

Concept of disease and disease prevention

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What is disease?

- **Disease** is a condition of the body or some part or organ of the body in which its functions are **disrupted or deranged**.
- **Disease** is **any deviation** from **normal functioning** or state of complete physical or mental well-being.
- **Disease** is a **physiological/psychological** dysfunction.
- **Illness** is a **subjective state** of the person who feels aware of not being well.
- **Sickness** is a state of **social dysfunction** i.e. a role that the individual assumes when ill (Sickness role).

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Concept of disease causation: Old theory

- Upto the time of Louis Pasteur, various concepts of disease causation were in vogue:
 - The supernatural theory of disease**
 - The theory of humors**
 - The concept of contagion**
 - Miasmatic theory of disease**
 - The theory of spontaneous generation**

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Concept of disease causation: Modern theory

- After the time of Louis Pasteur, following concepts of disease causation were established:
 - Germ theory of disease**
 - Epidemiological triad**
 - The triangle of epidemiology**
 - Multifactorial causation**
 - Web of causation**

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Germ theory of disease

- This concept gained **momentum** during the 19th and the early part of 20th century.
- The emphasis had shifted from empirical causes (e.g., bad air) to microbes as the sole cause of disease.
- **Louis Pasteur** (1822-1895) demonstrated the **presence of bacteria in air** and disproved the theory of "spontaneous generation".
- In 1873, **Pasteur** advanced the "**germ theory of disease**".
- In 1877, **Robert Koch** showed that **anthrax was caused by a bacteria**.
- The discoveries of Pasteur and Koch confirmed the **germ theory of disease**.

Germ theory of disease

- The concept of cause embodied in the germ theory of disease is generally referred to as a **one-to-one relationship** between causal agent and disease.
- The disease model accordingly is: **Disease agent > Man > Disease**
- It is now recognized that a disease is **rarely caused** by a single agent alone, but rather depends upon a number of factors which contribute to its occurrence.
- Therefore, modern medicine has **moved away** from the strict adherence to the germ theory of disease.

Epidemiological triad

- The germ theory of disease has **many limitations**.
- **For example**, it is well-known, that not everyone exposed to tuberculosis develops tuberculosis.
- The same exposure, however, in an undernourished or otherwise susceptible person may result in clinical disease.
- There are other factors relating to the host and environment which are equally important to determine whether or not disease will occur in the exposed host.
- This demanded a broader concept of disease causation that synthesized the basic factors of **agent, host and environment**.

Epidemiological triad

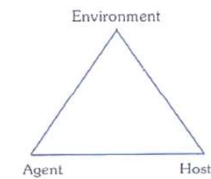


FIG. 4
Epidemiological triad

- The above model - **agent, host and environment** – has been in use for many years. It helped epidemiologists to focus on different classes of factors, especially with regard to infectious diseases.

The triangle of epidemiology

- The **traditional triangle of epidemiology** is shown in Figure 5.
- This triangle is **based on the communicable disease model** and is useful in showing the interaction and interdependence of agent, host, environment, and time as used in the investigation of diseases and epidemics.

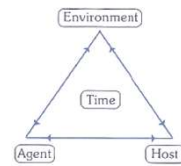


FIG. 5
The Triangle of Epidemiology

The triangle of epidemiology

- **Agents of infectious diseases** include bacteria, viruses, parasites, fungi, and molds.
- With regard to **non-infectious disease**, disability, injury, or death, agents can include chemicals from dietary foods, tobacco smoke, solvents, radiation or heat, nutritional deficiencies, or other substances, such as poison.
- A **host offers subsistence and lodging** for a pathogen and may or may not develop the disease.

The triangle of epidemiology

- The **level of immunity, genetic makeup, level of exposure, state of health, and overall fitness of the host** can determine the effect a disease organism will have on it.
- Environmental factors can include the **biological aspects as well as social, cultural, and physical aspects** of the environment.
- The **surroundings** in which a pathogen lives and the **effect** the surroundings have on it are a part of the environment.
- Environment can be within a host or external to it in the community.

