Concepts of Prevention and Control
L3

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Objectives

- Understand the fundamental responsibilities of prevention.
- Definition of related terms.
- Discuss determinants of prevention.
- Explain role of prevention at different stages of the disease.
- Explain different levels of prevention.
- Explore modes of interventions.

Introduction

- Doctors have 4 Fundamental responsibilities followed below ,

✓ Promotion of Health

✓ Prevention of illness

✓ Restoration of Health

✓ Alleviation of Suffering

- Two phases of Disease are

✓ (i) Pre Pathogenesis &

✓ (ii) Pathogenesis

Definition of Disease Prevention

- "Activities designed to protect patients or other members of the public from actual or potential health threats and their harmful consequences."
- OR
- "Prevention is the action aimed at eradicating, eliminating or minimizing the impact of disease and disability."

Disease control

In disease control, the disease agent is permitted to persist in the community at a level where it ceases to be a public health problem according to the tolerance of local community. For example, Malaria control program. Disease control activities focus on primary prevention.

Disease elimination

The term ‘elimination” is used to describe interruption of transmission of disease. For example, elimination of measles, polio or diphtheria from large geographic area or region. It is intermediate step between control and eradication.

DISEASE ERADICATION

- It is an absolute process.
- Tear out by root.
- Eradication of disease implies termination of all transmission of infection by extermination of the infectious agent.
- This term is reserved for cessation of infection and disease from the whole world. The only disease eradicated from the world is “Smallpox”

Criteria of a disease to be eradicated

1. There must not be any extra-human reservoir.
2. The incubation period should be short.
3. There must be an effective vaccine available. Measles, poliomyelitis and diphtheria are the diseases those can be eradicated.

Difference between Control and Eradication

	Control	Eradication
Definition	To reduce incidence to acceptable level e.g., malaria control	Total cessation of disease agent, e.g., Smallpox eradication
Objective	To reduce mortality and morbidity	To uproot the disease
Area of operation	In high incidence area	Total coverage
Duration of operation	Long follow up	Time limited
Economic aspect	Expensive	Cheap
Case finding, confirmation, Epidemiological investigation	Not important	Very important

MONITORING

Defined as “the performance and analysis of routine measurement, aimed at detecting changes in the environment or health status of population.

” Example:

- Growth monitoring of child,
- Monitoring of air pollution,
- Monitoring of water quality etc.

SURVEILLANCE:

Defined as “the continuous scrutiny (inquiry) of the factors that determine the occurrence and distribution of disease and other conditions of ill health.”

E.g., Poliomyelitis surveillance program of WHO.

INTERVENTION

Intervention is any attempt to intervene or interrupt the usual sequence in the development of disease.

- Health Promotion
- Specific Protection
- Early Diagnosis and Adequate Treatment
- Disability Limitation
- Rehabilitation

EARLY DIAGNOSIS & TREATMENT

- Though not as effective and economical as ‘Primary Prevention’, early detection and treatment are the main interventions of:

- disease control,
- besides being critically important in reducing the high morbidity and mortality in certain diseases like hypertension, cancer cervix, and breast cancer.

- The earlier the disease is diagnosed and treated the better :

- it is from the point of view of prognosis and
- preventing the occurrence of further cases (secondary cases) or
- any long-term disability.

Determinants of Prevention

Successful prevention depends upon:

- a knowledge of causation,
- dynamics of transmission,
- identification of risk factors and risk groups,
- availability of prophylactic or early detection and treatment measures,
- an organization for applying these measures to appropriate persons or groups, and
- continuous evaluation of and development of procedures applied

Utilizing the Stages of Disease in Medical School Teaching

Stage #	Disease Development	Aspects of Disease to Teach that Correlate with Stage of Development
1	Exposure	Epidemiology, Risk Factors, Genetics (a Type of Exposure)
2	Acquisition	Cellular Mechanisms, Immunology, Diagnosis, Tests and Imaging
3	Advancement/Progression	Pathophysiology, Monitoring of Disease Status, Treatment Mechanisms and Effects
4	Complications	Pathological Mechanisms, Medical and Surgical Interventions, Inpatient Care, Clinical Management
5	Death or Disability	a) Causes of Mortality, Intensive Interventions
		b) Types of Disability from Disease
		c) Pain Management and End of Life Care

