
ii) Balantidiasis,
iii) Giardiasis caused by Giardia lamblia,
iv) Intestinal trichomoniasis.

## Poliomyelitis

→ Poliomyelitis, also called polio is an infectious and acute disease affecting the central nervous system, which may lead to either temporary or permanent paralysis

### Causative Agent

- The causative agent of poliomyelitis is polio virus Which is of three types namelt type I, type II, type III.

### Epidemiology

♦ **Sources of Infection :** Faeces: The virus is found for a few weeks in the faeces of adults and for 3 months in the faeces of young children.
♦ **Infective Period :** 7 – 10 days
♦ **Age :** Polio mostly Occurs between 1-2 years of age.

- **Sex :** In both male and female
- **Incubation Period :** 7-21 days.

## Mode of Transmission

- **Faecal-Oral Route :** This is the most common route of transmission in which the virus transmits via contaminated water, food or flies
- **Droplet Infection :** The virus may also spread via infected individuals nasopharynx droplets. Close personal contact with infected individual facilitates droplet transmission.
- Direct infection is caused by finger contamination, whereas water, food, flies, etc., are the reasons of indirect infection.

## Clinical Presentations

- In initial phase, polio fever, soreness in throat, and stiffness in neck are observed.
- There are cases in which polio causes foot drop and flaccid paralysis of the limbs.

## Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should guide the infected person to isolate.
- He/she should guide the infected person to dispose- off urine as well as faeces properly.
- He/she should guide people to protect water source and supply of drinking water from contamination.
- He/she should guide people to avoid overcrowding at Schools as well as public places.
- He/she should guide people to take measures to restrict flies.

# Viral Hepatitis

→ Hepatitis denotes liver injury in which inflammatory cells are found to be present in the liver tissues. This condition may be self-limiting, healing on its own, or can lead to liver scaring. The disease may be acute if it persists for less than 6 months or chronic if it continues for a longer time period.

## Epidemiology

- **Source of Infection :** The virus spreads largely when an uninfected (and unvaccinated) person consumes food or water contaminated with an infected person's faeces.
- **Infective Period :** 6 – 12 days
- **Age :** mostly seen in 21 – 40 years age
- **Sex :** In both genders,
- **Incubation Period :** Approximately28 days.

## Mode of Transmission

- Faecal-Oral Route
- Direct Contact
- Blood

## Role of Pharmacist in Educating the Public in Prevention

Hepatitis can be prevented by the following measures:

- Early diagnosis of infected individuals.
- Preventing the transmission of virus.

- providing protection to the susceptible population.
- Maintaining good personal hygiene to prevent the transmission of HAV via faecal-oral route.
- Practicing proper food handling,

## Cholera

→ Cholera is an acute intestinal infection. In severe conditions, it becomes rapidly fatal. Within an hour of the onset of symptoms in a healthy individual, the blood pressure drops down to hypotensive levels, and the individual may die if not treated medically within three hours.

### Causative Agent

- The causative agent of cholera is a gram-negative bacterium, Vibrio cholerae, which produces an enterotoxin (cholera toxin). This enterotoxin acts on the mucosal epithelium lining of the small intestine, and causes exhaustive diarrhoea (the most salient feature of this disease).

### Epidemiology

- **Source of Infection :** Either a case or carrier is the major source of infection.
- **Infective Period :** 1 – 5 days
- **Age :** cholera may affect individuals of all ages.
- **Incubation Period :** Few hours to 5 days.

### Mode of Transmission

- The most common contamination source is the faeces of an infected person, which contaminates the water and food.
- The disease spreads rapidly in areas where proper treatment of sewage and drinking water is not carried out.

### Clinical Presentations

- Abdominal and leg cramps,
- Dehydration,
- Dry mouth and skin,
- Excessive thirst, Low urine output,
- Reduced blood pressure,
- Nausea,

### Role of Pharmacist in Educating the Public in Prevention

- People should keep their house and surroundings clean and free from flies.
- People should be educated about the dangers created by fingers, food, flies, fomites, and faeces.
- Breeding of flies should be prevented. Quick and efficient removal of night soil and refuse should be arranged.

## Acute Diarrhoeal Diasease

→ Acute diarrhoeal disease can affect people of any age, but Children are more likely to be impacted. Acute diarrhoeal by illnesses are characterised by the sudden onset of frequent loose or watery stools, accompanied by Vomiting and fever. The sickness is usually minor and recovers on its own.