Multifactorial causation

- **Pettenkofer of Munich** was an early proponent of this concept.
- But the "germ theory of disease" or "single cause idea" in the late 19th century overshadowed the multiple cause theory.
- As a result of advances in public health, chemotherapy, antibiotics and *vector control* communicable diseases began to replace by new types of diseases, the so-called "**modern**" **diseases of civilization**, e.g., lung cancer, CHD, chronic bronchitis, mental illness, etc.
- These diseases **could not be explained** on the basis of the **germ theory of disease nor could they be prevented** by the traditional methods of **isolation, immunization or improvements in sanitation**.

Multifactorial causation

- The realization began to dawn that the **"single cause idea" was an oversimplification** and that there are other factors in the aetiology of diseases - social, economic, cultural, genetic and psychological.
- **Tuberculosis is not merely due to tubercle bacilli**; factors such as **poverty, overcrowding and malnutrition** contribute to its occurrence.
- The **doctrine of one-to-one relationship** between cause and disease is **untenable**, even for microbial diseases, e .g. , tuberculosis, leprosy.
- It is now known that diseases such as **coronary heart disease and cancer are due to multiple factors**.

Multifactorial causation

- For example, **excess of fat intake, smoking, lack of physical exercise and obesity** are all involved in the pathogenesis of **CHD**.
- Most of these factors are linked to **lifestyle and human behaviour**.
- Fig. 6 presents an **advanced model of the triangle of epidemiology**.

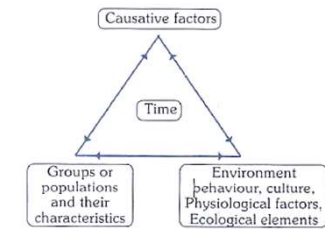


FIG. 6
Advanced model of the triangle of epidemiology

Multifactorial causation

- This new model includes all facets of the **communicable disease model**, and to make it more relevant and useful with regard to **today's diseases**, conditions, disorders, defects, injuries, and deaths; it also reflects the causes of current illnesses and conditions.
- Behaviour, lifestyle factors, environmental causes, ecologic elements, physical factors, and chronic diseases must also be taken into account.
- The term **agent** is replaced by **causative factors**, which implies the need to identify multiple causes or aetiological factors of disease, disability, injury and death.

Web of causation

- This model of disease causation was suggested by **MacMahon and Pugh** in their book: **"Epidemiologic Principles and Methods"**.
- This model is **ideally suited in the study of chronic disease**, where the disease agent is often not known but is the outcome of interaction of multiple factors.
- The **"web of causation"** considers all the predisposing factors of any type and their complex interrelationship with each other.
- Fig. 7 illustrates the complexities of a **causal web of myocardial infarction**.

