

Source of Infection

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- **The source of infection:** is the person, animal or subject from which the infectious agent is transmitted to susceptible host (harbors).
- **Mode of transmission:** any mechanism by which the infectious agent is transmitted from the source of infection or a reservoir to the susceptible person either :
 - Direct transmission.
 - Indirect transmission.
 - Air borne transmission.

- **Direct transmission:**
- The portal of exit & the portal of entry, should be in direct contact e.g. STD's & transmission from the mother to the fetus (longitudinal or transplacental transmission).

- **Indirect transmission:**

- Here there is no need of the reservoir to be in direct physical contact it's divided to:

- **Vehicle borne** : could be anything in which the infectious agent is presented & spread (there is no change in the infectious agent) e.g. water borne disease like the GIT diseases, food born disease like bacterial poisoning, toys & books if contaminated.

- **Vector borne** : the disease is transmitted via a vector, either:

- Mechanical : e.g. house fly.

- Biological : propagative e.g. malaria & non propagative.

- **Carrier**

- Carrier is any person or animal who harbors the infectious agent for a period of time during which he is apparently free of occurrence of disease (free from clinical features of that disease).

Classification:

- **According to the spectrum of infection:**

Convalescent carrier (recovery carrier):

They shed (excrete) the micro organism for short period of time after recovery or they may become chronic carriers.

Post Convalescent carrier (post recovery carrier):

They excrete the micro organism for long period of time after recovery.

Healthy carrier:

They harbor the micro organism in subclinical manifestation e.g. meningitis (it is the most dangerous), staph. infection (skin, nasopharynx, food poisoning & out break).

Contact carriers:

Healthy people have a history of being in contact with cases or carriers, they may develop signs & symptoms later on, They act as a source of infection e.g. HIV & hepatitis B infections.

Incubatory carrier:

The infected person excretes the pathogens during the incubation period before the onset of symptoms, e.g. mumps & measles.

- **According to the duration of carrier state:**

Transient carrier:

The person who harbor & excrete the micro organism for few weeks after the recovery e.g. convalescent carrier.

Temporary carrier:

The person who harbor & excrete the microorganism for 6-12 months e.g. healthy or post convalescent carrier.

Chronic carrier:

The person who harbor & excrete the micro organism for more than 1 year e.g. HBV.

Permanent carrier:

The person who harbor & excrete the microorganism for whole life.

e.g. rare cases of typhoid fever more than 40 years.

- According to the site or habitat of micro organism in side the body:

Nasal carrier: e.g. in *strept.* & *staph.* infections.

Urinary carrier: e.g.in *schistosoma haematobium* infections.

Fecal carrier: e.g. in cholera (intestinal).

Skin carrier: e.g. in scabies & *staph. aureus* infection.

Note: typhoid carrier is a good example for both of intestinal (fecal) & urinary carriers.

- **Incubation Period:**

Incubation period: a time interval between initial exposure to infectious agent (entrance of infectious agent to the body) & the first time of appearance of signs & symptoms of the disease. We have the extrinsic & prepatent incubation period.

- **Extrinsic incubation period:** (this I.P. applicable to the time vector)
- It is the time interval between the entry of micro organism to the vector till the time that vector can transmit the micro organism to susceptible host.
- **Prepatent incubation period:** (related to man)
- It is the time interval between the entry of micro organism to the body of a person & the time that micro organism can be detected by clinical investigations or lab. tests in blood or stool (depending on type of micro organism & availability of tests). This I.P. related to the person for the prevention & control.

- **Communicability Period:**

- It is the time interval during which the infected person may spread or transmit the infectious agent to another person or even another animal including arthropods e.g. mosquito/ malaria.

- **Disinfection:**

Killing of the infective agent outside the body by the application of chemical or physical methods. We have:

High level of disinfection for killing all spores & bacteria (e.g. chemical 6% stable H₂O₂).

Intermediate level of disinfection for killing bacteria without spores

(e.g. pasteurization 75C° for 30 min.)

We have also 2 type of disinfection according to the time of disinfection applying.

1. Application of disinfection measures as soon as possible after the infective material, discharge have been excreted or discharged from the infected person. This is called **Concurrent Disinfection**.
2. Application of disinfection measures after the patient had been removed by death or when transferring the patient to the hospital or patient seen to be source of infection this is called **Terminal Disinfection**.