## Causative Agent

- The common infective causative bacteria are Salmonella and Vibrio parahaemolyticus, and causative viruses are norovirus, rotavirus, sapovirus, and astrovirus. Acute diarrhoeal diseases may occur in all ages; however, children are more commonly affected.

## Epidemiology

- **Source of Infection :** Diarrhoea is a symptom of infections caused via host of bacterial, viral and parasitic organisms, most of which can spread by faeces-contaminated water.
- **Infective Period :** 1 to 3 days for viral diarrhoea.
- **Age :** In any age
- **Sex :** In both male & female
- **Incubation Period :** It usualy ranges from a few hours to 5 days

## Mode of Transmission

➲ Acute diarrhoeal infections are generally transmitted by contaminated hands or ingestion of Contaminated food or beverages. They can also spread through aerosol disperse by contaminated vomitus droplets.

## Clinical Presentations

Acute diarrhoeal illnesses are characterised by abrupt onset of frequent loose or watery stools, frequently accompanied by vomiting and fever. The sickness is usually minor and recovers on its own. In severe cases, dehydration and shock may occur.

## Role of Pharmacist in Educating the Public in Prevention

- Maintain Good personal Hygiene
- Maintain Good food Hygiene
- Maintain Good Environment Hygiene

## Typhoid

→ Typhoid, also known as typhoid fever is caused by ingesting the food or water contaminated with faeces from an infected person. The causative agent is a gram-negative short bacillus that is motile due to the presence or peritrichous flagella. The bacterium grows best at human body temperature (37°C/99°F).)

## Causative Agent

- The causative agent is a gram-negative short bacillus, Salmonella typhimurium (S. typhi). Other than this, some Non-Typhoid Salmonella (NTS, Paratyphoid strains A, B, and C) may also cause this infection.

## Epidemiology

- **Source of Infection :** Patients or carriers of typhoid fever are the major sources. Contaminated water, food, fingers and flies are the secondary sources.
- **Infective Period :** 5 – 9 days
- **Age :** Typhoid affects all age groups; however, it more commonly occurs in individuals of 5-19 years of age.
- **Sex :** Typhoid mainly occurs in males than in females.
- **Incubation Period :** 7-28 days.

## Mode of Transmission

- Typhoid is transmitted by contaminated food and water High concentration of bacteria through the faeces of an infected person is exposed to the external environment and contaminates the surrounding water supply. Supply of contaminated water leads to infected food supply. The bacteria remain alive for weeks in water and dried sewage.

## Clinical Presentations

- Headaches,
- Muscle aches and pains,
- Abdominal pain & discomfort,
- Fever up to 104°F,
- Diarrhoea.
- Chest congestion,

## Role of Pharmacist in Educating the Public in Prevention

- **Proper Sanitation :** The important measures that should be considered to prevent typhoid infection are sanitation and hygiene. Typhoid can only transmit in environments where faeces or urine of infected person contaminate the food or drinking water. Therefore, careful food preparation and washing of hands is required for preventing typhoid infection.
- **Vaccination :** The WHO has recommended two typhoid vaccines, namely the live oral Ty21a vaccine and tne injectable typhoid polysaccharide vaccine

# Amoebiasis

→ A Condition in which the intestines get infected with E.histolytica (a parasite) is termed as amoebiasis. Entamoebae are a group of single-celled parasites (living things that live in or on other living organisms) which infect humans and some animals. Among 6 different species of entamoeba that can infect the human gut, amoebiasis is caused only by E. histolytica.

## Causative Agent

- Entamoeba histolytica is a parasite that causes amoebiasis. in the Several protozoan species in the genus Entamoeba colonise humans, but not all of them can cause the disease. It is present in two forms, i.e., vegetative (trophozoite) and cystic (cyst).

## Epidemiology

- **Source of Infection :** Consumption of infected food or water, contact with contaminated food handlers, contact with contaminated medical devices, and pregnancy are all risk factors for amoebiasis.
- **Age and Sex :** Amoebic liver abscess is 7-12 times more common in men, especially among men aged 18-50 years
- **Incubation Period :** 2-4 weeks, but can also range from a few days to years.

## Mode of Transmission

- Faecal-oral pathway, directly from person-to-person or indirectly by eating or drinking food or water contaminated with faeces.
- Sexual transmission by oral-rectal contact (especially among male homosexuals).
- Vectors (flies, cockroaches, and rats).