Web of causation

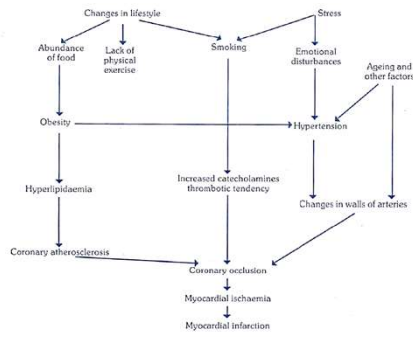


FIG. 7
Web of causation for myocardial infarction

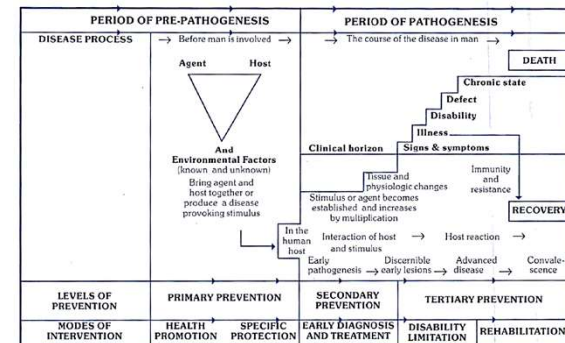
Natural history of disease

- Disease results from a **complex interaction** between man, an agent (or cause of disease) and the environment.
- The term **natural history of disease** is a key concept in epidemiology.
- It signifies the way in which a disease evolves over time from the earliest stage of its **pre-pathogenesis phase to its termination** as recovery, disability or death, in the **absence of treatment or prevention**.
- The natural history of disease is best **established by cohort studies**.
- What the **physician sees** in the hospital is just an **"episode"** in the natural history of disease.

Natural history of disease

- The **epidemiologist**, by studying the **natural history of disease in the community setting**, is in a unique position to fill the gaps in our knowledge about the natural history of disease.
- A **schematic diagram** of the natural history of disease is shown in Fig. 8.
- It is a necessary **framework to understand the pathogenetic chain of events** for a particular disease, and for the application of preventive measures.

Natural history of disease



Natural history of disease

- Key stages include-
 - i. **Exposure**
 - ii. **Incubation period**
 - iii. **Prodromal period**
 - iv. **Clinical stage**
 - v. **Recovery or resolution**
 - vi. **Chronic or latent stage**
 - vii. **Disability or death**

Natural history of disease

- It is customary to describe the natural history of disease as consisting of two phases: **pre-pathogenesis** (i.e., the process in the environment) and **pathogenesis** (i.e., the process in man).
- **Pre-pathogenesis phase**
 - This refers to the **period preliminary to the onset of disease** in man.
 - The disease agent has not yet entered man, but the factors which favour its interaction with the human host are already existing in the environment.
 - This situation is frequently referred to as "**man in the midst of disease**" or "**man exposed to the risk of disease**".

Natural history of disease

□ Pathogenesis phase

- The pathogenesis phase begins with the **entry of the disease "agent"** in the susceptible human host.
- The further events in the pathogenesis phase are **clear-cut in infectious diseases**, i.e., the disease agent multiplies and induces tissue and physiological changes, the disease progresses through a period of incubation and later through early and late pathogenesis.
- The final outcome may be **recovery, disability or death**.
- The pathogenesis phase may be modified by intervention measures such as **immunization and chemotherapy**.

Natural history of disease

□ Pathogenesis phase

- The infection may be **clinical or subclinical**; **typical or atypical** or the host may become a carrier with or without having developed clinical disease as in the case of diphtheria and hepatitis B.
- The early pathogenesis phase in chronic diseases is referred to as **presymptomatic phase** in which there is no manifest disease.
- The **clinical stage** begins when recognizable signs or symptoms appear.
- By the time signs and symptoms appear, the disease phase is already well advanced into the **late pathogenesis phase**.

Agent factors

- The first link in the **chain of disease transmission** is a disease agent.
- The disease **"agent" is defined** as a substance, living or non-living, or a force, tangible or intangible, the excessive presence or relative lack of which may initiate or perpetuate a disease process.
- A disease may have a **single agent**, a number of independent alternative agents or a complex of two or more factors whose combined presence is essential for the development of the disease.
- Disease agents may be **classified broadly** into the following groups :

Agent factors

- a. **Biological agent:** These are living agents of disease, viz, viruses, rickettsiae, fungi, bacteria, protozoa and metazoa. These agents exhibit certain "host-related" biological properties such as:
 - **Infectivity:** the ability of an infectious agent to invade and multiply in a host
 - **Pathogenicity:** the ability to induce clinically apparent disease
 - **Virulence:** the proportion of clinical cases resulting in severe clinical manifestations including death. Case fatality rate is a way of measuring virulence.