Preventing each Stage of Disease

- **What is it we try to accomplish through prevention?**
  - Avoid progressing to successive, more severe stage (regardless of how severe disease already is)
  - Reverse the disease process if possible
  - Prevent suffering and disability through rehabilitation
  - Prevent futile and expensive care
  - Avoid secondary cases
    - Applies to communicable diseases, but also to those caused by shared lifestyle

Combining the Stages of Disease Development and Stages of Prevention

Stage #	Disease Development	Prevention of the Respective Stage
1	Exposure	Avoidance of Exposure • Sexual abstinence; anti-smoking efforts
2	Acquisition	Reduction of Acquisition Post-exposure prophylaxis; hepatitis B vaccine for drug users
3	Advancement/Progression	Interruption of Progression Screening tests (Pap, cholesterol, etc.) followed by treatment
4	Complications	Avoidance of Complications Treatment , medical or surgical
5	Death or Disability	a) Preventing (Delaying) Mortality b) Rehabilitation of Disability c) Palliative Care for Inevitable Death

Levels of Prevention

- 1) Primordial Prevention
- 2) Primary Prevention
- 3) Secondary Prevention
- 4) Tertiary Prevention

Level of Prevention

Manage risk factors ,prevent the onset of disease

Early diagnosis & prompt treatment

Reduce complications and disability

1) Primordial Prevention

- "This is a prevention of Development of risk Factors in a Population group , which they have not yet appeared."
- Special Attention is Given in preventing Chronic Disease.
- Main Intervention is Health Education.
- In this efforts are dedicated towards Discouraging people from adopting Harmful Life styles/Habits through Individual & Mass Education.

Cont...

- Primordial prevention, a relatively new concept, is receiving special attention in the prevention of chronic diseases. Ex., many adult health problems (e.g. obesity, hypertension) have their early origins in childhood, because this is the time when lifestyles are formed(Ex., smoking, eating patterns, physical exercise).

- Primordial prevention begins in childhood when health risk behavior begins. Parents, teachers and peer groups are important in imparting health education to children.

Examples of Primordia prevention

- National programs and policies on:

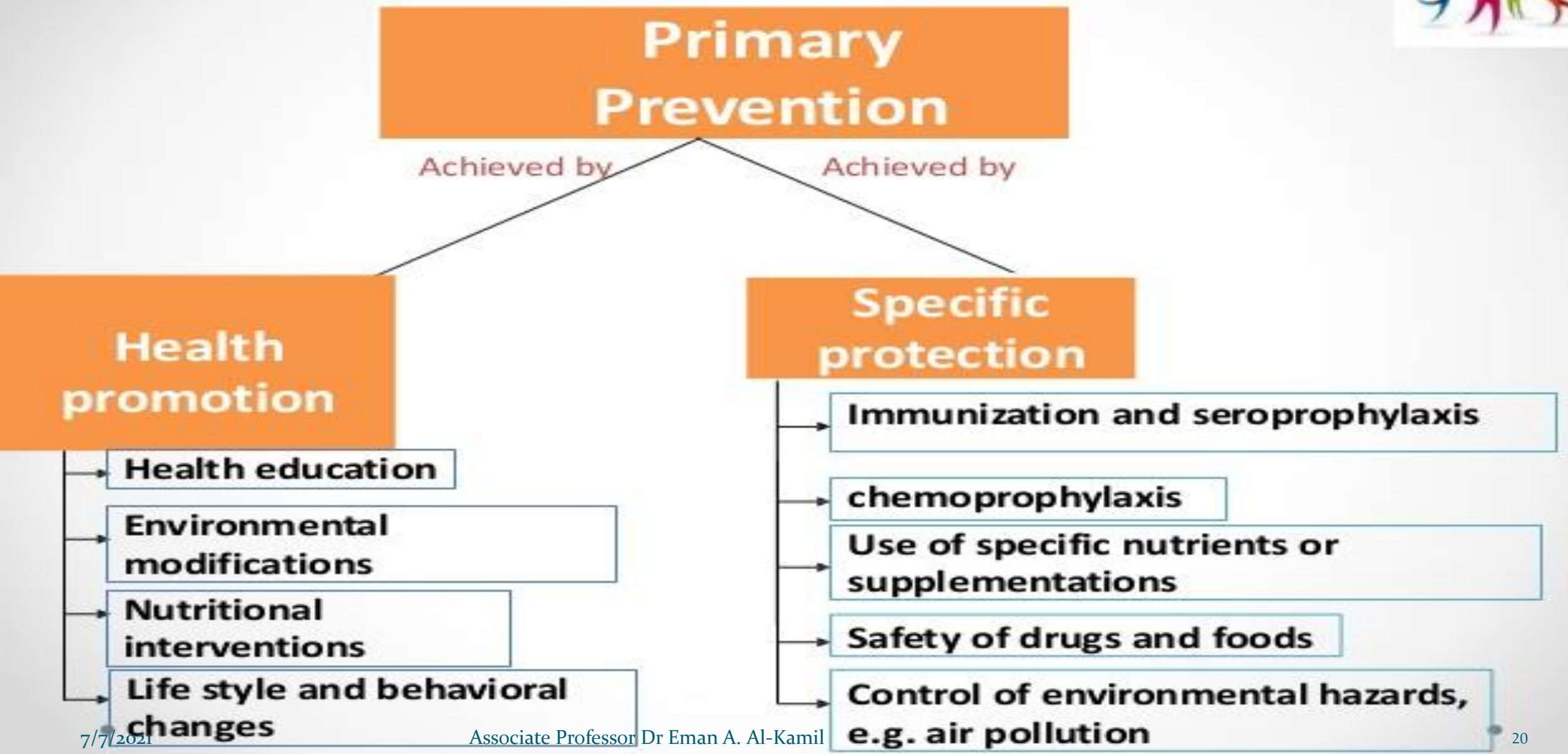
- Food and nutrition
- Comprehensive Policies for discourage smoking , Alcohol & Drugs
- To promote regular physical activity
- Making major changes in lifestyle

2) Primary Prevention

- "Primary prevention can be defined as the action taken prior to the onset of disease, which removes the possibility that the disease will ever occur."
- In this Action are taken before the onset of Disease.
- It signifies intervention in the pre-pathogenesis phase of a disease or health problem.

Cont...

- It includes the concept of "positive health", a concept that encourages achievement and maintenance of "an acceptable level of health that will enable every individual to lead a socially and economically productive life".


Primary Prevention
Achieved by
Achieved by
Health promotion
Health education
Environmental modifications
Nutritional interventions
Life style and behavioral changes
Specific protection
Immunization and seroprophylaxis
chemoprophylaxis
Use of specific nutrients or supplementations
Safety of drugs and foods
Control of environmental hazards, e.g. air pollution

Approaches for Primary Prevention:

- The WHO has recommended the following approaches for the primary prevention of chronic diseases where the risk factors are established:

  - A) Population (mass) strategy
  - B) High -risk strategy

A)Population (mass) strategy

- "Population strategy" is directed at the whole population irrespective of individual risk levels.
- For example, studies have shown that even a small reduction in the average blood pressure or serum cholesterol of a population would produce a large reduction in the incidence of cardiovascular disease
- The population approach is directed towards socio-economic, behavioral and lifestyle changes

Population strategy

- The major advantage of the population strategy is that one does not have to identify the high-risk group but simply aims to reduce the level of a given risk factor in the entire population.

Examples: Iodization of salt , fluoridation of water.

- Its main disadvantage is that it offers little benefit to many individuals because their absolute risks of disease are quite low.

