Environmental Transmission of Pathogens

What is a Pathogen?

Pathogen: A disease causing organism

Host: the organism which is attacked and becomes diseased

Disease: the disease is a complex process and is the result of host-pathogen interaction

- In simpler terms, disease is an abnormal condition

Infection: The process in which a microbe multiplies or grows in or on the host and causes disease

Incubation Time: the time between infection and appearance of the symptoms

Pathogenicity: refers to the ability of a parasite to gain entry into the host tissue and brings about a change (anatomical or physical) resulting in a change of health and thus disease

- It is used in a qualitative sense

Parasitism: refers to a relationship between two living organisms in which one partner is benefitted and the other is in loss

Opportunistic Pathogens: these microbes exist as commensals in the body until normal defense mechanism is suppressed, when they invade the tissue and act as pathogens

- E.g. Streptococcus pneumoniae

Virulence: it is used in a quantitative sense giving a measure of the extent of pathogenicity of a parasite

Moderately Virulent: when a pathogen causes disease moderately, not severe

Highly Virulent: when a pathogen causes disease and severe conditions; symptoms are dominant

Any microbe has the ability to change genetically and become virulent

- For example, E.coli is avirulent but some strains can cause diarrhea in humans

Virulence depends on two properties of a microbe

The viruses multiply rapidly in the nucleus of infected cells forming inclusion bodies used for diagnosis

The virus remains for a longer time in the body

In each case, the initial lesion looks the same

- A clear vesicle containing infectious virus with a base of red (erythematous) lesion at the base of the vesicle
- This is often referred to as a 'dewdrop on a rose petal'
- From this pus-containing (pustular), crusted lesions and ulcers may develop

Herpes Viruses 1 & 2

Affect primarily the oral and genital areas

Disease is typically a manifestation of reactivation

- Triggers for clinical reactivation are not well understood

Herpes simplex Type-1 (HSV-1)

- Largely involves mouth/oral cavity
- Can cause urogenital infections

Herpes simplex Type-2 (HSV-2)

- Most common cause of genital ulcers in developing world

HSV-1

Primary infection may be asymptomatic

Vesicles form moist ulcers after several days

- If untreated, epithelialize over 1-2 weeks

Recurrences

- Tend to be labial
- Heal faster
- Induced by stress, fever, infection, sunlight

HSV-2

Genital herpes is usually the result of HSV-2 with about 10% of cases being the result of HSV-1

Ebola Hemorrhagic Fever

- Mortality rate is 50 to 90% and no vaccine or control measure has been developed so far

Symptoms

- Muscle pain
- Sore throat
- Diarrhea
- Weakness
- Vomiting
- Rashes
- External and internal bleeding

Ebola Virus

- Within a week, a raised rash, often hemorrhagic (bleeding), spreads over the body
- Bleeding from the mucous membranes is typical causing apparent bleeding from the nose, mouth, eyes and rectum

The exact mode of transmission is not known

The incubation period appears to be up to 1 week, at which time the patient develops fatigue, malaise, headache, backache, vomiting, and diarrhea

The disease spread through direct contact with infected person (contagious) or through body fluids and secretions

The virus is worm-shaped filovirus native to forests of Central Africa

Mortality is high, reaching 90%

- Patients usually die from shock rather than blood loss