Agent factors

- b. **Nutrient agents:**
 - Carbohydrate, protein, fats, vitamins, minerals, water.
 - **Any excess or deficiency** may result in nutritional disorders.
 - **Protein energy malnutrition (PEM), anaemia, goitre, obesity and vitamin deficiencies** are some of the current nutritional problems in many countries.
- c. **Physical agents:** Exposure to excessive heat, cold, radiation, pressure, electricity, sound etc. may result in illness.

Agent factors

- d. **Chemical agents:**
 - **Endogenous:** Some of the chemicals may be produced in the body as a result of derangement of function, e.g., urea (uraemia), serum bilirubin (jaundice), ketones (ketosis), uric acid (gout), calcium carbonate (kidney stones), etc.
 - **Exogenous:** Agents arising outside of human host, e.g., allergens, metals, fumes, dust, gases, insecticides, etc. These may be acquired by inhalation, ingestion or inoculation.

Agent factors

- e. **Mechanical agents:** Exposure to chronic friction and other mechanical forces may result in crushing, tearing, sprains, dislocations and even death.
- f. **Social agents:** Poverty, smoking, alcohol, unhealthy lifestyle, social isolation, maternal deprivation etc.
- g. **Absence or insufficiency or excess of a factor necessary to health:** These may be (i) **Chemical factors:** e.g., hormones, enzymes) (ii) **Nutrient factors** (iii) **Lack of structure:** e.g., thymus (iv) **Lack of part of structure,** e.g., cardiac defects (v) **Chromosomal factors.** e.g., mongolism, turner's syndrome, and (vi) **Immunological factors.** e.g., agammaglobulinaemia.

Host factors

- Human host is referred to as **“soil”** and disease agent as **“seed”**.
- In some situations, host factors play a major role in determining the outcome of an individual's exposure to infection (e.g., tuberculosis).
- **Demographic characteristics:** age, sex, ethnicity
- **Biological characteristics:** genetic factors, immunological factors, biochemical levels of the blood etc.
- **Socio-economic characteristics:** socio-economic status, education, occupation, stress, marital status, housing etc.
- **Lifestyle factors:** personality traits, living habits, nutrition, physical exercise, behavioural patterns etc.

Environmental factors

- All that which is **external to the individual human host**, living and non-living, and with which he is in constant interaction is called environment.
- For descriptive purposes, the environment of man has been divided into three components - **physical, biological and psychosocial**.
- **Physical environment:** air, water, soil, light, noise, radiation etc.
- **Biological environment:** virus, microbes, insects, rodents, animals, plants etc.
- **Psychological environment:** cultural values, customs, habits, beliefs, attitude, morals, religion etc.

Environmental factors

□ Physical environment

- The term **“physical environment”** is applied to non-living things and physical factors (e.g., air, water, soil, housing, climate, geography, heat, light, noise, debris, radiation, etc) with which man is in constant interaction.
- In most developing countries, **defective environment** (e.g., lack of sanitation) continues to be the main health problem.
- By altering physical environment for advantage, man has created for himself a **host of new health problems** such as air pollution, water pollution, noise pollution, urbanization, radiation hazards, etc.

Environmental factors

Physical environment

- The increasing use of **electrical and electronic devices**, including the rapid growth of telecommunication system (e.g., satellite systems), radiobroadcasting, television transmitters and radar installations have increased the possibility of **human exposure to electromagnetic energy**.
- Man is living today in a **highly complicated environment** which is getting more complicated as man is becoming more ingenious.

Environmental factors

Biological environment

- The biological environment is the **universe of living things** which surrounds man, including man himself.
- The living things are the **viruses and other microbial agents, insects, rodents, animals and plants**.
- These are constantly working for their survival, and in this process, some of them act as **disease producing agents, reservoirs of infection, intermediate hosts and vectors of disease**.

Environmental factors

Psychosocial environment

- **"Psychosocial environment"** includes a complex of psychosocial factors which are defined as those factors affecting personal health, health care and community wellbeing that stem from the psychosocial make-up of individuals and the structure and functions of social groups.
- They include **cultural values, customs, habits, beliefs, attitudes, morals, religion, education, lifestyles, community life, health services, social and political organization**.
- The impact of social environment has both **positive and negative** aspects on the health of individuals and communities.