- For example, most people will wear a seat-belt while driving a car for their entire life without being involved in a crash. The widespread wearing of seat-belts has been very beneficial to the population as a whole, but little apparent benefit is accrued by those individuals who are never personally involved in a crash. This phenomenon has been called the prevention paradox

B) High -risk strategy:

- The high -risk strategy aims to bring preventive care to individuals at special risk.
- This requires detection of individuals at high risk by the optimum use of clinical methods.
- Primary prevention is a "Holistic" approach which relies on the measures taken to Promote Health.

High-risk individual strategy

- Although the high risk- individual strategy (which aims to protect susceptible persons) is most efficient for the people at greatest risk of a specific disease, these people may contribute little to the overall burden of the disease in the population.

- However, if people with established disease are included in this high -risk group, the strategy will contribute more to the overall reduction in the burden of disease .

- The main disadvantage of the high-risk-individual strategy is that it usually requires a screening program to identify the high-risk group, something that is often difficult and costly.

Population strategy

Advantages:

- Radical :Large potential for population
- Behaviorally appropriate

Disadvantages:

- Small benefits to individual
- Poor motivation of subject
- Poor motivation of physician
- Benefit to risk ratio may be low

High risk strategy

Advantages :

- Appropriate to individuals
- Subject motivation
- Physician motivation
- Benefit to risk ratio is favorable

Disadvantages:

- High screening costs.
- Temporary effects
- Limited effect
- Behaviorally inappropriate

Modes of Intervention

- (i).Health Promotion
- (ii). Specific Protection

Specific Protection

- " Efforts directed toward protection against specific diseases."
- OR
- " The provision of Conditions for normal Mental & Physical Functioning of the Human beings & in Group.it includes the Promotion of Health , Prevention of Sickness , & Care of Individuals ."

Intervention

- Immunization
- Use of specific nutrients
- Chemoprophylaxis
- Protection against occupational hazards
- Protection against accidents
- Control of General Environment
- Avoidance of allergens etc.

Cont...

- Use of Specific immunization (BCG, DPT,MMR vaccines)
- Chemoprophylaxis (tetracycline for Cholera, dapsone for Leprosy, Chloroquine for malaria,etc.,)
- Use of specific nutrients (vitamin A for Children, iron folic acid tablets for Pregnant mothers)
- Protection against accidents (Use of helmet, seatbelt,etc.,)
- Protection against occupational hazards.
- Avoidance of allergens.
- Protection from air pollution.

3.Secondary Prevention

- It is defined as " An Action which halts the progress of a disease at its incipient stage and prevents complications."

- The specific interventions are:

- (i) early diagnosis (e.g. screening tests, breast self examination, pap smear test, radiographic examinations etc.)& Treatment

- (ii) Referral

Cont...

- Secondary prevention attempts to arrest the disease process, restore health by seeking out unrecognized disease and treating it before irreversible pathological changes take place, and reverse communicability of infectious diseases.

- It protects others in the community from acquiring the infection and thus provide at once secondary prevention for the infected ones and primary prevention for their potential contacts.

Objectives of Secondary Prevention

- Complete cure and prevent the progression of disease process.
- To prevent the spreads of disease by curing all the known cases.
- To prevent the complications and sequel of disease.
- To shorten the period of disability.

(i) Early Diagnosis

- The Disease complications can be prevented & Health can be Restored by Diagnosing the Disease at it's Early stages & by providing the adequate Treatment according to the Health problem. Includes :

✓ Arrests/Stops the Disease Process
✓ Restore the Health
✓ Treat the Disease before Irreversible pathological changes occur.
✓ Reverse the Communicability of infectious Disease.

- It is directed at the period between the onset of disease and the normal time of diagnosis and aims to reduce the prevalence of disease.
- Secondary prevention can be applied only to diseases in which the natural history includes an early period when it is easily identified and treated, so that progression to a more serious stage can be stopped.
- The two main requirements for a useful secondary prevention program are a safe and accurate method of detecting the disease – preferably at a preclinical stage – and effective methods of intervention.