## Clinical Presentations

- Abdominal cramps
- Diarrhoea
- Fatigue
- Excessive gas
- Rectal pain while having a bowel movement (tenesmus )
- Unintentional weight loss )

## Role of Pharmacist in Educating the Public in Prevention

- Improved Water Supply
- Sanitation
- FoodSafety

# Hookworm Infection

→ Hookworm Infection is an intestinal infection characterised by itchy rash, and respiratory gastrointestinal problems. and iron deficiency anaemia due to continuous blood loss. Hookworms are parasites, i.e., they live on other living things. They get transmitted to humans through their larvae present in soil dirt contaminated with faecal matter. Hookworms mainiy affect the lungs, skin, and small intestine.

## Causative Agent

- The causative agents of hookworm infection are the two major types of parasitic hookworms, namely Necator americanus and Ancylostoma duodenale.

## Epidemiology

- Source of Infection : It mainly occurs due to walking barefoot on contaminated soil
- Infective Period : Within 7 days.
- Incubation Period : Approximately 7-14 days.

## Mode of Transmission

- Hookworm larvae transmit through the skin of a person Who comes in contact with contaminated human faeces.)

## Clinical Presentations

- Headaches,
- Muscle aches and pains,
- Abdominal pain & discomfort,
- Fever up to 104°F,
- Diarrhoea.
- Chest congestion,

## Role of Pharmacist in Educating the Public in Prevention

- Pharmacist should guide people to never walk barefoot in soiled areas with a high contamination risk.
- He/she should guide people to never sit on the ground without using a barrier.
- He/she should guide people to never consume soil that may be contaminated with hookworm.
- He/she should guide people to never defecate in the soil or outdoors.

# Food Poisoning

→ Food poisoning, also known as food-borne disease results due to contanminated food consumption.

→ Food Infection: It is caused by consuming food contaminated with bacteria or other microbes which infect the body.

## Causative Agent

Food poisoning can be caused by the following agents

- **Virus :** Noroviruses
- **Bacteria:** Intestinal Infection
- **Parasites :** Giardia (Beaver Fever)
- **Toxic Agents :** Mushroom Toxins

## Epidemiology

- Effective Period: Signs and symptoms may occur within a few hours of eating contaminated food, or may also begin days or even weeks later. Sickness caused due to food poisoning lasts from a few hours to several days.
- Incubation Period: 1-2 days

## Mode of Transmission

➲ Food poisoning mainly transmits by consuming food contaminated with soil or faeces, reheated foods (stews) or raw or inadequately cooked foods (seafood, cross contamination by handling raw seafood).

## Clinical Presentations

- Nausea,
- Vomiting,
- Abdominal cramping, and
- Diarrhoea which may ocur all of a sudden (within 48 hours) after consuming contaminated food or drink.

## Role of Pharmacist in Educating the Public in Prevention

- Safe Shopping
- Safe Storageof Foods
- Safe Food Preparation

# ARTHROPOD-BORNE INFECTIONS

❖ Arthropod-borne infections are caused by bacteria, viruses, or protozoal parasites, and get transmitted by insects (e.g., mosquitoes, sand flies, tsetse flies, and by and others) and arachnids (e.g, ticks and mites). The viruses belonging to the families

## Dengue

→ Dengue is a mosquito-borne viral infection that causes a severe flu-like illness, and sometimes causes a potentially lethal complication called severe dengue. Severe dengue has a higher risk of death if not managed appropriately. Dengue virus is transmitted by the vector, Aedes aegypti mosquito.

### Causative Agent

- Dengue is caused by group B arborvirus (dengue types 1, 2, 3, 4), which was first isolated in India in 1945 by Sabin. DEN-2 and DEN-3 are associated with shock syndrome.

### Epidemiology

♦ **Infective Period :** 4-15 days
♦ **Age and Sex :** Except for those aged below 5 years, males were found to have higher notification rates of dengue than their female counterparts, and the risk difference was greatest among those aged 16-40
♦ **Incubation Period :** 4-10 days

### Mode of Transmission

➲ aegypti is a domestic mosquito, and the most common and efficient vector. The female mosquitoes bite humans during the daytime.They feed on an infected individuall's blood, and transmit the infection to another host when the blood-meal is interrupted or after an incubation period of 8-10 days during which the virus multiplies in the salivary glands. A. albopictus, A. polynesiensis, and A. scutellaris are the less efficient vectors.

