



Public Health

Title : *Concepts of prevention
and control*

Lec no : *3*

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وَقُلْ رَبِّ زِدْنِي عِلْمًا



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** *To keep people healthy*
 - ✓ **Prevention of illness**
 - ✓ **Restoration of Health** → *Any Patient with a health problem, we should be able to restore his health back (if possible) by medical or surgical interventions.*
 - * ✓ **Alleviation of Suffering**
Natural history of the disease
- **Two phases of Disease are**
 - ✓ **(i) Pre Pathogenesis &** *(No Pathological changes)*
 - ✓ **(ii) Pathogenesis**

* Alleviation of suffering;
one of the medical ethics of doctors is to decrease pain & suffering of individuals.

- Suffering includes (pain, social & mental problems)
Doctors have a responsibility to assist patients with disabilities in adapting to their environment & enhancing their quality of life.

Handicap = عاقبة المرض

* Phases of the disease:

- In normal phase (pre-pathogenesis), ① we're concerned about preventing the occurrence of risk factors, promotion of health by certain policies.

- ② In case we noticed some changes, or development of some risk factors (without occurrence of the disease - No symptoms)
⇒ stopping further changes and arresting the risk factors
So we can prevent the development of the disease.

If no interventions were made to stop the disease, pathological changes will occur (with symptoms), & might lead to complications / disabilities if not treated.

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.” *Protect them from Personal hazards; individuals' life-style*
- **OR** *or Enviromental hazards; Occupational hazards.*
- “Prevention is the action aimed at eradicating, eliminating or minimizing the impact of disease and disability.”

* مهم الفرق بين الـ 3 مصطلحات.

* الفرق بين Epidemic و Endemic مهم، وارجو التعرف عليه بالمحاضرات القادمة

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.**

* Some infectious diseases can't be eradicated but can be controlled;
• the infectious agent still exists & may cause epidemics from time to time.

Disease elimination • Endemic diseases are continuously present in the community but under control (Malaria)
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 **Africa** region. It is intermediate step between **control and eradication**.

* any interruptions in the vaccination schedule, can lead to adverse outcomes in some cases.

• الأعراس هاري تقريباً من
حجوة بالياً، لكن من نهائياً.

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

* chicken Pox, Monkey Pox
منجوتان ويا لها علاقة بال Small Pox

only disease eradicated from the world is "**Smallpox**" من سنة الـ 78 إلى الآن لم يسجل أي حاله

Criteria of a disease to be eradicated

1. There must not be any extra-human reservoir. *Pure human disease; doesn't have any animal 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.*
Measles, poliomyelitis and diphtheria
↳ the three conditions are met, so with more efforts, they 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

Prevalance still exists.
**There's no malaria vaccination.*



Control

Eradication

*عنا بعض الأعراف التي يتسبب عنها
 chicken-pox, Small Pox
 Pox*

*من أعراف المردة التي يتكلم
 قور أحد إنه الممرضا موجودة بمختلفة عينة.*

MONITORING [Continuous]

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, *Starts from the first day after baby is born [height, weight, head circumference, skeletal & milestone development....]*
- Monitoring of **air pollution**, *head circumference, skeletal & milestone development....*
- Monitoring of **water quality** etc. → *occupational monitoring [Pre-employment, at the beginning & Periodic examination]*

SURVEILLANCE:

Defined as "the **continuous scrutiny** (inquiry) of the **factors** that determine the **occurrence and distribution** of disease and other conditions of ill health." *We gather data from the population through surveys; how many cases of Polio are still there?...*

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 ** → Primary Prevention*
- ✗ Specific Protection *→ no pathological changes*
- ✗ Early Diagnosis and Adequate Treatment
- ✗ Disability Limitation *✗ Rehabilitation*

- *Cervical cancer monitoring in developed countries [Periodic examination for women who are at risk for human Papilloma [sexually active women]*

Monitoring ← مثال آخر

EARLY DIAGNOSIS & TREATMENT

□ Though not as effective and economical as 'Primary Prevention', early detection and treatment are the main interventions of: * At this stage we have some risk factors & Pathological changes, but with no symptoms.