- Screening for Cervical cancer provides an example of the importance of secondary prevention.
- Studies supported the value of such screening programs, which are now widely applied in many developed countries.

- Other examples of secondary prevention measures that are widely used include:

1. testing of eyesight and hearing in school-age children,

2. screening for high blood pressure in middle age,

3. testing for hearing loss in factory workers, and

4. skin testing and chest radiographs for the diagnosis of tuberculosis.

4.Tertiary Prevention

- It is used when the disease process has advanced beyond its early stages.
- It is defined as "all the measures available to reduce or limit impairments and disabilities, and to promote the patients' adjustment to irremediable conditions."
- Intervention that should be accomplished in the stage of tertiary prevention are disability limitation, and rehabilitation.
- Intervention in Late Pathogenesis Phase.

Tertiary prevention

Tertiary prevention is aimed at reducing the progress or complications of established disease and is an important aspect of therapeutic and rehabilitation medicine.

It consists of the measures intended to:

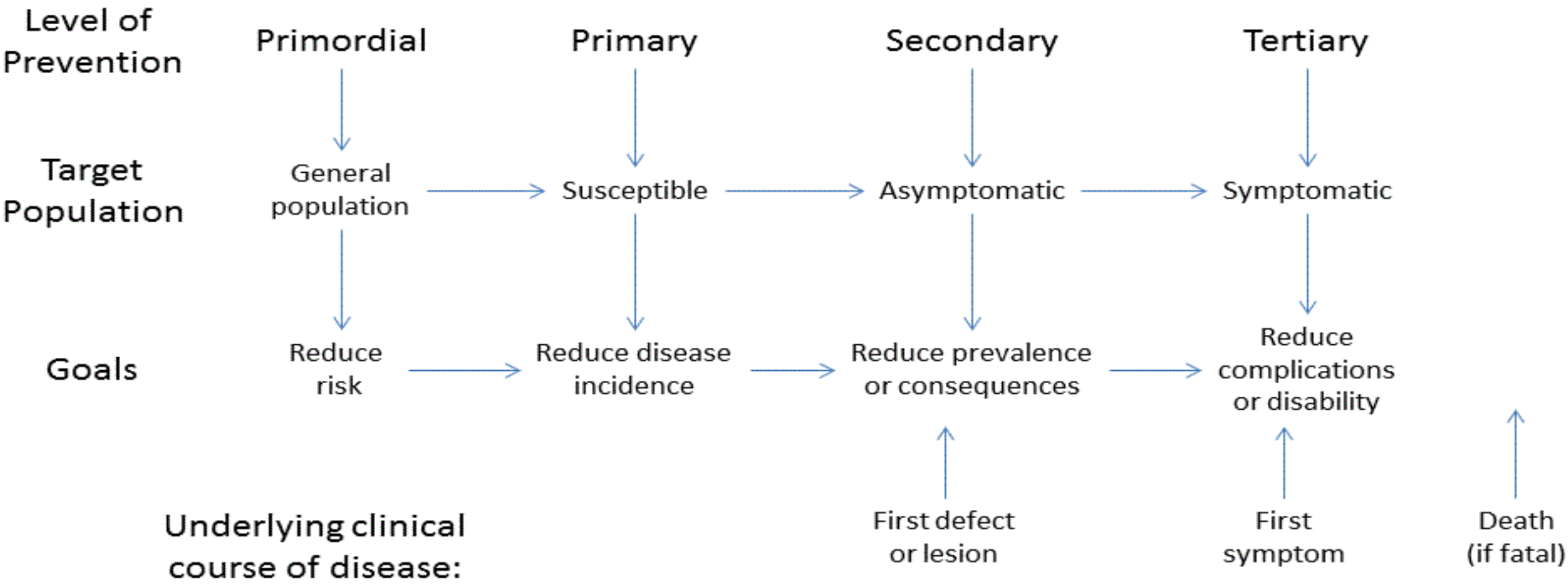
1. reduce impairments and disabilities,

2. Minimize suffering caused by poor health and

3. promote patients' adjustment to incurable conditions.