### Clinical Presentations

Dengue virus infection may be asymptomatic or may cause undifferentiated febrile illness (viral syndrome), Dengue Fever (DF), Dengue Haemorrhagic Fever (DHF), or Dengue Shock Syndrome (DSS),

### Role of Pharmacist in Educating the Public in Prevention

➢ **Mosquito Control :** The vectors of dengue fever and DHE. i.e., A. aegypti, breed in and around houses, and can he controlled by individual and community action with anti-adult and anti-larval measures.
➢ **Other Measures :** The infected individuals should be isolated under bed-nets for the first few days to protect against mosquitoes.
➢ Personal prophylactic measures include wearing clothes that cover the body entirely; using mosquito repellent creams, liquids, coils, mats, etc.; and using bed-nets for sleeping infants and young children during day time to prevent mosquito bites.
➢ Environmental measurements include detection and elimination of mosquito breeding places, management of roof tops, porticos and sunshades, proper covering of stored water, and observation of weekly dry day

## Malaria

→ Malaria is a life-threatening disease, transmitted through the bite of an infected female Anopheles mosquito, carrying the Plasmodium parasite. The infected mosquito releases the parasite in the blood by biting an individual.

### Causative Agent

- Tne causative agent of malaria is a protozoan parasite of the genus. The species of plasmodium responsible for malaria in human beings are P. falciparum and P. vivax causing about 80% of recognised cases of malaria and approximately 90% of deaths. Malaria is also caused by other species such as P. ovale, P. malariae, P. knowesli, and P semiovale. The female Anopheles mosquito acts as a vector for human beings.

### Epidemiology

- **Source of infection :** a person who harbours the sexual forms ( gametocytes ) of the parasite in the source of infection These gametocytes are sucked by a female anopheles mosquito when it bites a sick person
- **Age :** Malaria can occur at all ages.
- **Sex :** Males are more frequently exposed to the risk of infection than female due to outdoor life
- **Incubation Period :** 12 – 14 days.

### Mode of Transmission

- **Uninfected Mosquito :** A mosquito become infected by feeding on a malaria–infected person.
- **Transmission of Parasite :** If the infected mosquito now bites health individuals, the malarial parasites are transmitted to them.
- **In the Liver :** Parasites then reach the liver, where some types of them remain dormant for even a year.
- **Into the Bloodstream :** The parasites on maturing leave the liver and infect the RBCs. At this point, the symptoms of malaria are observed.

### Clinical Presentations

- The infected person suffers from high fever (which comes and goes); the pattern of fever depends on the species of malarialparasite.
- At the initial stage, malaria infection seems to be like flu with high fever, fatigue, and body aches, with hot and cold stages.

## Filariasis

→ Filariasis is a parasitic and infectious tropical disease, caused by the thread-like parasitic filarial worms. It is a significant health problem in many developing countries but extremely rare in Western countries. *Loa loa* is another filarial parasite of humans, transmitted by the deer fly.

### Causative Agent

- The causative agent of filariasis is a parasitic nematode. Wuchereria bancrofti, Brugia malayi, and Brugia timori.

### Epidemiology

- **Age :** The infection can occur at all ages; however, the infection rate is high in 20-30 years aged individuals.
- **Sex :** The infection rate in endemic areas is higher in males.
- **Migration :** Movement of people from one place to another has spread filariasis to non-endemic areas.

- **Source of Infection :** An individual with the microfilariae in peripheral blood is the source of infection.

## Mode of Transmission

Filariasis is transmitted by mosquito bites harbouring infective larvae. The infection is transmitted by the following two types of mosquitoes:

- Culex Fatigans - Bancroftian filariasis
- Mansonoides Mosquitoes -Malayan filariasis

## Clinical Presentations

- The most remarkable symptom of lymphatic filariasis is thickening of the skin and underlying tissues, also known as elephantiasis.
- Elephantiasis occurs in the lower extremities, rarely affecting the ears, mucus membranes, and amputation stumps.

## Role of Pharmacist in Educating the Public in Prevention

- Reducing contact with the mosquito vectors, and
- Providing systemic individual and community chemotherapy.

# Chikungunya

→ The term chikungunya means doubling up due to severe by joint pains. It is a haemorrhagic fever caused by a Togavirus. Its clinical symptoms are almost similar to dengue haemorrhagic fever, with the exception that pains are limited to joints. Chikungunya is characterised by high fever and severe articular pains in limbs and spinal column.

## Causative Agent

- Chikungunya virus is transmitted by Aedes mosquitoes.

## Epidemiology

- **Source of Infection :** Chikungunya virus can spread among people by the bite of an infected mosquito
- **Age and Sex :** Infection rate is higher in females. mostly in 40-50 years age group.
- **Incubation Period :** 3-7 days (ranges between 1-12 days).

