

Prevention and control of infectious diseases

Session objectives;

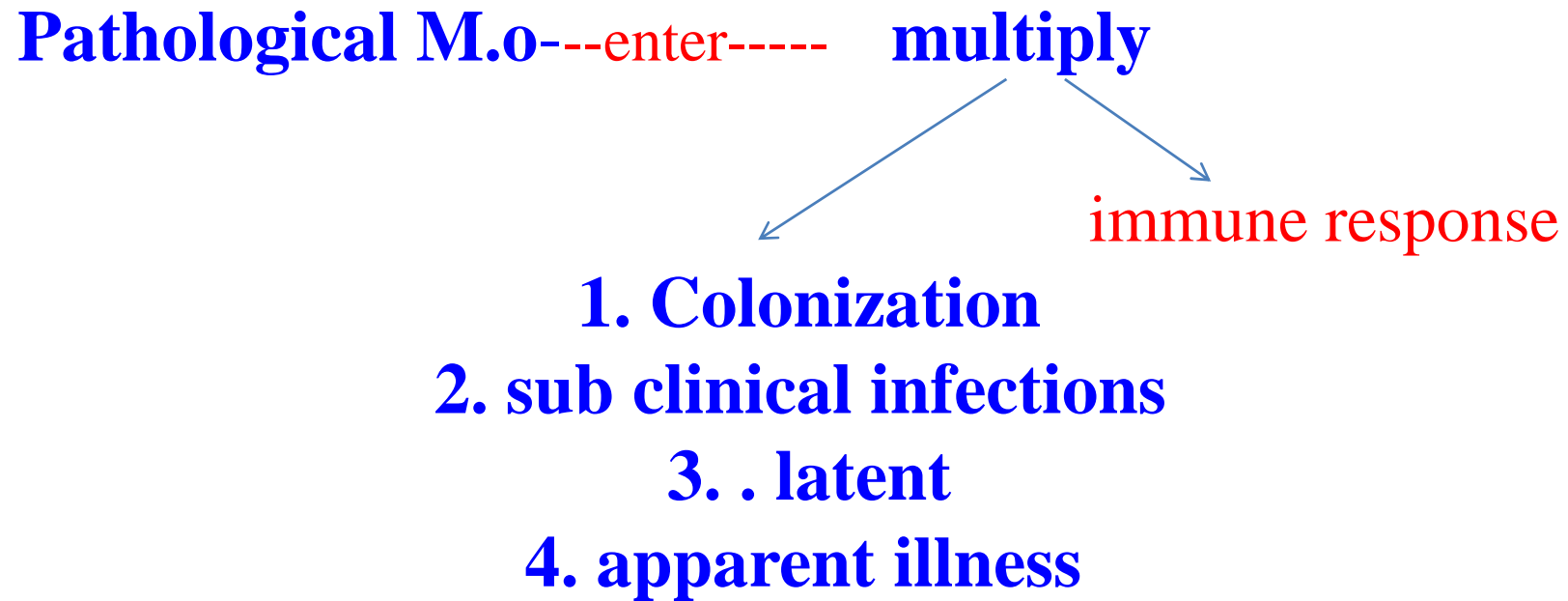
- 1. What is Infection& its process?**
- 2. What is the Disease process?**
- 3. The causative factors of disease (agents, host and environment).**
- 4. Gradient of infection(spectrum of disease)**
- 5. What is Communicable diseases?**
- 6. Dynamics of infectious disease**
- 7. Dynamic of disease transmission**
- 8. Reservoir definition & types**
- 9. Carriers definition & types (classification)**

Prevention and control of infectious diseases

Infection:

**Is the entry and development or
multiplication of an infectious agent in the
body of man or animals.**

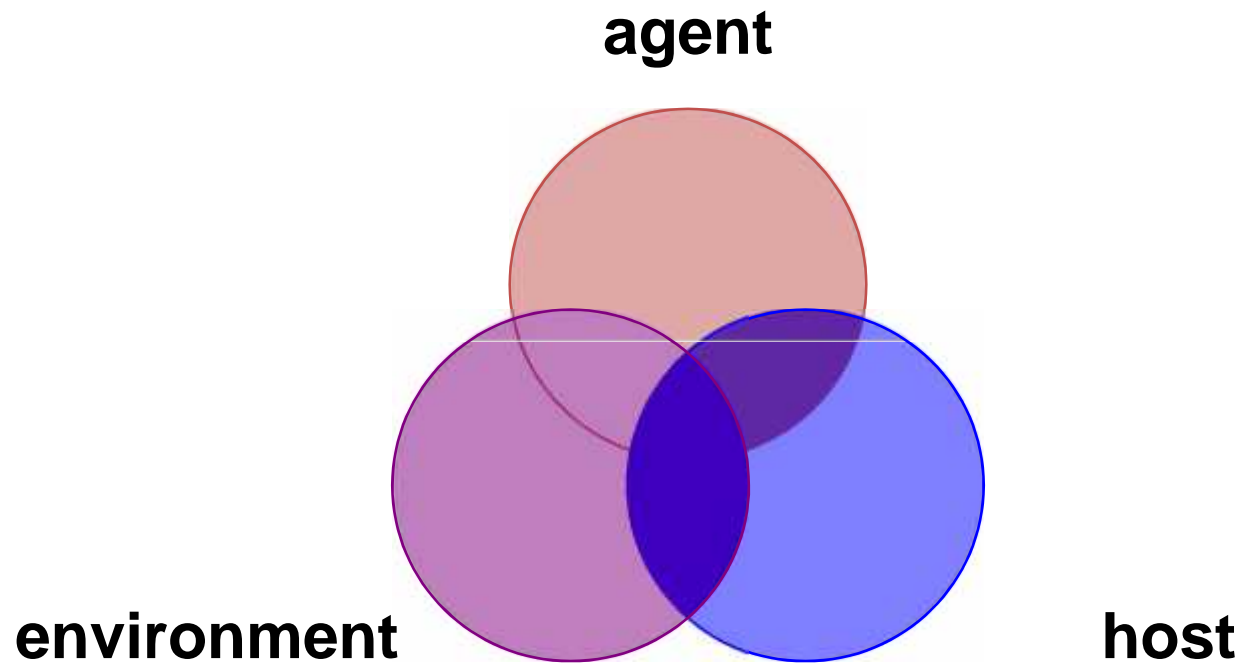
Infectious process:



- **Disease process**: which is the product of reaction (or struggle) between two forces:
 - 1) force of infection (path. M.O).
 - 2) force of resistance (i.e., the immune response, host defense).

The modern theory of disease
epidemiological triad (agents, host and environment)

Epidemiological triad



1. Agent factors

The disease agent is defined as a substance, living or nonliving, or a force, tangible or intangible, the excessive presence or relative lack of which may initiate or perpetuate a disease process.

It classified into:

1. Biological agents
2. Nutrient agents
3. Physical agents
4. chemical agents;
 - (I). Endogenous (produced in the body)
 - (ii). Exogenous (arising out side the human host)
5. Mechanical agents; (friction, other forces)
6. Absence or insufficiency or excess of factor necessary to life
7. Social agent

2. Host:

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

Host factors (intrinsic)

It classified into:

1. Demographic characteristics (age, sex and ethnicity).
2. Biological characteristics (genetic factors, biochemical levels of the blood, blood group, enzymes and immunological factors).
3. Social and economical characteristics (occupation, education, marital status, economic status, etc.).
4. Lifestyle factors (living habits, nutrition, use of alcohol and smoking, behavioral pattern, etc.).