Tertiary prevention is often difficult to separate from treatment, since the treatment of chronic disease has as one of its central aims the prevention of recurrence.

A Classification of Preventive Strategies



Disease

Impairment

Disability

Handicap

Tertiary Prevention

IMPAIRMENT	DISABILITY	HANDICAP
Any loss or abnormality of psychological, physiological or anatomical structure or function.	The inability to carry out certain activities because of impairment, that are considered normal for his age and sex.	The inability to discharge the obligations required of him and play the role expected of him in the society.
Loss of foot	Cannot walk	unemployed

Disability Limitation

- To prevent or halt the transition of disease process from Impairment & Handicap.
- Impairment: any loss or abnormality of psychological, physiological or anatomic structure or function.
- Disability: any restriction or lack of ability to perform an activity in the manner considered normal for a human being.
- Handicap: disadvantage for a given individual, resulting from impairment or disability, that limits or prevents the fulfillment of a role that is normal for that individual

(ii) Rehabilitation

- **Rehabilitation is " the combined and coordinated use of medical, social, educational, and vocational measures for training and retraining the individual to the highest possible level of functional ability."**

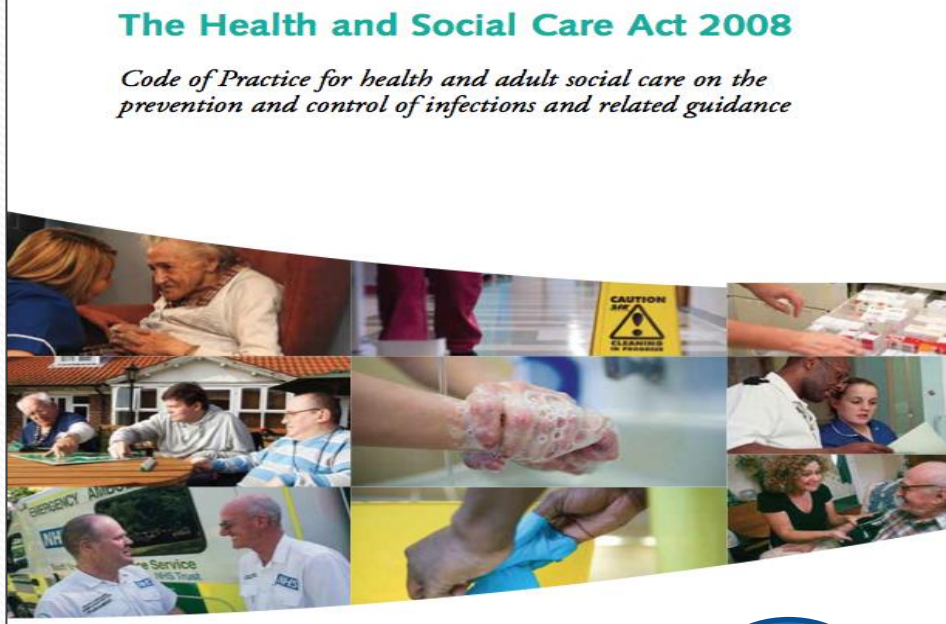
- **Requires cooperation from different sections of society.**

REHABILITATION

 Rehabilitation has been defined as the ‘combined and coordinated use of medical, social, educational and vocational measures for training and retraining the individual to the highest possible level of functional ability”

Areas of concern in rehabilitation:

- Medical Rehabilitation
- Vocational (Occupational) Rehabilitation
- Social Rehabilitation
- Psychological



Examples of Rehabilitation

- Establishing schools for the blind.
- Exercises in neurological disorders
- Prosthetic restoration of lost tooth
- Reconstructive surgery in Leprosy.
- Change of profession for a more suitable one and modification of life in general in the case of TB,etc.,

Thank you