## Clinical Presentations

- fever,
- chills,
- cephalalgia (headache)
- anorexia,
- lumbago (pain in the lower back).

## Role of Pharmacist in Educating the Public in Prevention Control

- **Vector Control:** The Aedes aegypti mosquitoes should be the main target of control activities. Active community involvement is required for keeping water storage containers free of mosquitoes and for eradicating other breeding places of mosquitoes in and around houses and dwellings.

## Surface Infections

→ Skin is the largest organ of human body that functions as first line of defence. Skin protects body from various infections but sometimes becomes infected itself. Skin gets infected from various germs, and suffers from mild to serious symptoms. Some mild infections can be treated with OTC medications and home remedies, but serious with infections require medical interventions.

- ♦ Bacterial Skin Infections:
- ♦ Viral Skin Infections:
- ♦ FungalSkin Infection

## Trachoma

→ Trachoma is a chronic infectious disease affecting the conjunctiva and cornea. It is the leading cause of the world's infectious blindness.

### Causative Agent

- The causative agent of trachoma is Chlamydia trochomatis (a gram-negative cocci bacterium).

### Epidemiology

- ♦ **Source of Infection :** Ttrachoma can easily spread by direct personal contact,sharing towels & cloths, and through flies that have come in contact with the eyes or nose of an infected person.
- ♦ **Infective Period :** Between 2 to 3 months.
- ♦ **Incubation Period :** 5 to 10 days.

### Mode of Transmission

- ➲ Direct contact from one person to another if they sleep together,
- ➲ Indirect contact by sharing towels, kerchiefs, and pillows, and
- ➲ Mechanical transmission by flies.

### ClinicalPresentations

- Inflammation and scarring of the conjunctiva, which leads to inward deviation of eyelashes and lid margin.
- The eyelashes produce abrasion of the cornea, resulting in corneal ulcer, and
- If left untreated, blindness occurs.

### Role of Pharmacist in Educating the Public in Prevention

- ➢ Pharmacist should recommend sulphonamides and tetracycline antibiotics.
- ➢ Pharmacist should suggest the patient to undergo Surgery to correct eyelid deformities.
- ➢ Pharmacist should guide people to maintain proper environmental sanitation such as fly control, safe water supply, and improvement of personal and general hygiene.
- ➢ Pharmacist should provide health education on cleanliness of family members and the surrounding environment.

## Tetanus

→ Tetanus is a muscular disease in which the muscles (particularly the jaw muscles) become stiff. It is caused when the causative bacteria enter the body via cuts and wounds.

### Causative Agent

- The causative agent of tetanus is Clostridium tetani which releases an exotoxin.

### Epidemiology

➲ **Source of Infection :** Spores are important sources of infection and are widely distributed in the soil, street dust, horse, and cow dung.

➲ **Incubation Period :** 3-21 days.

### Mode of Transmission

♦ The bacterium infects a person whenever dirt enters any open cut or wound. The germs of tetanus show optimum growth in deep wounds as a result of dirty nails, tools, knives, splinters, and animal bites.

♦ Infants or children are also at risk of tetanus if contaminated or unhygienic instrumentis used for scarification, skin piercing and circumcision.

### Clinical Presentations

- Signs and symptoms of generalized tetanus include: Painful muscle spasms and stiff, immovable muscles (muscle rigidity) in your jaw. Tension of muscles around your lips, sometimes producing a persistent grin. Painful spasms and rigidity in your neck muscles.

### Role of Pharmacist in Educating the Public in Prevention

General hygiene should be enhanced.

1) Tetanus Toxoid (TT) is used for active immunisation.
2) Pregnant women and children should be immunised.
3) All the wounds and damaged tissues should be cleaned and locally treated.

## Leprosy

→ Leprosy (or Hansen's disease) is a contagious disease characterised by painful white patches on the dermis and Capable of causing necrosis of nerves and muscles.

→ Leprosy is of two types, lepromatous leprosy and tuberculoid leprosy. Other types of leprosy are borderline leprosy and intermediate leprosy, Iying in between these two types.

### Causative Agent

- The causative agent of leprosy is Mycobacterium leprae.

### Epidemiology

1) **Source of Infection :** Only the multibacillary cases (e-g., lepromatous leprosy) are highly infectious.
2) **Age :** Infection can occur at any age.
3) **Sex :** Males are more commonly affected than females.
4) **Incubation Period :** The incubation period is long, variable, and ranges from 2-5 years.