Environmental factors

Psychosocial environment

- A **favourable social environment** can improve health, provide opportunities for man to achieve a sense of fulfilment, and add to the quality of life.
- Psychosocial factors can also affect negatively man's health and well-being.
- **For example**, poverty, urbanization, migration and exposure to stressful situations such as bereavement, desertion, loss of employment, birth of a handicapped child may produce feelings of anxiety, depression, anger, frustration, and so forth; and these feelings may be accompanied by physical symptoms such as headache, palpitation and sweating.

Risk factors

- Where the **disease agent is not firmly established**, the aetiology is generally discussed in terms of "risk factors".
- **"Risk factor"** is an attribute or exposure that is significantly associated with the development of a disease.
- **"Risk factor"** is a determinant that can be modified by intervention, thereby reducing the possibility of occurrence of disease or other specified outcomes.
- Risk factors may be **truly causative** (e.g., smoking for lung cancer); may be **contributory** to the undesired outcome (e.g., lack of physical exercise is a risk factor for coronary heart disease), or may be **predictive** (e.g., illiteracy for perinatal mortality).

Risk factors

- Some risk factors **can be modified**; others **cannot be modified**.
- The **modifiable factors** include smoking, hypertension, elevated serum cholesterol, physical activity, obesity, etc.
- They are **amenable to intervention** and are useful in the care of the individual.
- The **unmodifiable or immutable risk factors** such as age, sex, race, family history and genetic factors are not subject to change.
- They **act more as signals** in alerting health professionals and other personnel to the possible outcome.

Risk factors

- Risk factors may characterize the **individual, the family, the group, the community or the environment**.
- For example, some of the **individual risk factors** include age, sex, smoking, hypertension, etc.
- But there are also **collective community risks** - for example, from the presence of malaria, from air pollution, from substandard housing, or a poor water supply or poor health care services.
- **Epidemiological methods** (e.g., case control and cohort studies) are needed to identify risk factors and estimate the degree of risk.

Risk factors of certain chronic diseases

- **Heart disease:** Smoking, hypertension, elevated cholesterol, diabetes, obesity, lack of exercise, type A personality etc.
- **Cancer:** Smoking, alcohol, solar radiation, ionizing radiation, occupational hazard, environmental pollution, medications, dietary factors, infectious agents etc.
- **Stroke:** Hypertension, elevated cholesterol, smoking etc.
- **Diabetes:** Obesity, diet etc.
- **Cirrhosis of liver:** Alcohol
- **Motor vehicle accidents:** Alcohol, non-use of seat belts, helmet, speed, automobile design

Risk groups and risk approach

- **"Risk groups"** or **"target groups"** are the selective part of population characterized by certain defined criteria e.g. at-risk mothers, at-risk infants, at-risk families, handicapped, elderly population etc.
- The approach by which direct appropriate action is applied to the risk groups first is called **"risk approach"**.
- Modern epidemiology is concerned with the **identification of risk factors and high-risk groups** in the population.
- The **knowledge of risk factors and risk groups** can be used to prevent disease in so far as we are able to remove or minimize the risk.

Guidelines for defining "at-risk" groups

- Biological situation:**
 - age group, e.g., infants (low birth weight), toddlers, elderly
 - sex, e.g., females in the reproductive age period
 - physiological state, e.g., pregnancy, cholesterol level, high blood pressure
 - genetic factors, e.g. family history of genetic disorders
 - other health conditions (disease, physical functioning, unhealthy behaviour)
- Physical situation:**
 - rural, urban slums
 - living conditions, overcrowding
 - environment: water supply, proximity to industries
- Sociocultural and cultural situation:**
 - social class
 - ethnic and cultural group
 - family disruption, education, housing
 - customs, habits and behaviour (e.g., smoking, lack of exercise, over-eating, drug addicts)
 - access to health services
 - lifestyles and attitudes

Spectrum of disease

- The term **"spectrum of disease"** is a graphic representation of variations in the manifestations of disease.
- At one end of the disease spectrum are **subclinical infections** which are not ordinarily identified, and at the other end are **fatal illnesses**.
- In the middle of the spectrum lie **illnesses ranging in severity** from mild to severe.
- These different manifestations are simply reflections of individuals' **different states of immunity and receptivity**.
- Leprosy is an excellent example of the spectral concept of disease.

