Community 432 Medicine

6 Epidemiology of Communicable Diseases

Objectives

1. Describe the process of infectious diseases transmission (Chain of infection).
2. List the types of reservoir of infectious diseases.
3. Define a carrier and list its types.
4. Define a zoonosis and list examples.
5. Identify the different mode of transmission of the organisms from the reservoir to the susceptible host.

Note: Please don't forget to go through the main lecture, thank you

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1.Chain of Infection

Cycle of infection:

It is a process that begins when the **agent** leaves its **reservoir** through a portal of exit by some mode of transmission, then it enters through an appropriate portal of entry to infect a susceptible host.

Agent:

The microorganism responsible for disease production.

Agent Characteristics affect disease transmission:

Infectivity
- The ability of an agent to produce infection in a susceptible host.

Pathogenicity
- It is the ability of the organisms to produce specific clinical reaction after infection.

Virulence
- The ability of an infectious agent to case sever disease.

Antigenicity
- The ability of the organism to produce specific immunity (antibodies or antitoxins).

Measurements:

- How the infectivity could be measured?

The ***Secondary Attack Rate*** measures the infectivity, which is the proportion of exposed susceptible persons who became infected.

$$Secondary\ attack\ rate = \frac{Number\ of\ secondary\ cases}{Number\ of\ susceptibles} x100$$

- How the pathogenicity could be measured?

The pathogenicity measured by the ***Ratio of Clinical to Sub-clinical Case***, which is the proportion of infected persons how developed clinical disease.

$$\frac{Clinical\ cases}{Subclinical\ cases}$$

Subclinical infection: 1. without clinical manifestations; said of the early stages or a very mild form of a disease, e.g. subclinical disease, infection, parasitism, or when a disease is detectable by clinicopathological tests but not by a clinical examination. 2. Disease state, before signs and symptoms become overt. (http://medical-dictionary.thefreedictionary.com/subclinical)

- How the virulence could be measured?

The virulence measured by the ***Case Fatality Rate***, which is the proportion of persons with the disease who became severely ill or die.

$$\text{Case fatality rate} = \frac{\text{Total number of deaths from a disease}}{\text{Total number of cases of that disease}} x100$$

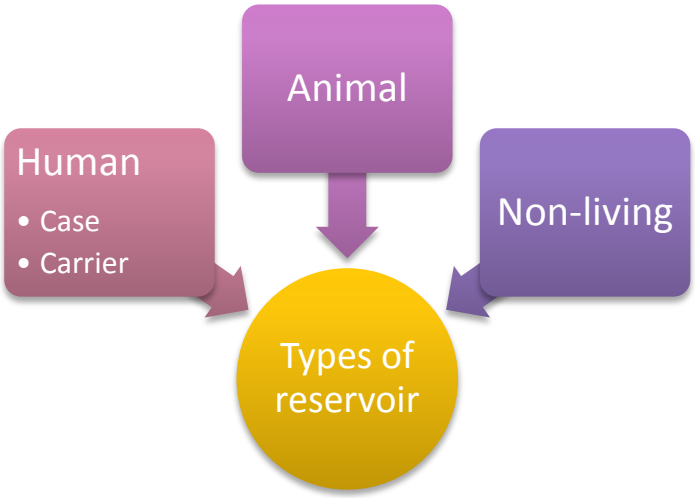
- How the antigenicity "immunogenicity" could be measured?

Second Attack Frequency measures the antigenicity.

2.Reservoir of Infection

What is the reservoir?

It is the **habitat** in which an infectious agent normally lives, grows and multiplies.



The *human carrier reservoirs* harbor the infectious agent and transmit it to other but do not demonstrate signs of the disease, either it is temporary/ chronic infection or they are not diagnosed yet.

Zoonosis: An infection transmissible under natural conditions from vertebrate animal to humans, like **Brucellosis** from sheep, goats or pigs.

Bovine tuberculosis from cattle, **rabies** from bats, dogs, and other mammals.

Non-living reservoirs "environmental": Ex. **Soil** may harbor spores that cause tetanus and anthrax, **pools of water** that are primary reservoir of Legionnaires' bacillus.

3. Modes of transmission

1. Direct modes:

The reservoir and the host are physically present together resulting in immediate transfer of infectious agent.

Direct contact

E.g. Sexually transmitted infections.

Droplet infection

E.g. Sneezing leading to ARI.

Contact with soil

E.g. Tetanus, hookworm larvae.

Inoculation into skin or mucosa

E.g. Rabies, Hepatitis B.

Trans-placental (vertical)

E.g. HIV.

2. Indirect modes:

Vehicle-borne	• Food (Hepatitis A), water (Cholera). • Milk (TB), blood (Hepatitis B).
Vector-borne	• Flies carrying Shigella. • Mosquito propagating malaria parasites.
Airborne	• TB. • Legionnaires' and fungal spores.
Fomite-borne	• Through clothes, cups, door handles, ect. • E.g. Hepatitis A, influenza.
Unclean hands and fingers	• Typhoid, Hepatitis A.

4. Susceptible host

The host does not have resistance against the pathogenic agent, which can cause a disease.

Resistance: The total body mechanisms that interpose to progression of invasion and/or multiplication of infectious agent. ***It depends on:*** genetic factors, malnutrition and acquired immunity.

Body's defense mechanisms against infections:

- ✓ Skin.
- ✓ Mucous membranes.
- ✓ Gastric acidity.
- ✓ Cilia in respiratory tract.
- ✓ Cough reflex.
- ✓ Non-specific immune response (phagocytes).
- ✓ Specific immune response (protective specific antibodies).

MCQs

Q1: How can the infectivity of infectious disease be defined?

A. The ability of the organism to produce specific immunity
B. The ability of an infectious agent to cause severe disease
C. The ability of an organism to produce specific clinical reaction
D. The ability of the germs to invade and multiply in a susceptible host

answer: D

Q2: How can pathogenicity of an infectious agent be measured ?

A. Case fertility rate
B. Secondary attack frequency
C. Ratio of clinical to sub-clinical case
D. Secondary attack rate

answer: C

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If you find any Mistakes please contact me:

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