Epidemiology - 2

* contamination and infistation.

The presence, multipication and development of infectious agent on body surface or inaminate bodies (clothes, bedding, toys, surgical tool, food, water, milk)

(إصابة) ① Lodgement, development and reproduction of arthropods (lice, itch mite) on the body surface or animal or in clothing

② describe the invation of the gut by the parasitic worm (ex. ascariasis)

* **Host** : A person or animal that afford living or lodgement of an infictious agent under natural conditions. (include birds, and arthropods)

Types

→ **Obligate host** : mean the only host (ex. man in measles and typhoid fever).

→ **Definitive host** (primary) : in which the Parasite attain maturity (accomplish, achieve) or passes its sexual stage. (ex. human in human Tapeworm).

→ **intermediate host** (secondary) : in which parasite is in larval stage or passes one or more of its asexual stage. (usually there is more than one)

→ **Transport host** : the one that is used until the appropriate one (definitive host) reached.

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* According to communicability :

[1] Communicable disease :- infectious disease due to infectious agent or its toxic Product.
- directly or indirectly transmitted (man to man, animal to animal, environment (air, food, dust, soil, water) to man or animal.

ex influenza

↳ Contagious disease :- part of communicable disease
- transmitted directly from reservoir and host.
- ex. : scabies, trachoma, sexually transmitted disease (STD) leprosy

[2] Non-communicable disease: - infectious Disease
- can't be transmitted
- ex: peritonitis, appendicitis

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* **Epidemic** : - is the unusual occurance in a community or region of 1- disease (communicable or non-communicable). ex. CHD, lung cancer
2- health related behaviour ex. smoking.
3- health related events ex. traffic accident.
- The key word is ((excess of expected occurance)).

(There is no agreement of what consitute excess)
↳ one case of cholera in USA is potentional epidemic while in india hundreds of cases is epidemic.

* **Outbreak** : - Small, localized epidemic affected large number or group in the community.
- ex. food poising in an institution.

* **Sporadic** : - means scattered about.
- The cases are irregularly and from time to time (separated in time and space)
- infrequently (so few)
- little or no connection between each other.
- no recognizable common source of infection.
- ex: polio, tetanus, herpez-zoster, meningococcal meningitis

(in favourable condition for spread, sporadic may be the starting point for epidemic)

in ↳
* **Endemic** : - constant or permenent disease or infectious agent within a specific geographic area or community. (All the time)
- ex. bilharziasis in Egypt.

* **Pandemic** : - an epidemic affecting large population, wide geographic area (section of nation, entire nation, the world)
- affecting countries seqeuntly, At the same time
- ex. COVID 19, H_1N_1

* **Nosocomial infection** : (hospital acquired)

- infection originated in patient while in hospital or other health care facility.

- new disorder unrelated to the patient primary condition.
- it was not present, or incubating, or the the residual of an infection acquired during the previous admittion at the the time of admittion.
- include → infections acquired in the hospital and appeared after
  ↳ infections among the staff of the facility.
- ex: infection of surgical wound, hepatitic C, B, urinary tract infection.

* **Opportunistic Disease** : -infection by organism take opportunity of defect in host defense and cause disease.
  ex (TB, AIDS, Toxoplasma, Herpes simplex. Cytomegalo virus)

* **Iatrogenic Disease** : (physician induced)

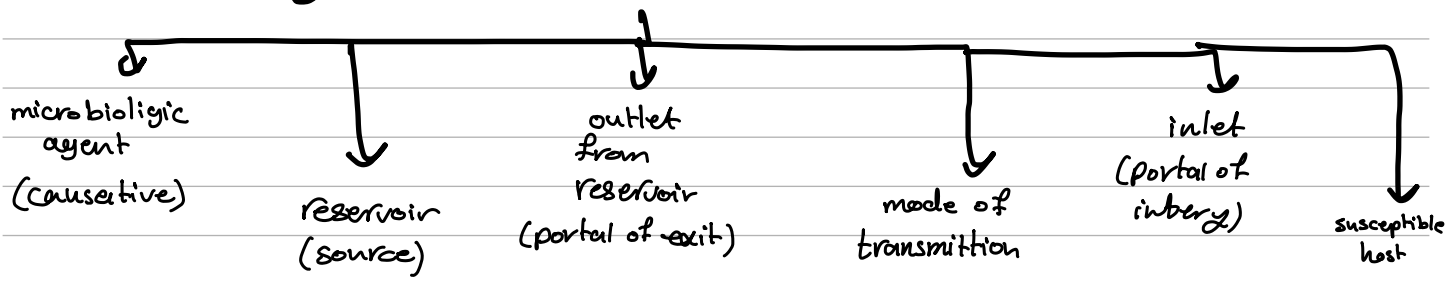
- any adverse consequence result from Physician or othe health professionals activity (preventive, diagnostic, therapuntic procedure) that cause handicap, disability, death

may have → nephrotoxic reaction
* intra-venous or intra-arterial injection
may have mild or moderate or severe reaction, may be fatal

- **Eradication** : -Termination of all transmittion of infection from the the whole world by extermination of the infectious agent.
  - The disease is no longer occur in Population.
  → only disease has been eradicated is smallpox
  → disease are amendable to eradicate are measles, diphtheria, polio.