Host defenses (immune response) against infection are:

- **natural body defense mechanisms (skin, blood, lymph nodes, BM,....) non-specific**
- **Passive immunity from mother to the fetus specific and last for few months.**
- **Specific protective antibodies or cellular immunity as a result of previous infection or immunization (specific and active), while anti sera and IG (specific and passive).**

Differences?

3. Environmental factors (extrinsic)

It is defined as all that which is external to the individual human host, living and nonliving, and with which he is in constant interaction.

- a. Physical environment (air, water, soil, housing, climate, heat light, noise, radiation, etc)
- b. Biological environment (living things which surrounds man, including man himself)
- c. Psychosocial environment (cultural values, customs, and habits, beliefs, attitudes, morals, religion, education, lifestyle, community life, and health services, social and political organization).

Gradient of infection

**Also referred as 'spectrum of disease',
variation in the manifestation of disease.
That varies from sub clinical infections (at
one end of the spectrum), to a fatal illnesses
(at the other end), in the middle of the
spectrum lie the illnesses ranging in severity
from mild to sever.**

Force of infection

Force of resistance

- **Very high** ----- **very weak**
Very sever infection (fatal)
- **High** ----- **weak**
Moderate infection
- **Bit higher** ----- **moderate**
Mild infection
- **Equal** ----- **Equal**
Sub clinical infection
- **Very weak** ----- **very high**
No disease

Which is more important?

Sub-clinical infections are more important in epidemiological point of view because:

- 1. The **no.** of persons with sub-clinical infection may be **more than no. of cases** (polio).**
- 2. The sub-clinical are usually not aware of infection, not take a precaution measures, **moving free** in the community, while patients are known and avoided.**
- 3. They **act as a source** of infection and can introducing the disease to an area which is free of infection.**

Communicable diseases (infectious diseases)
are characterized by the existence of living
infectious agent which are transmissible and
in order to survive it must have a **reservoir**.

**the infectious agents may be viruses,
rickettsiae, bacteria, protozoa, fungi or
helminthes**

- **Dynamics of infectious disease:**

1. incubation period (IP).
2. prodromal period (PP).
3. illness (appearance of characteristic sign and symptoms).
4. Convalescent period.

**infectivity may occur at any of these periods, and according to type of diseases.

Incubation period (I.P):

is the time interval between invasion by the infectious agent and the appearance of first sign or symptom of the disease in question.

I.P can be ranging from very short (few hrs), to very long (few months or years).

prodromal period (P.P):

is the interval between the onset of symptoms and appearance of specific characteristic clinical manifestations.