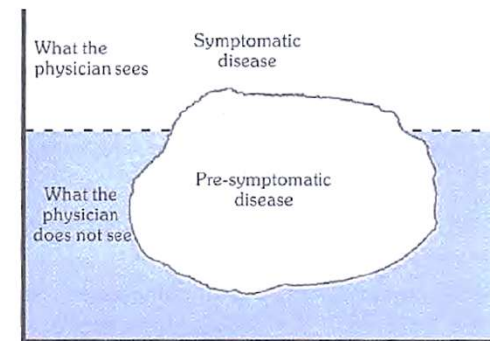
Spectrum of disease

- For almost every disease there exists a spectrum of severity, with few **exceptions such as rabies**.
- In infectious diseases, the spectrum of disease is also referred to as the **"gradient of infection"**.
- The sequence of events in the spectrum of disease can be interrupted by **early diagnosis and treatment** or by **preventive measures** which if introduced at a particular point will prevent or retard the further development of the disease.
- The concept of spectrum of disease provides for inclusion of all cases, both **subclinical and clinical**, in the study of disease.

Iceberg of disease

- A concept closely related to the spectrum of disease is the concept of the iceberg phenomenon of disease.
- According to this concept, disease in a community may be compared with **an iceberg**.
- The **floating tip** of the iceberg represents what the physician sees in the community i.e. **clinical case**.
- The **vast submerged portion** of the iceberg represents the **hidden mass of disease** i.e. latent, inapparent, presymptomatic, undiagnosed cases and carriers in the community.
- The waterline represents the **demarcation between** apparent and inapparent disease.

Iceberg of disease



Iceberg of disease

- In some diseases (e.g., hypertension, diabetes, anaemia, malnutrition, mental illness) the unknown morbidity (i.e., **the submerged portion of the iceberg**) far exceeds the known morbidity.
- The hidden part of the iceberg thus constitutes an important, **undiagnosed reservoir of infection or disease** in the community, and its detection and control is a challenge to modern techniques in preventive medicine.
- One of the major deterrents in the study of **chronic diseases of unknown aetiology** is the absence of methods to detect the subclinical state - **the bottom of the iceberg**.

Concepts of control

□ Disease control

- The term "**disease control**" describes (ongoing) operations aimed at reducing:
 - a. the incidence of disease**
 - b. the duration of disease, and consequently the risk of transmission**
 - c. the effects of infection, including both the physical and psychosocial complications; and**
 - d. the financial burden to the community.**

Concepts of control

□ Disease control

- Control activities may focus on **primary prevention or secondary prevention**, most control programmes combine the two.
- The concept of **tertiary prevention** is comparatively less relevant to control efforts.
- 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 the local population.
- An excellent example of this concept is **tuberculosis control program** in Bangladesh.

Concepts of control

□ Disease elimination

- Between control and eradication, an intermediate goal has been described, called **"regional elimination"**.
- The term **"elimination"** is used to describe **interruption of transmission of disease**, as for example, elimination of measles, polio and diphtheria from large geographic regions or areas.
- Regional elimination is now seen as an **important precursor of eradication**.

Concepts of control

□ Disease elimination

- **Disease elimination** refers to the reduction of **disease incidence to zero in a specific geographical area** or population, but it may still exist in other regions.
- Bangladesh has successfully eliminated **Poliomyelitis in 2014**.
- Bangladesh has also got the elimination certificate for the **elimination of lymphatic filariasis (Filaria) and visceral leishmaniasis (Kala-azar) in 2023**.