- **Period of Communicability** :
  - the time which the infectious agent can be transmitted directly or indirectly from the the reservoir to a susceptible host.

The cycle of infection (communicable)



* **Disease Agent** (in general) : - first link in the chain of disease transmission.
- substance living or non living or force tangible or intangible
- The excessive presence or lack (mineral, vitamins) of may initiate or perpetuate a disease process.

* A disease may have → single agent
→ number of independent alternative agents.
→ complex factors whose combined presence essential for development of the disease.

⇒ **Biological Agent** : (living agents)

- Viruses (hepatitis viruses, influenza, mump, measles)
- Rickettsia (typhus)
- Fungi (candida)
- Bacteria
  - cocci (staph, strep.)
  - Bacilli (Diphtheria, salmonella, shigella)
  - Spirochetes (syphilis, Borrelia)
- Protozoa (Entamoeba)

* Agent host-related Biological Properities:
① Pathogenicity ② infectivity ③ virulence

* **Mechanism of Disease Production (Pathogenesis)** :

[1] **invasiveness** : ability of the organism to invade the tissue and multiply (each organism has the ability of invasiveness and toxicity).
ex. (Treponema Palidum, Typhoid organism) → ↑ invasiveness ↓ toxicity.

[2] **Toxicity** :

• Endotoxins
- released by living organisms
- destroyed by heat (above 60°C)
- highly immunogenic
- converted to toxoid (antigenic non toxic) by formaline, heat, acid.
- Diffusible (don't Produce fever)

ex: • Neurotoxins of tetanus and botulism
• erythrogenic toxins of scarlet fever

• Exotoxins
- released after integration of microbe.
- highly heat stable (above 60°C)
- weakly immunogenic
- not converted to toxoid
- Produce Pathophysiologic effects (fever, leucopenia, hypotention, hypoglycemic, shock)

[3] **Hypersensitivity** : - allergic state of the host following the exposure to microbes, subsequent result in disease. ex. TB

Outcome of infection depend on:

[1] Pathogenicity:
- ability to Produce clinical reaction after infection

[2] Virulence:
- ability to Produce severe Pathological reaction (refer to severity)

→ Pathogenesis and virulence measured by:
- Ration of clinical to subclinical cases
- Case fatality rate = $\frac{\text{No. of death of disease}}{\text{No. of cases of same disease}} \times 100$

[3] Antigenic Power of microbe:
ability of develop immunity (antibodies and anti-toxin)

→ measured by:
- second attack frequency
  - → secondary attach rarely record in (measles, mumps, chickenpox) — high antigenic power
  - → re-infection occur in: ① common cold ② syphilis ③ gonorrhea ④ upper respiratory diseases.

  * high antigenic power → ↑ Ab → no second attach

- Age specific attach rate
  - in measles there is drop of the attach rate after young age.

  infection in young age → ↑ Ab production → low attach rate

[4] Period and ease of Communicability:
measured by

Primary case : الدكتورة -
Secondary case : الطلاب -
(مثال)

Secondary attach rate = $\frac{\text{No. of secondary cases occuring within the incubation period following exposure to primary case}}{\text{No. of exposed susceptible}}$

[5] Dose of infection: (inoculums)
↑ the dose → more liability of apparent illness → ↑ severe

[6] Tissue slectivity: (tropism)
- The inherent capacity of the microbe to invade specific tissue.
- The factor that gives each disease its specific signs and syptoms.

[7] Host specificity:
- Some pathogen infect only man (ex. relapsing fever)
- Some only animal
- Some both animal and man (Zoonotic disease).

8 Susceptibility of Pathogen to chemotherapy

(degree of sensitivity of pathogen to Antibodies differ from one to another (even from strain to another)

9 Spore formation: → is the ability of some bacteria to change to a resistance form under unsuitable conditions.

→ remain viable for long Period

→ when get in contact with susceptible host change to vegetative form and cause disease (ex. Tetanus, anthrax) (active form)

10 Viability of organism (resistance)

→ ability to live outside the body

→ longer the duration → ↑ change to come into contact to new host and cause disease.