## Mode Of Transmission

- **Contact Transmission :** Leprosy is transmitted by direct (skin-to-skin) or indirect (contact with fomites ) with the infectious patient.
- **Droplet Infection :** Leprosy can also be transmitted by droplet infection.

## Clinical Presentations

- Presence of hypopigmented spots on the skin,
- The affected area loses its cutaneous sensitivity either partially or totally,
- The nerves get thicken,
- In the later phase, leprosy can lead to several complications.

## Role of Pharmacist in Educating the Public in Prevention

- Detecting leprosy cases and tracing their contacts such as children belonging to houses where there is a leprosy patient.
- There must be no contact between the patient and the healthy person.
- An acute patient should be isolated selectively or should be hospitalised.
- The infected person should be treated with dapsone.
- Patient should be rehabilitated with suitable work, especially psychologically and socially.

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## Sexually Transmitted Diseases ( STDS )

→ The term Sexually Transmitted Diseases refers to a variety of clinical syndromes and infections caused by pathogens that can be acquired and transmitted through sexual activity.

→ Some examples of STDs include AIDS, syphilis, gonorrhoea, chlamydia, genital herpes, genital warts, hepatitis B, Human Papilloma Virus (HPV) infection, trichomoniasis (parasitic infection), molluscum contagiosum, Pelvic Inflammatory Disease (PID), scabies, etc.

## Syphilis

→ Syphiis is a sexually transmitted disease which is not as common as other STIs, however if left untreated it can cause very serious health problems in both males and females.

### Causative Agent

- The causative agent of syphilis is Treponema pallidum (a spiral bacterial spirochete which is 15um long and visible in dark field microscopy with screw-like motions).

### Epidemiology

- **Source of Infection :** The most common route of transmission is via contact with an infected person's sore during sexual intercourse. Bacteria enter the body through minor cuts or abrasions present on the skin or mucous membranes.
- **Infective Period :** 10 days to 3 months
- **Age and Sex :** Highest rates among women were among those aged 20-24 years and those aged 25-29 years.
- **Incubation Period :** 21 days

### Mode of Transmission

➲ The bacterium is transmitted through direct mucous membrane contact. An infection occurs in 30% of sexual intercourses with infected partners. A transmission is possible even with less intensive contact. Rarely transmission may occur through blood transfusion.

### Clinical Presentations

- This rash is usually not itchy and may be accompanied by wartlike sores in your mouth or genital area. Some people also experience hair loss, muscle aches, a fever, a sore throat and swollen lymph nodes. These signs and symptoms may disappear within a few weeks or repeatedly come and go for as long as a year.

### Role of Pharmacist in Educating the public in Prevention

- Detecting the cases and tracking the contacts
- Treating with drugs like PAM or benzathine penicillin
- Avoiding promiscuous sexual contact.
- Using contraceptive device during sexual intercourse
- Providing health education on syphilis and its problems.

# HIV / AIDSs

→ AIDS (Acquired Immunodeficiency Syndrome) is a condition characterised by a group of signs and symptoms occurring together, as a result of decreased efficiency of the immune system, caused by the HIV.

## Causative Agent

The causative agent of AIDS is Human Immunodeficiency Virus (HIV), which may be of the following two types:

1) **HIV-1 :** Most common in sub-Saharan Africa and throughout the world, and
2) **HIV-2 :** Most common in West Central Africa, parts 2) of Europe, and India.

## Epidemiology

- **Source of Infection :** HIV patients and carriers are the sources of infection.
- **Infective Material :** Blood and semen of infected persons are the infective materials.
- **Age :** Sexually active persons (20-49 years) are mostly infected with the virus.
- **Incubation Period :** 6 years or more.

## Mode of Transmission

- Transmission of HIV primarily takes place via three routes:
- Through unprotected sexual intercourse with an infected partner.
- Through contaminated blood transfusion , using blood products or using contaminated needles for piercing or tattooing and
- Through placentral transmission from mother to child during pregnancy , birth, or breastfeeding

## Clinical Presentations

- As the virus continues to multiply and destroy your immune cells — the cells in your body that help fight off germs — you may develop mild infections or chronic signs and symptoms such as: Fever. Fatigue. Swollen lymph nodes — often one of the first signs of HIV infection.

## Role of Pharmacist in Educating the public in Prevention

- HIV testing
- Treatment of HIV infection
- Treatment of HIV in key patient populations
- HIV treatment failure
- Management of HIV disease state complications
- Treatment and prevention of opportunistic infections
- Prevention of HV infection
- HIV education
- Social services and HIV infection
- Professional engagement