- 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 especially in infectious diseases ; sexual transmitted diseases
- any long-term disability.

STDs.

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 <i>Genetic/ Environmental</i>	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	<ul style="list-style-type: none"> a) Causes of Mortality, Intensive Interventions b) Types of Disability from Disease c) Pain Management and End of Life Care

Sometimes we might need tertiary prevention; if the patient developed a disability.

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 *نرجع المريض لوضعه الطبيعي قبل المرض إذا أمكن*

- Prevent suffering and disability through rehabilitation

- Prevent futile and expensive care

- Avoid secondary cases

*يعني تجنب
أي إجراء
غير ضروري سواء
للمريض أو علاج المرض*

- Applies to communicable diseases, but also to those caused by shared lifestyle

Through prevention, we try to accomplish :-

①

• in chronic disease \Rightarrow reduction of complications ;

patients with non-communicable diseases (NCDs) by treatment

they can perform their normal activities while the disease still persists.

② Alleviating the symptoms of the disease.

* المكتورة ذكرت قال « Hepatitis B » ما أول سبي قال إنه chronic & acute disease

; it is chronic but sometimes it could be self-limited.

\Rightarrow Primary prevention (أ) كالمنع الإصابة أساساً عن طريق التطعيم

ولكن إذا حدثت الإصابة ، يتقوم ببعض الإجراءات والعلاجات حين نسيطر على المرض بين حضعات
which means it can be successfully managed, but not in all cases.

* Many of acute infectious diseases are reversible.

* Avoid secondary cases :

Applies to communicable diseases ;

عادة إجراءاتنا تكون بالاعتماد على mode of transmission

① \uparrow personal hygiene (بعض كس أحرفنا بتعال انتقالها عن طريق)

② for STDs \rightarrow prevention of sexual contact.

Combining the Stages of Disease Development and Stages of Prevention

Stage #	Disease Development	Prevention of the Respective Stage
1	Exposure	Avoidance of Exposure <ul style="list-style-type: none"> Sexual abstinence; anti-smoking efforts
2	Acquisition <i>Rabies vaccine +</i> <i>يُعطى للمريض بعد تعرّضه للعض من الكلاب الضالة خطراً</i>	Reduction of Acquisition + <i>Some of STDs</i> 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 <i>Elderly people have many risk factors due to physiological & anatomical changes</i>	a) Preventing (Delaying) Mortality b) Rehabilitation of Disability c) Palliative Care for Inevitable Death

الكثيرة خاصة اقلية ثانية هون العلاقة بالعمى بالحر، هالأعزج عن elderly بين العمى ⇒ Periodic examination → vision and Blood pressure for Patient ≥ 40 year old.