• Isolation:

- The separation of the infected person or animal (in the communicability period) in certain places & circumstances to limit the possibility of transmission & spread of the disease.

Types: depending on virulence & pathogenesis as well as the mode of transmission, we divide the isolation into:

1. **Strict:** put the patient alone even without other cases of same disease, usually done for highly contagious diseases, it's used in rare conditions.
2. **Contact:** for less contagious diseases i.e. more than one person of the same disease in the room.
3. **Respiratory:** mask and gloves dependent matter.
4. **TB isolation.**
5. **Precaution isolation:** enteric in GIT diseases, drainage & secretion in discharge abscess.

- **Quarantine:**

- Refers to the limitation or restriction of the activities of a person or an animal who have been in contact with a case of a communicable disease.

This will continue to a time equal to the usual longest incubation period.

- **Types:**

- **Absolute or complete quarantine:**

We modify the freedom of movement of well person for a period of time equal to the longest incubation period of that disease.

- **Modified quarantine:**

Partial & selective restriction of the freedom of activities of the person who is in contact with the disease, this depend on the susceptibility of the person & nature of transmission of that disease e.g. preventing some children from going to school to prevent the occurrence of certain disease.

- **Terms of Communicable Diseases**

- **Communicable disease:**

Is an illness due to an infectious agent or its toxic products, occur due to the entry or the transmission of that agent or its products from infected person, animal or inanimate (non living) reservoir to susceptible host. e.g. tetanus.

- **Infectious disease:**

Is a clinically manifested disease of human or animal resulting from infection e.g. tetanus.

- **Infection:**

Entry & development of many parasites or multiplication of infectious agent (pathogenic agent) in the body of human & animal.

- **Infectious agent:**

Any living micro organism (viruses, bacteria, protozoa, helminthes & rickettsia) that can multiply & survive in the person.

• Characters of Infectious Agent:

- **Infectivity:** the ability of the infectious agent to enter, survive and multiply in the host.
- **Infectiveness:** the relative speed by which an infectious agent can be transmitted to other host.
- **Virulence:** indicate the speed by which an infectious agent can destroy its host.
- **Pathogenesis:** determine to which extent an infectious agent can produce disease in non infected population (power of the agent to produce a disease).
- **Infected individual:** any person or animal that harbor the disease agent & this disease agent will result in two possibilities:
Will result into manifestation of the disease “Infection”.
Without signs & symptoms, this is called “carrier”, the disease could be transmitted from this carrier.

- **Reservoir:** any person, animal, plant, arthropod, soil or substance or combination in which the disease agent lives & multiply. This depends primarily on its survival & where it reproduce itself in such a manner that can be transmissible from person to another, e.g. measles in human, Rabies in dogs & hemorrhagic fever in ticks.
- **Susceptible:** a person or animal that show insufficient resistance to the infection, that may prevent the development of the disease when exposed to the disease agent.
- **Host:** a person or other living animal including birds, arthropods..etc that can provide shelter for an infectious agent under natural conditions. We have 3 main types according to stage of life cycle:
 - Primary “definitive” host:* host at which infectious agent reach it’s sexual stage.
 - Secondary host:* host at which infectious agent pass to its larval (asexual) stage.
 - Transport host:* the host at which the organism remain alive but doesn’t undergo any development.

- **Vector:** It should be an insect carrying the infectious agent either mechanically e.g. fly, or biologically within its body e.g. mosquito, so the infectious agent can be transmitted through saliva when susceptible host is bitten, or through the vomitus of flea that produce plague, or through the feces of ticks that produce the endemic fever.
- **Epidemic:** an increase in the frequency of occurrence of a particular disease above its baseline level for a limited period of time i.e. some times in cases of particular diseases greatly exceed the known level.
- **Endemic:** disease which constantly present in particular area, but sometimes there is an increase in incidence of that disease leading to epidemic disease e.g. cholera.
- **Pandemic:** it's an epidemic of worldwide distribution (when the disease occur in more than one country) e.g. SARS "Sever Acute Respiratory Syndrome".
- **Sporadic:** it's the term used to describe the occurrence of communicable disease in different focuses at the same time & at a limited region.

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