I.P

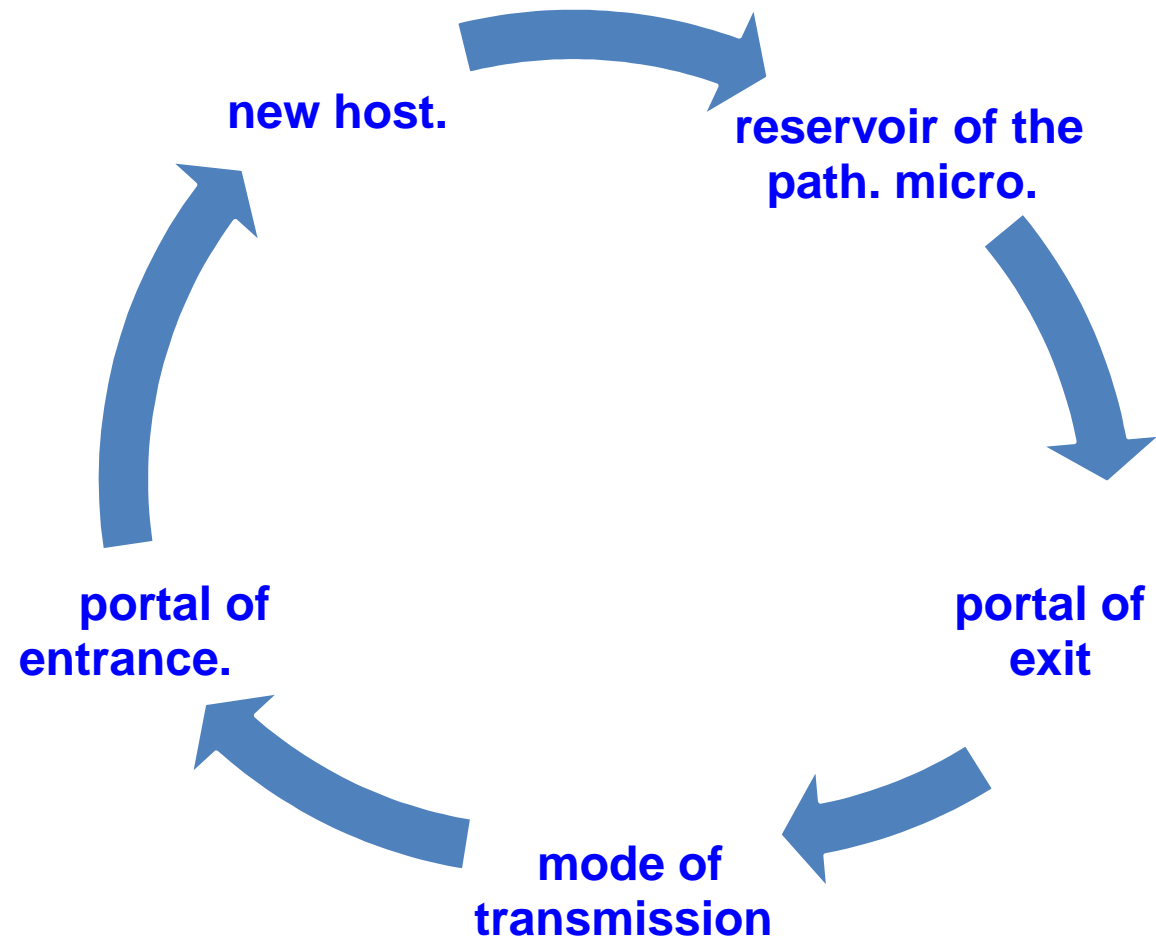
P.P

exposure onset of symptoms appearance
of characteristic symptoms

communicable period:

- is the time during which the infectious agent may transferred directly or indirectly from an infected person to another person, or from an infected animal to man.
- **Infectivity** is the ability to transfer the disease to the others.

sequence of events in infection: (dynamic of disease transmission)



- **The sequence of events can be interrupted at any point in order to prevent or retard the development of disease.**

A reservoir

is defined as “any person, animal, arthropod, plant, soil or substance (or combination of these) **in which** an infectious agents 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”.

The reservoir may be of 3 types:

1. human reservoir

- a) Cases (clinical, Sub-clinical infection & latent).**
- b) Carrier (inadequate Rx, inadequate immune response)**

2. animal reservoir

- a) Arthropods (tick, mite, flies).**
- b) Lower vertebrates (dogs, bats, mouse, sheep).**

3. non-living reservoir (soil in tetanus and anthrax)

Carrier:

is define as an infected person or animal that harbors a specific infectious agent in the absence of clinical symptoms and serves as a potential source of infection for others, e.g typhoid.

Carriers can classified according to following:

1) Course of the disease

- a. Incubatory carrier (measles, mumps, influenza)**
- b. Convalescent carrier (typhoid, dysentery, diphtheria)**
- c. Healthy carrier (sub clinical with no overt disease)**

2) Duration

- a. Transient carrier (few wks as polio).**
- b. Temporary carrier (6-12 months, dysentery).**
- c. Chronic carrier (>yr, typhoid, hepatitis B).**
- d. Permanent carrier (for a life, AIDS).**
- The longer the carrier state, the greater the risk to the community.**

3) Portal of exit (urinary, intestinal, respiratory, others)



Thank you

love23ea