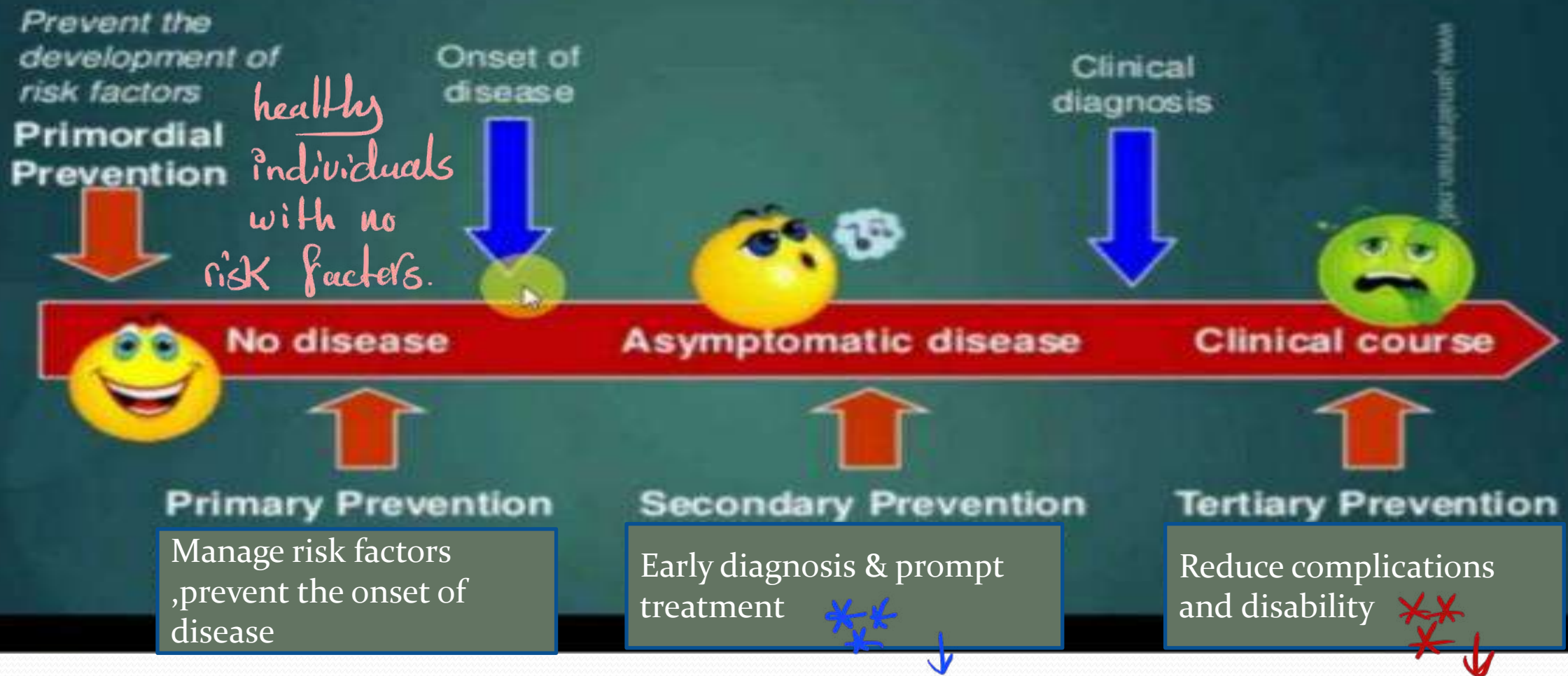


Levels of Prevention

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



Level of Prevention



Primordial prevention Vs Primary prevention

primordial prevention targets (the general population **), to prevent the emergence of risk factors, whereas, primary prevention focuses on (individuals **) who already have risk factors, to prevent the onset of a disease. example: offering life-style counseling to individuals with HTN → risk factor for CVD) to prevent cardiovascular diseases.

** ما ينصح كلنا على نتائج screening ;

we should do further investigations to confirm the diagnosis

** When we say interventions, it doesn't have to be surgical or medical, it could be modification of life style

حين نتكلم على نتائج screening لمريض حين كانت له السكريات عالية ، أولا لنا عمل كمان فحوصات لحتى اتأكد من التشخيص ، ببدأ بتعديل life-style مع فحوصات مستمرة فاختبره لفترة وحسب نتائج المراقبة نقرر اذا يحتاج علاج أو لا ، ونفس الأمر ينطبق على HTN

→ Prevention of cardiovascular diseases.



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 Primordial 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".



