Prevention and control of infectious diseases

Session objectives;

1. **Carriers definition & types (classification)**
2. **Mode of transmission**
3. **New susceptible host (**successful parasitism, Host defenses)
4. **Concept of disease control**
5. **Principles of disease control**

Carriers can classified according to following:

1) **Course(type) of the disease**

a. **Incubatory carrier (measles, mumps, influenza)**

b. **Convalescent carrier (typhoid,dysentry,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**

Portal of exit

1. Respiratory tract
2. Gastro-intestinal tract (typhoid, cholera)
3. Skin, open lesions and mucous membrane (septic wound)
4. Urinary tract (typhoid)
5. Glandular secretion (saliva in rabies)
6. Trans-placental (as rubella)

Mode of transmission: depend on(infectious agent, portal of entry &local ecological conditions)

Which may be classified as:

A. **DIRECT Transmission:** reservoir and host are present at the same place and time,

a) direct contact (skin, STD)

b) droplet infection: 30-60cm (coughing, laughing, speaking, sneezing)

c) contact with soil(hookworm, tetanus)

d) inoculation into skin or mucosa (needle, bites)

e) Vertical or called transplacental (rubella, toxoplasmosis, congenital syphilis).

B. INDIRECT Transmission: reservoir and the new host are not present at the same place and time:

a) vehicle-borne (water, food, blood, tissues)

b) vector-borne

1) mechanical(crawling or flying)

2) biological(multiplication &development in vector)

c) air-borne

1) droplets nuclei(T.B, measles)

2) dust

d) fomite-borne(typhoid fever, hepatitis)

C. Both

susceptible host: 4 stages described in successful parasitism (1. portal of entry 2. site of election 3. portal of exit 4. survive in external environment)

Portal of entry:

1. Respiratory tracts
2. gastro-intestinal tract
3. Skin and mucous membrane
4. Mechanical through polluted needles, blood products.
5. Genital tract.
6. others.

Host defenses of New susceptible host depend on :

* individual immunity and herd immunity.

(Herd or community immunity) which is the total no. of immune persons against specific disease present in that community and it **depend on:**

1) occurrence of that disease,

2) epidemiological pattern of its occurrence,

3) the state of immunization.

* the new host after infection become….?

Prevention and control

Concept of disease prevention:

The measures that ensuring the following goals;

Promote health, preserve health, restore health when it is impaired and to minimize suffering and distress.

Successful prevention depends upon;

A. knowledge of causation,

B. dynamics of transmission,

C. risk factors & risk groups,

D. availability of early detection and Rx measures.

Actions prior to the onset of disease:

Immunization, health education, healthy environment, early detection and Rx.

Concept of disease control; describes ongoing operations aimed at reducing the following:

1. Incidence of disease.
2. Duration of disease (risk of transmission)
3. The physical and psychological effects of disease.
4. The financial burden to the community.

The basic approach in controlling disease is to identify the weak points and break the weakest links in the chain of disease process.

Principles of disease control:

I. Controlling the reservoir

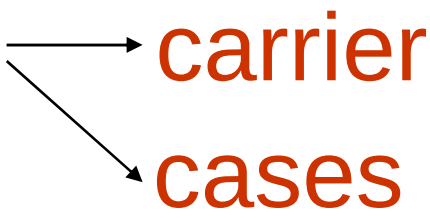
II. Interruption of the mode of transmission.

III. Protection of the susceptible host.

I. Control of reservoir:

Animal reservoir: (e.g., bovine TB, brucellosis) by eradication or Rx of animals till recovery.

Human reservoir



Control of carriers (human carriers)

1. Discovering of carriers
2. Prevent their contact with others
3. Thoroughly treated

Control of cases (human reservoir):

1. Early detection(diagnosis);
2. Notification and reporting for surveillance purposes;
3. Isolation;
4. Treatment;
5. Disinfection;

1. Early diagnosis: is needed for

a) Rx of Pt

b) For epidemiological investigation, to trace the source of infection.

c) To study the time, place and person distribution (descriptive epidemiology)

d) To institute the preventive measures to prevent the spread.

