CHAPTER TWO
NATURAL HISTORY OF DISEASE AND LEVELS OF PREVENTION

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Natural history of disease

- The "**natural history of disease**" refers to the progression of disease process in an individual over time, in the absence of intervention.

- Each disease has its own life history, and thus, any general formulation of this process is arbitrary.

- However, it is useful to develop a schematic picture of the natural history of diseases as a frame work within which to understand and plan intervention measures including prevention and control of diseases.

Natural History of disease cont…

There are four stages in the natural history of a disease.

These are:

1. Stage of susceptibility
2. Stage of pre-symptomatic (sub-clinical) disease
3. Stage of clinical disease and
4. Stage of disability or death

Natural History of disease cont…

I. Stage of susceptibility

In this stage, disease has not yet developed, but the groundwork has been laid by the presence of factors that favor its occurrence.

Examples:

- A person practicing casual and unprotected sex has a high risk of getting HIV infection.
- An unvaccinated child is susceptible to measles.
- High cholesterol level increases the risk of coronary heart disease.

Natural History of disease cont…

II. Stage of Pre-symptomatic (sub-clinical) disease

- In this stage there is no manifestation of disease but pathogenic changes have started to occur.
- There are no detectable signs or symptoms.
- The disease can only be detected through special tests.

Natural History of disease cont…

Examples:

- Detection of antibodies against HIV in an apparently healthy person.
- Ova of intestinal parasite in the stool of apparently healthy children.
- The pre-symptomatic (sub-clinical) stage may lead to the clinical stage, or may sometimes end in recovery without development of any signs or symptoms.

Natural History of disease cont…

III. The Clinical stage

- By this stage the person has developed signs and symptoms of the disease.
- The clinical stage of different diseases differs in duration, severity and outcome.
- The outcomes of this stage may be recovery, disability or death.

Natural History of disease cont…

Examples:

- Common cold has a *short* and *mild* clinical stage and almost everyone *recovers* quickly.
- Polio has a *severe* clinical stage and many patients develop paralysis becoming *disabled* for the rest of their lives.
- Rabies has a *relatively short* but *severe* clinical stage and almost always results in *death.*
- HIV/AIDS has a *relatively longer* clinical stage and eventually results in *death.*

Natural History of disease cont…

IV. Stage of disability or death

Some diseases run their course and then resolve completely either spontaneously or by treatment.

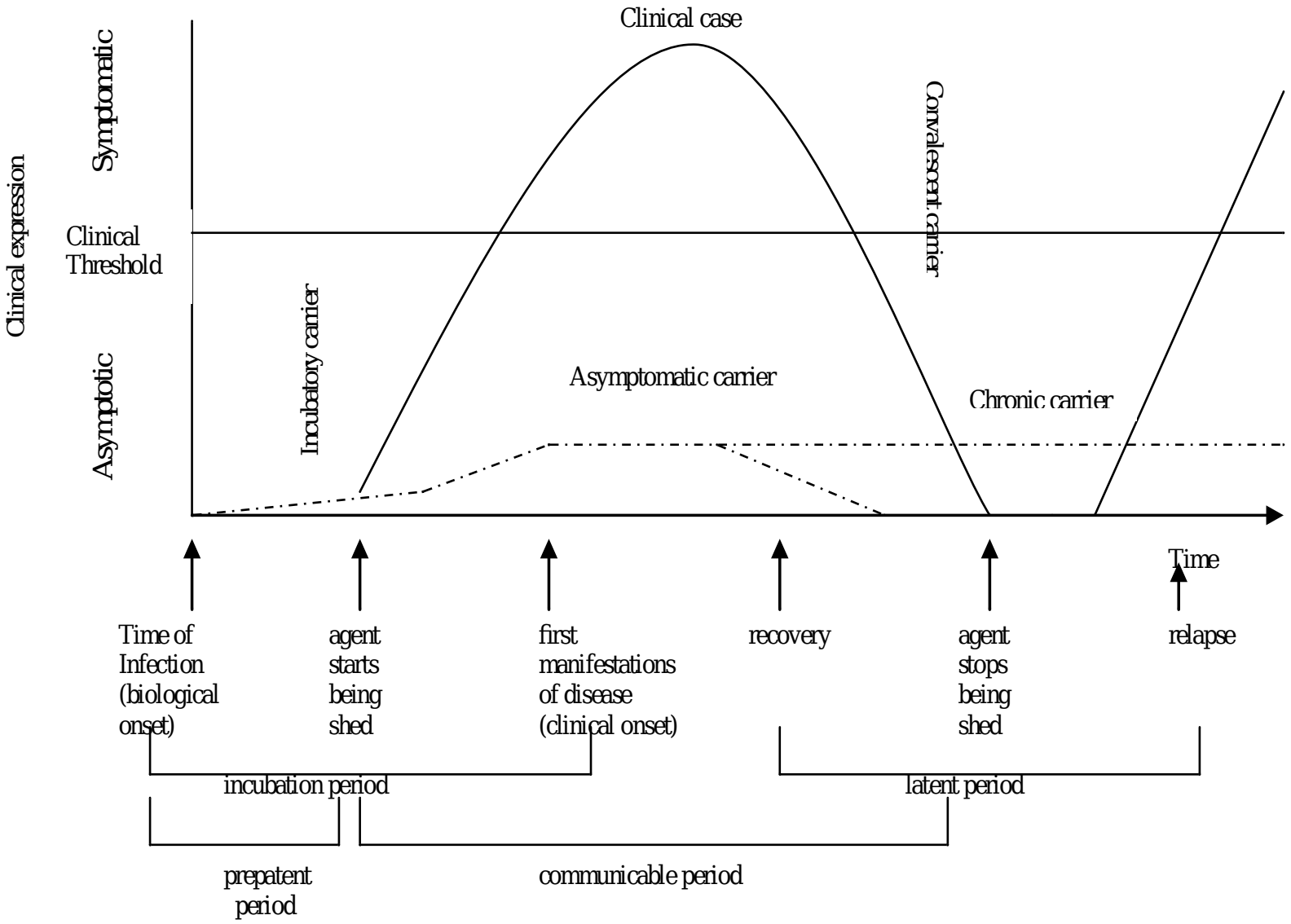
- In others the disease may result in a residual defect, leaving the person disabled for a short or longer duration. Still, other diseases will end in death.

