**Family and Community Medicine Dept**

**Prof Dr Najlaa Fawzi Jamil**

**Fourth Grade/ 2019-2020 (1st group)**

**Principles of Communicable Diseases Epidemiology – 1**

**Objectives:**

-Definition of communicable diseases

- -Identify the importance of studying communicable diseases epidemiology

- Learn common terminology in communicable diseases -

--Define dynamics of disease transmission (chain of infection): Types of reservoir or source of infections

**Importance of studying communicable diseases epidemiology**

Changes of the pattern of infectious diseases -

Discovery of new infections-

 The possibility that some chronic diseases have an infective origin. -

**Why Communicable Diseases are important to any health system?**

1- Continuous presence

2- Eradicated

3- Re-Emerging

4- Emerging (New)

**Reason for changes in pattern of infectious diseases?**

1-This has been due to improved nutrition, better sanitation and housing, immunizations and antimicrobial chemotherapy.

2-Infections such as diphtheria, poliomyelitis and tetanus have decreased and, in some locations, have almost disappeared.

3-Smallpox has been eradicated from the world while another lethal infection, human immunodeficiency virus (HIV), H5N1 and other diseases had emerged in pandemic proportions.

**Infection:** Complex process of interaction between pathogen and human body.

-- Infection is the entry and development or multiplication of an infectious agent in the body of man or animals.

 An infection does not always cause illness

 .

**There are several levels of infection (Gradients of infection):** Colonization, subclinical or in apparent infection, latent infection, manifest or clinical infection.

**What are the factors influence the development of several levels of infection**?

**1- Agent factors**: Are related to the

A-Number (dose of infection)

B-Pathogenicity: Number of diseased/ Number infected

C-Virulence: Number of serious condition & mortality/ Number diseased

D-Invasiveness &toxicity

E-Tissue selectivity

F-Antigenic Character &Antigenicity

G-Viability

H- Susceptibility to chemotherapy and antibiotics.

 **-Host factors** **2**

 The HOST is defined as '' Any susceptible man or animal potentially exposed to be parasitized by infective organisms.

A person or other animal, including birds & arthropods, that affords subsistence or lodgement to an infectious agent under natural conditions.

**Primary** (definitive) host

**Secondary** (intermediate) host

The host factors in causation of diseases are factors specific to host, important for:

**---- Occurrence; Type; Spread; severity of infection**

**They include:**

1-Resistance and immunity

2-Genetic factors

3-Social and habitual factors

4-Physiological factors

5-Age and sex factors

**Contagious disease:** A contagious disease is the one that is transmitted through contact. Examples include scabies, trachoma, STD and leprosy.

**Communicable diseases:** A communicable disease is an illness due to a specific infectious (biological) agent or its toxic products capable of being directly or indirectly transmitted from man to man, from animal to man, from animal to animal, or from the environment (through air, water, food, etc..) to man.

**Latent Infection:** The host doesn’t shed the infectious agent which lies dormant within the host without symptoms. Ex., latent infection occurs in herpes simplex.

**In apparent infection:** The presence of infection ina host without recognizable clinical signs or symptoms. In apparent infections are identifiable only by laboratory means such as a blood test or development of positive reactivity to specific skin tests.

**Contamination:** The presence of an infectious agent on a body surface, on or in clothes, beddings, toys, surgical instruments or dressings, or other articles or substances including water and food.

**Incubation and Latent periods**

**Incubation period:** time from exposure to development of disease. The time intervals between invasion by an infectious agent and the appearance of the first sign or symptom of the disease in question.

**Latent period**: the period between exposure and the onset of infectiousness (this may be shorter or longer than the incubation period).

**Generation time:** is the time taken for a person from receipt of infection to develop maximum infectivity. Is roughly equal to the incubation period of the disease

**Median incubation period:** The time required for50% of cases to occur following exposure.

**The factors which determine the incubation period:**

1-Generation times of pathogen.

2-Infective dose

3-Portal of entry

4-Individual susceptibility

**Incubation period of a disease is useful for:**

 - Tracing the source of infection and contacts

 -Determining the period of surveillance

 -Applying immunization principles for prevention of diseases

 -Identification of point source or propagated epidemics

 -Estimating prognosis of a disease

**The period of infectivity** is the time that the patient is infectious to others.

**Period of communicability** is the time during which an infectious agent may be transferred directly/indirectly from an infected person to another person, from infected animal to man or from an infected person to animal, including arthropods.

An important measure of communicability is secondary attack rate.

**Dynamics of disease Transmission (Chain of Infection):**

 **Source OR reservoir of infection Mode of transmission Susceptible host**

**Source & Reservoir:** The starting point for the occurrence of a communicable disease is the existence of a reservoir or source of infection.

**The source of infection** is defined as “the person, animal, object or substance from which an infectious agent passes or is disseminated to the host (immediate source).

**Reservoir** is defined as “any person, animal, arthropod, plant, soil, or substance (or combination of these) in which an infectious agent lives and multiplies, on which it depends primarily for survival, and where it reproduces itself in such manner that it can be transmitted to a susceptible host”. In short, it is the natural habitat of the organism.

**Types of reservoirs: Human reservoir; Animal reservoir; Non-living reservoir**

**Human reservoir: include**

 **1-Cases:** A case is defined as “a person in the population or study group identified as having the particular disease, health disorder, or condition under investigation”. The case may be clinical, subclinical, or latent. Cases shows manifestation of disease, are infectious for varied period of time, according to the nature of disease, and whether specific therapy available and given or not.

**Types of cases:** index, primary, secondary.

 **2- Carriers:** A carrier is an apparently healthy person who is infected and harbors a pathogenic organism in his body, without showing the manifestations of disease, but can spread infection. It occurs either due to inadequate treatment or immune response, the disease agent is not eliminated, leading to a carrier state.

Carriers are less infectious than cases but are more dangerous epidemiologically.

**Types of carrier:** according to type, duration, portal of exit

**Three elements have to occur to form a carrier state:**

1- The presence of the disease agent in the body.

2- The absence of recognizable symptoms and signs of disease.

 3- The shedding of disease agent in the discharge or excretions.

**Animal Reservoirs:** Zoonosis is an infection that is transmissible under natural conditions from vertebrate animals to man, e.g. rabies, plague, bovine tuberculosis. There are over a 100 zoonotic diseases that can be carried from animal to man.

**Reservoirs of non-living things:** Nonliving reservoirs of infection include water, food, and soil.

 Water is the most dangerous--

**----** Pathogens found in soil generally require the skin to be broken for entry into the body. Many of the agents are basically saprophytes living in soil and fully adapted to live freely in nature. Biologically, they are usually equipped to withstand marked environmental changes in temperature and humidity.