Occupational hazard;
الناس التي يتشغل بالمصانع معرضة
للـ chemical hazard
فعلنا برامج التوعية التي سيحقق صحة
الخاصة فقال على الـ Primary Prevention



Primary Prevention

Achieved by

Achieved by

Health promotion

- Health education
- Environmental modifications
- Nutritional interventions
- Life style and behavioral changes

Specific protection

بعيداً عن تناول
الأدوية

- Immunization and seroprophylaxis *immunoglobulin*
- chemoprophylaxis *Pre and Post-exposure Prophylaxis; anti-malarial*
- Use of specific nutrients or supplementations *drugs. AIDS Patients + meningitis Patients*
- Safety of drugs and foods
- Control of environmental hazards, e.g. air pollution

Environmental modifications ex: establishment of factories causing pollution in remote areas (in the desert)

Nutritional interventions; should be available to all ages.

ex: ① pregnant women should be given iron and folic acid.

② mothers with history of multiple miscarriages or abnormal babies (congenital malformations) should be given folic acid before and during the next pregnancy.

③ Fortifying infants formula with various vitamins and minerals.

④ Fortification of flour with iron.

* chemoprophylaxis;

administration of some drugs for individuals, who are in contact with people with infections, such as anti-malarial drugs.

anti-malarial drugs are given before, during & after going to endemic areas.

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. [rare diseases with ↓ incidence rate]
- ❑ 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, dapsonone 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.**



Early
Diagnosed
Better
Prognosis



- 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

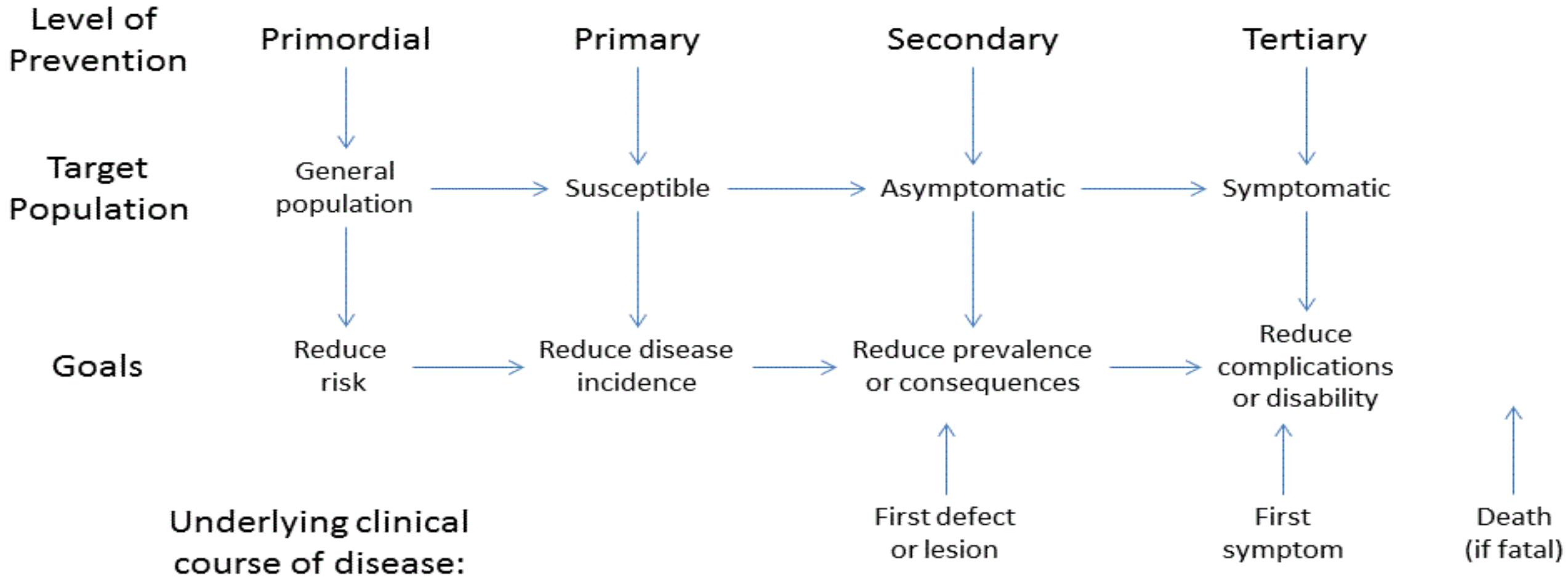
Tertiary prevention is aimed at reducing the progress or complications of established disease and is an important aspect of therapeutic and rehabilitation medicine.