- Disability is limitation of a person's activities including his role as a parent, wage earner, etc.

Examples:

- Trachoma may cause blindness
- Meningitis may result in blindness or deafness. Meningitis may also result in death.

Figure1. (Natural history of diseases)
TIME COURSE OF A DISEASE
IN RELATION TO ITS CLINICAL EXPRESSION AND COMMUNICABILITY



Disease prevention

The major purpose in investigating the epidemiology of diseases is to learn how to prevent and control them.

- Disease prevention means to interrupt or slow the progression of disease.

- The aim is to push back the level of detection and intervention to the precursors and risk factors of disease.

- Epidemiology plays a central role in disease prevention by identifying those modifiable causes.

Disease prevention

Table 1: Levels of prevention in relation to the stage of disease

Level of Prevention	Stage of disease	Aim	Target
Primordial	Existence of underlying condition leading to causation.	Avoiding the emergence and establishment of the social, economic, and cultural patterns of living that are known to contribute to an elevated risk of disease. *Example: Smoking, environmental pollution*	Total population and selected groups
Primary	Specific causal factors exist.	The causative agent exists but the aim is to prevent the development of the disease. *Example: Immunization*	Total population, selected groups and healthy individuals

Disease prevention cont…

Secondary	Early stage of disease	The aim is to cure patients and prevent the development of advanced disease. *Example: Early detection and treatment of cases of tuberculosis and STD*	Patients
Tertiary	Late stage of disease (treatment and rehabilitation)	The aim is to prevent severe disability and death *Example: Leprosy*	Patients

Disease prevention cont…

1. **Primary prevention is aimed at preventing healthy people from becoming sick.**

- The main objectives of primary prevention are **promoting health, preventing exposure and preventing disease.**

- Primary prevention keeps the disease process from becoming established by eliminating causes of disease or increasing resistance to disease.

Disease prevention cont…

- *Health promotion* consists of general non-specific interventions that enhance health and the body's ability to resist disease.

- Improvement of socioeconomic status, provision of adequate food, housing, clothing, and education are good examples of health promotion.

Disease prevention cont…

Prevention of exposure is the avoidance of factors which may cause disease if an individual is exposed to them.

- Examples can be provision of safe and adequate water, proper excreta disposal, and vector control.

- *Prevention of disease* is the prevention of disease development after the individual has become exposed to the disease causing factors.

- The timing is between exposure and biological onset. Immunization can be taken as a good example.

Disease prevention cont…

A. Active immunization involves exposing the host to a specific antigen against which it will manufacture its own antibodies after three weeks interval.

B. Passive immunization involves providing the host with the antibodies necessary to fight the disease.

- It is commonly given after exposure.
  - Examples: rabies, tetanus.

Disease prevention cont…

- Note: Both active and passive immunization act after exposure has taken place.
- Immunization does not prevent an infectious organism from invading the immunized host, but does prevent it from establishing an infection.

2. Secondary prevention involves detecting people who already have the disease as early as possible and treat them.

- It is carried out after the biological onset of the disease, but before permanent damage sets in.

Disease prevention con't…

- The objective of secondary prevention is to *stop or slow the progression of disease* and to *prevent or limit permanent damage.*
- Examples:
- Prevention of blindness from trachoma
- Early detection and treatment of breast cancer to prevent its progression to the invasive stage.

Disease prevention cont…

3. Tertiary prevention is targeted towards people with chronic diseases and disabilities that cannot be cured

- Tertiary prevention is needed in some diseases because primary and secondary prevention have failed, and in others because primary and secondary prevention are not effective

Disease prevention cont…

- **It has two objectives:**

Treatment to *prevent further disability or death* and

- To *limit the physical, psychological, social, and financial impact of disability,* thereby improving the quality of life.

- This can be done through *rehabilitation,* which is the retraining of the remaining functions for maximal effectiveness.

Disease prevention cont…

- Examples:
- Blindness due to vitamin A deficiency occurs when primary prevention (*adequate nutrition*) and secondary prevention (*early detection of corneal ulcers*) have failed, and damage to the cornea (keratomalacia) can not be treated

- Tertiary prevention (*rehabilitation*) can help the blind or partly blind person learn to do gainful work and be economically self supporting

Disease prevention cont…

- Diabetes mellitus is a disease that can not really be prevented or cured so primary and secondary prevention are not effective.

- Hence, the goal of tertiary prevention in diabetics is to control the level of their blood sugar using drugs and/ or diet, and to treat complications promptly in order to *improve the quality of life, prevent permanent damages such as blindness,* and *prevent early death.*

THANK YOU FOR YOUR ATTENTION!!!