2.Notification may be immediate (daily), weekly, or monthly and this is sub grouped according to the country and the level of disease importance to the public health.

Certain diseases are subjected to international health regulations as; cholera, plague, yellow fever.

Certain diseases under the surveillance of WHO as; paralytic polio, viral influenza, malaria, relapsing fever, typhus.

3. Isolation: is separation of infected patient or animals from others (for the period of communicability) in such places and under such conditions, as to prevent the direct and indirect transmission of the infectious agents from those infected to those who are susceptible and so to protect community.

Types of isolation:

1) Strict isolation
2) protective isolation
3) Enteric precaution
4) Chemical isolation

(hospital is better than home, village or community isolation)

Types of isolation:

1- strict isolation: is applied to highly infectious diseases e.g., small pox, the spread is by air and contact. Private room with or without negative pressure, mask, gowns, gloves, are used for all contacts as doctors, nurses, or relatives.

2- protective isolation, contact isolation as diphtheria, or respiratory isolation here mask are used gowns and gloves used only if soiling.

3- **Enteric precaution:** applied for diseases transmitted by feco-oral routes. Gloves and gowns are needed here but private room is not indicated only if poor hygiene.

4- **Chemical isolation**: rapid Rx of cases in their homes, rendering them non-infectious as quickly as possible as in TB and leprosy.

*Isolation in modern days is **not successful**, as there is sub-clinical infections, carrier states, and usually cases reported after disease has spread widely. And today isolation is recommended only in case of exceptionally serious disease transmission.

4- Treatment:

that is kill the infectious agents inside the reservoir before its disseminated to others, by effective drugs, E.g., syphilis, TB. The problem is drug resistance if the Rx is inadequate or inappropriate which hinder the control.

5- Disinfection:

is the destruction of harmful microbes outside the body by direct exposure to chemical or physical agents.

Types of disinfection:

a) Concurrent disinfection; by application of dis-infective measures as soon as possible after discharge of the infectious materials from the body or after the soiling of articles with such discharges. To prevent the spread of agents through the course of the disease (urine, feces, vomit, blood ect).

b) Terminal disinfection; the application of dis-infective measures after the patient has been removed by death or cure (airing or sunning of rooms may be sufficient).

c) Prophylactic disinfection;

II. Interruption of modes of transmission:

Include control of:

a) Vehicles; as water-borne by chlorination, milk-borne by boiling or pasteurization, food-borne by adequate cooking and good storing.

b) Vectors-borne; by control of mosquito (malaria control program), control of breeding places, and animal eradication.

c) Environment; by changing some component of man's environment to prevent the entering of infective agent to susceptible host, by:

- good environmental sanitation
- sanitary water supply
- Sanitary sewage disposal.

III. Protection of the new susceptible host:

This cover the following:

1) Identification of contacts.
2) Quarantine.
3) Immunization.
4) Chemical prophylaxis.

A. Causal(elimination of invading agent)
B. Chemical (prevention clinical symptoms)

Quarantine:

Is the complete limitation of freedom of movement of well person or domestic animals exposed to communicable diseases for a period of time not longer than the longest usual IP of disease to prevent effective contact with those not exposed.

Types of quarantine:

- Absolute quarantine (as above).
- Modified quarantine (selective partial limitation of movement, as exclusion of children from school.

Immunization: which is the most powerful and cost-effective weapons of modern medicine.

Immunization is a mass means of protecting the greatest no. of people, by reducing the no. of susceptible in the community, it augment "HERD IMMUNITY" making infection difficult to spreads. Each country have its own schedule of immunization. **It is either;**

1. **Active immunization;** some diseases their control is solely based on active immunization, as polio, tetanus, diphtheria & measles.
2. **Passive immunity;** is a short term expedient useful only when exposure to infection has just occurred or is within the next few days and induced a short & variable immunity, as in diphtheria or tetanus.

3. Combined immunization.

as in tetanus, diphtheria & rabies, to provide both immediate (temporary) passive immunity and slowly developing active immunity. By giving the injections in separate sites & by using different syringes to prevent the impairment of the immune response by immunoglobulin.


Thank
love23ea