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.

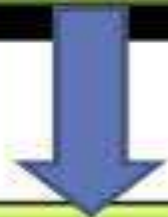
Tertiary prevention is often difficult to separate from treatment, since the treatment of chronic disease has as one of its central aims the **prevention of recurrence.**

A Classification of Preventive Strategies





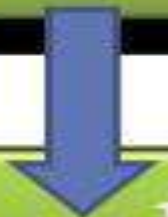
Disease



Impairment



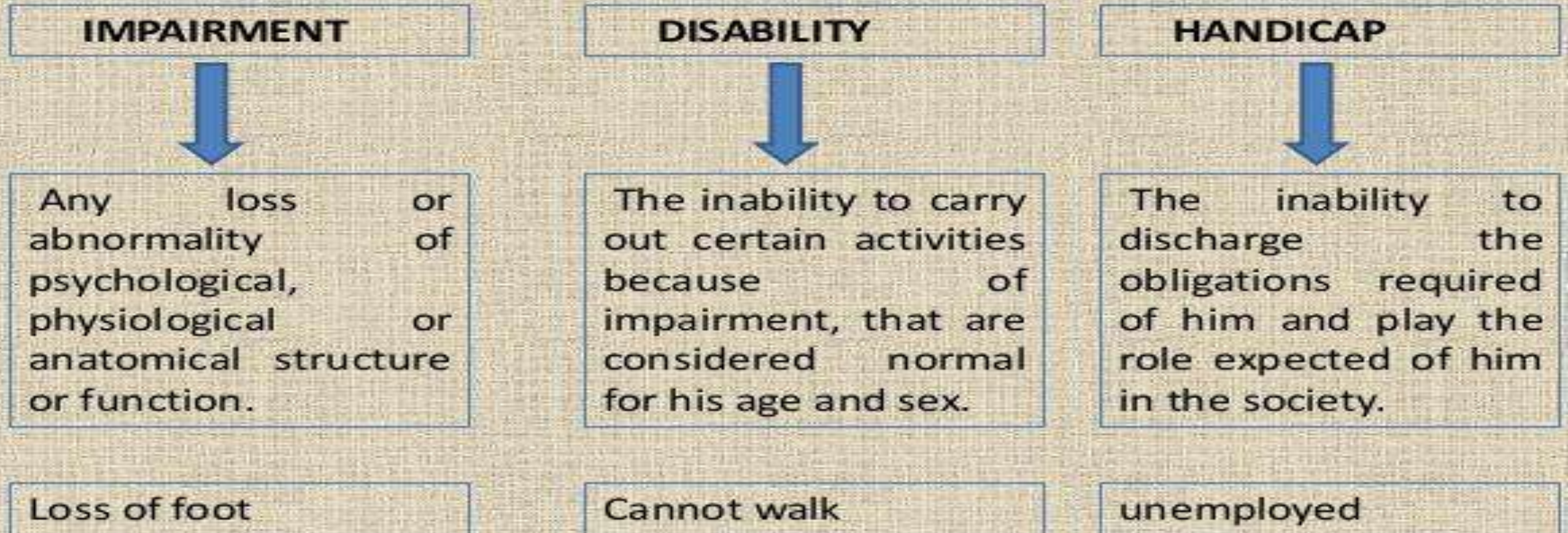
Disability



Handicap



Tertiary Prevention





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



The Health and Social Care Act 2008

Code of Practice for health and adult social care on the prevention and control of infections and related guidance



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