Community Medicine

Part 3
Principles of prevention and control of communicable diseases

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Strategies to prevent and control infectious diseases

They can be directed at points along the cycle of infection to

- eliminate the agent
- eliminate the reservoir
- cut off routes of transmission
- protect portals of entry, or
- reduce susceptibility of the host.
1. Control measures applied to the agent

- **Sterilization** is killing all forms of living organisms. It is used for medical and surgical instruments.

- **Disinfection** is Killing of infectious agents outside the body by direct exposure to chemical or physical agents. It includes concurrent and terminal disinfection.
• a) Concurrent disinfection is the application of disinfective measures using chemical or physical means as soon as an infected person produces infectious discharge or after the soiling of articles with infectious discharge during the course of illness.
Disinfection

- b) Terminal disinfection is the application of disinfective measures after the patient has been removed by death or hospitalization, or has ceased to be a source of infection by treatment.
2. Control measures applied to the reservoir

- The objective of control measures applied to the reservoir is to reduce the quantity of infectious agent and to reduce the communicability to the contacts. These include:
  
  a) Control measures applied to cases
  
  b) Control measures applied to carriers
  
  c) Control measures applied to animal reservoir
a) Control measures applied to cases

• 1. Case finding is the first step in the control of communicable diseases.
  – It is done by early recognition of relevant signs and symptoms or by screening of population.

• 2. Reporting is notifying the local health authority of the occurrence of a communicable disease.
  – Diseases under International Health Regulations (IHR) should be reported to the WHO.
a) Control measures applied to cases

• 3. Isolation is the separation, for the period of communicability

• 4. Treatment of cases following appropriate regimens (antibiotics, antivirals or anti-parasites)

• 5. Disinfection including concurrent and terminal disinfection
b) Control measures applied to carriers

• 1. Detection of carriers

• (e.g. enteric fever) if carriers are suspected in a closed community, such as boarding schools, army barracks and food handling places.

• 2. Exclusion of carriers from work is necessary in certain occupations as food handlers (e.g. typhoid carrier) or a teacher (e.g. diphtheria carrier).

• 3. Treatment for the carrier state whenever available.
c) Control measures applied to animal reservoir

• Control measures applied to animals include

– testing and immunization (uninfected sheep and cattle to control brucellosis)

– inspection and slaughtering of infected animals (in bovine tuberculosis)

– proper husbandry and sterilization of animal products (in anthrax)

– killing of animals (in rabies).
3. Control measures to protect the portal of exit and entry

• Use of personal protective equipment (PPE) such as masks, safety glasses, face shield, gowns, gloves.

• Use of condoms to protect from sexually transmitted infections (STIs)
4. Control measures applied to interrupt the mode of transmission

• Direct contact transmission
  – personal hygiene especially hand washing and regular bathing. Also, the use of condoms to prevent sexually transmitted infections.

• Indirect contact by sterilization of equipment and disinfection of articles.

• Droplet and airborne transmission by the use of mask, reduction of overcrowding, social distancing, better housing conditions, proper ventilation, and control of dust.
4. Control measures applied to interrupt the mode of transmission

- **Foodborne** by proper handling, storage, cooking of food and the provision of safe water, sanitary sewage and refuse disposal.

- **Vector borne** by the use of insect repellent, long pants, mosquito bed-nets, screens for windows and the elimination of vectors using insecticides or larvicides.
5. Control measures applied to the susceptible host

- Protection of the human host against infection and disease can be achieved by:
  - surveillance or
  - quarantine of **contacts** of communicable disease and
  - by measures to improve the defense mechanism of the host
Surveillance

• **Surveillance** is the close medical supervision of the contacts (by measuring the temperature and asking about the symptoms) **without restricting** their movement, for the purpose of early detection of the disease.

• The duration of surveillance should be for **the longest “incubation period”** of the disease counted from date of last exposure.
Quarantine

• **Quarantine** is the **restriction** of the activities of apparently healthy persons (contacts) or animals who have been exposed to a case of communicable disease during the period of communicability to prevent disease transmission if infection should occur.

• The duration of quarantine is for the duration of **the longest “incubation period”** of the disease counted from date of last exposure.

• Quarantine allows the early detection of the disease among contacts.
Measures to improve the defense mechanism of the host

• A) Nonspecific measures:

• Through measures of health promotion that encourage people to develop healthy habits such as adequate nutrition, regular exercising and personal hygiene especially hand washing.

• B) Specific measures
B) Specific measures

• a) Vaccination (Active Artificial Immunization)

• The Expanded Program on Immunization (EPI) provides vaccination of infants and young children against prevalent childhood diseases as diphtheria, pertussis, tetanus, polio, measles, tuberculosis.
B) Specific measures

• b) Seroprophylaxis (Passive Artificial Immunization)

• e.g. anti-diphtheritic serum, hepatitis B immunoglobulin.
B) Specific measures

• c) Chemoprophylaxis is the administration of antimicrobials including antibiotics, antiviral and antiparasitic to prevent the progress of an infection to an actively manifested disease or to eliminate the carrier of a specific infectious agent to prevent its transmission to others.
B) Specific measures

- Chemoprophylaxis is used for travelers to endemic areas (malaria), occupationally exposed persons (health care workers) and for contacts in closed communities as in camps, schools and institutions.

- Examples of chemoprophylaxis are rifampicin for contacts of meningococcal meningitis, chloroquine for travelers to malaria endemic areas, and penicillin for contacts of syphilitic patients.
Levels of Disease Prevention

• Understanding the natural history of diseases is important to plan strategies to prevent and control infectious diseases.
The natural history of a disease is its normal course in the absence of intervention.
NATURAL HISTORY OF DISEASE & COINCIDING LEVEL OF PREVENTION

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Primordial prevention

- **Primordial prevention** aims at achieving the highest possible level of health of the population.

- It includes policies and legislations to address behavior of the population and elements of the environment, legislation for the protection of water from pollution, the sanitary disposal of wastes, and licensing of food handlers.
Primary prevention

• **Primary prevention** includes measures aiming at preventing disease before it occurs, thereby reducing the incidence of disease. Primary prevention includes:
  
  – **Health promotion** to encourage the people to develop healthy habits such as adequate nutrition, regular exercising and appropriate personal hygiene especially hand washing.
  
  – **Specific protective** measures such as chemoprophylaxis, sero-prophylaxis, and vaccination.
Secondary prevention

- **Secondary prevention** aims to reduce the prevalence of disease by shortening the duration of the disease, to decrease disease severity and prevent complications.

- Also, the aim of secondary is to reduce the incidence of infectious disease as the early detection of cases reduce communicability thus reducing the rate of its occurrence among contacts.
Secondary prevention involves:

- **Early detection** (e.g. by screening programs) of a disease during the asymptomatic period before it is manifested.

- **Treatment** of cases may result in either cure of the disease or limiting its progress and reducing severity and the risks of complications.
Tertiary prevention

- Tertiary prevention aims at reducing the impact of long-term disease and disability. Tertiary prevention measures include:
  - Disability limitation to prevent the progress of a disease by treatment of complications
  - Rehabilitation which is the training of disabled individuals to reach the highest level of functional ability by using combined coordinated medical, social, vocational, psychological and educational measures.
Levels of prevention

- Primordial Prevention
  - Policies & legislations to address behavior of the population and environment

- Primary Prevention
  - Health promotion & specific protection

- Secondary Prevention
  - Screening & mass treatment

- Tertiary Prevention
  - Disability limitation & rehabilitation
Thank You