High-Yield Summary – Modes of Transmission & Infectious Process

Modes of transmission

The ways an infectious agent moves from its reservoir/source to a susceptible host.

Transmission pathway depends on:

- Type of infectious agent

- Portal of entry

- Environmental/ecological factors

Some infections use one route only (e.g., typhoid → vehicle), while others use multiple routes (AIDS, HBV, brucellosis).

Multiple routes increase agent survival.

A. Direct Transmission

1. Direct Contact

- Immediate transfer from person to person.

- No intermediate objects.

- Touching, kissing, sexual contact.

- Ensures large infectious dose.

- Diseases: STIs, AIDS, leprosy, skin/eye infections.

2. Droplet Infection

- Large droplets from coughing, sneezing, talking.

- Travel 30–60 cm.

- ≥10 μm trapped in nose; ≤5 μm reach alveoli.

- Increased in overcrowding, poor ventilation.

- Diseases: cold, diphtheria, pertussis, TB, meningococcal meningitis.

3. Inoculation into Skin/Mucosa

- Via bites or trauma.

- Example: rabies, hepatitis via needles.

4. Transplacental (Vertical)

- In utero transmission.

- Agents: TORCH, varicella, syphilis, HBV/HCV, HIV.

- Often causes congenital malformations.

B. Indirect Transmission

Requires agents to survive outside the host while retaining virulence.

Includes 5 F's: Flies, Fingers, Fomites, Food, Fluid.

1. Vehicle-Borne Transmission

Vehicles: water, food, milk, blood, tissues, organs.

Agents may multiply in vehicle or be passively carried.

Diseases: diarrhea, cholera, typhoid, polio, Hep A; HBV, HCV, malaria, CMV via blood.

Epidemiological features:

- Heavy contamination → explosive outbreaks.

- Initially affects exposed individuals.

- Long-distance spread possible.

- Removing vehicle stops outbreak.

2. Vector-Borne Transmission

Vector = arthropod or living carrier (mosquito, flea, tick).

Transmission can be mechanical or biological.

a. Mechanical:

- No multiplication inside vector.

b. Biological:

- Multiplication or development occurs inside vector.

- Types:

* Propagative: multiplication only (plague).

* Cyclo-propagative: multiplication + development (malaria).

* Cyclo-developmental: development only (filaria).

- Trans-ovarian transmission possible.

Factors affecting vector transmission:

- Feeding preference

- Infectivity

- Susceptibility

- Survival

- Association with humans

- Environment

3. Airborne Transmission

a. Droplet Nuclei:

- Tiny particles (1–10 μm) that remain airborne long periods.

- Spread via air currents.

- 1–5 μm reach alveoli.

- Diseases: TB, influenza, measles, Q fever.

b. Dust:

- Droplets settle on surfaces → become dust.

- Pathogens may survive long periods (e.g., TB).

- Common in hospital infections.

4. Fomite-Borne

Fomites include towels, utensils, toys, books, handles, instruments.

Diseases: diphtheria, typhoid, dysentery, Hep A, skin/eye infections.

5. Unclean Hands & Fingers

Most common transfer method from skin/nose/bowel to food.

Diseases: staph, strep, typhoid, dysentery, Hep A, parasites.

Portals of Entry

- Respiratory
- GI
- Genitourinary
- Skin/mucosa
- Insect bites, injections
- Transplacental

Some pathogens have one portal of entry but multiple exits (poliovirus, Salmonella typhi).

Incubation Period

Time from entry to symptom onset.

Types:

- Intrinsic (in host)
- Extrinsic (in vector)

Affected by:

- Host resistance
- Virulence & dose
- Toxin production
- Route of entry

Susceptible Host

A host capable of developing infection depending on immunity, nutrition, age, genetics.