

UNIT FOUR

Infectious Diseases Epidemiology

Learning Objectives

At the end of this unit the student is expected to:

-) Define communicable/infectious disease
-) Discuss the components of infectious process
-) Describe different modes of disease transmission

Communicable disease (infectious disease)

- Communicable disease
 - Disease transmitted from one host to another
- In order for disease to spread, a chain of events must occur
 - Pathogen must have suitable environment in which to live
 - Pathogen must leave reservoir to be transmitted to susceptible host

Non-communicable

- Disease that does not spread from one host to another
- Disease is often caused by individual's own normal flora or from an environmental reservoir

Components of the infectious process

- The infectious process of a specific disease can be described by the following components, which constitute of the chain of disease transmission.
 1. The Agent
 2. Its reservoirs
 3. Its portal of exits
 4. Its mode of transmission
 5. Its portals of entry
 6. The human host

Components of the infectious process...

I. The Agents

- The agents in the infectious process range from viral particles to complex multi-cellular organisms

II. Reservoirs

- A reservoir is an organism or habitat, in which an infectious agent normally lives, transforms, develops and/or multiplies.
- Reservoirs for infectious agents may be humans, animals, plants or other inanimate objects

Components of the infectious process...

Some diseases with human reservoirs are:

-)Most bacterial and viral respiratory diseases
-)HIV/AIDS/Sexually Transmitted Infections (STIs),
- measles,
- typhoid etc.

Components of the infectious process...

- All infected humans, whether showing signs and symptoms of the disease or not, are potential sources of infection to others.
- A person who does not have apparent clinical disease, but is a potential source of infection to other people is called a Carrier.
- An example of carrier is a person infected with HIV.
- A person infected with HIV might not have the signs and symptoms but he/she is capable of transmitting the infection to others

Components of the infectious process...

- ❖ Some diseases are transmitted to human beings from animals.
- ❖ These diseases are called zoonoses.
 - Examples: Rabies, anthrax, etc

Components of the infectious process...

III. Portal of Exit

- Portal of exit is the way the infectious agent leaves the reservoir.
- Possible portals of exit include all body secretions and discharges:
- Mucus, saliva, tears, breast milk, vaginal and cervical discharges, excretions (feces and urine), blood, and tissues.
- For example feces is the portal of exit for the eggs of hook worm.

Components of the infectious process...

IV. Mode of Transmission

- Modes of transmission include the various mechanisms by which agents are conveyed to other susceptible hosts.
- Transmission may be direct or indirect.

Components of the infectious process...

1. Direct Transmission

- Direct contact:
 - Occurs when there is contact of skin, mucosa, or conjunctiva with infectious agents directly from person or vertebrate animal, via touching, kissing, biting, passage through the birth canal, or during sexual intercourse.
 - Example: HIV/AIDS/STIs, rabies

Components of the infectious process...

- Direct Projection:
 - is transmission by projection of saliva droplets during coughing, sneezing, singing, spitting or talking.
 - Example: common cold
- Trans placental:
 - is transmission from mother to fetus through the placenta.
 - Example: syphilis, HIV/AIDS

Components of the infectious process...

2. Indirect transmission

- The following are the different types of indirect transmission.

2.1. Vehicle-borne:

- Transmission occurs through indirect contact with inanimate objects fomites: bed sheets, towels, toys, or surgical instruments; as well as through contaminated food, water, IV fluids etc.

Components of the infectious process...

2.2.Vector-borne:

- The infectious agent is conveyed by an arthropod to a host.
- Vectors may be biological or mechanical.

Components of the infectious process...

Biological vector:

- A vector is called biological vector if the agent multiplies in the vector before transmission.
- Example: anopheles mosquito is a biological vector for malaria.

Mechanical vector:

- A vector is called mechanical vector if the agent is directly infective to other hosts, without having to go through a period of multiplication or development in the vector.
- Example: Flies are mechanical vectors for the transmission of trachoma.

Components of the infectious process...

2.3.Airborne:

- which may occur by dust or droplet nuclei (dried residue of aerosols)
- Example: Tuberculosis.
- When pulmonary tuberculosis patients cough, they emit many aerosols which consists the agents of tuberculosis.
- When another healthy susceptible individual breaths he/she will inhale the droplet nuclei and become infected with tuberculosis.

Components of the infectious process...

V. Portal of entry –

- is the site where an infectious agent enters a susceptible host.
- Examples:
- Nasal mucosa is portal of entry for common cold
- Conjunctiva is the portal of entry for trachoma
- Injury site is portal of entry for tetanus

Components of the infectious process...

VI. Susceptible human host:

- The susceptible human host is the final link in the infectious process.
- Host susceptibility or resistance can be seen at the individual and at the community level.
- Host resistance at the community (population) level is called herd immunity.

Factors that influence Epidemiology of disease

- Dose
 - Probability of contracting disease is often proportional with dose
 - Minimum number of bacteria required to establish disease
- Incubation period
 - Disease with long incubation period can spread extensively before first case appears
- Population characteristics
 - Certain populations are more susceptible than others to certain pathogens

Population characteristics that influence occurrence of disease

- Immunity to pathogen
 - › Previous exposure or immunization of population decreases susceptibility of population to organism
 - › Can lead to herd immunity

Population characteristics that influence occurrence of disease...

- General health
 - › Stressors such as malnutrition or overcrowding increase susceptibility of population
- Age
 - › Very young and very old tend to be at greater risk
 - Young due to underdeveloped immune system
 - Old due to waning immune system