Concepts of control

□ Disease eradication

- Eradication literally means to **"tear out by roots"**.
- Eradication of disease implies **termination of all transmission of infection** by extermination of the infectious agent.
- **Disease eradication** refers to the complete and permanent reduction to zero of the global incidence of a disease, without the need for further intervention.
- As the name implies, **eradication is an absolute process**, and not a relative goal.

Concepts of control

□ Disease eradication

- The word eradication is reserved to **cessation of infection and disease from the whole world**.
- Today, **smallpox is the only disease** that has been eradicated globally.
- During recent years, three diseases have been seriously advanced as candidates for global eradication within the foreseeable future: **polio, measles and dracunculiasis**.
- **Afghanistan and Pakistan** are the only two countries endemic for poliomyelitis at present.

Concept of prevention

- **Primordial prevention**: prevention of emergence or development of risk factors. **Reduce exposure.**
- **Primary prevention**: action taken prior to the onset of disease, which removes the possibility of occurrence of diseases. **Reduce incidence.**
- **Secondary prevention**: action which halts the progress of a disease. **Reduce prevalence.**
- **Tertiary prevention**: action which reduce or limit impairments and disabilities, minimize sufferings. **Reduce complication.**

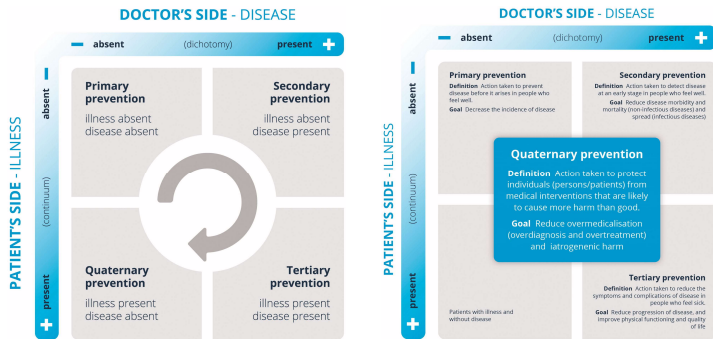
Concept of prevention

Level	Phase of disease	Aim	Actions	Target
Primordial	Underlying economic, social, and environmental conditions leading to causation	Establish and maintain conditions that minimize hazards to health	Measures that inhibit the emergence of environmental, economic, social and behavioural conditions.	Total population or selected groups; achieved through public health policy and health promotion.
Primary	Specific causal factors	Reduce the incidence of disease	Protection of health by personal and community efforts, such as enhancing nutritional status, providing immunizations, and eliminating environmental risks.	Total population, selected groups and individuals at high-risk; achieved through public health programmes
Secondary	Early stage of disease	Reduce the prevalence of disease by shortening its duration	Measures available to individuals and communities for early detection and prompt intervention to control disease and minimize disability (e.g. through screening programmes).	Individuals with established disease; achieved through early diagnosis and treatment.
Tertiary	Late stage of disease (treatment, rehabilitation)	Reduce the number and/or impact of complications	Measures aimed at softening the impact of long-term disease and disability; minimizing suffering; maximizing potential years of useful life.	Patients; achieved through rehabilitation.

Quaternary prevention

- According to the WONCA International Dictionary for General/Family Practice Quaternary Prevention is defined as: **'Action taken to identify patient at risk of overmedicalization, to protect him from new medical invasion, and to suggest to him interventions, which are ethically acceptable.'**
- The concept of quaternary prevention was initially proposed by **Marc Jamouille** and the targets were mainly patients with illness but without a disease.
- Quaternary prevention is newly defined as an **'action taken to protect individuals (persons/patients) from medical interventions that are likely to cause more harm than good.'**

Quaternary prevention



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Modes of intervention

• Intervention can be defined as any attempt to intervene or interrupt the usual sequence in the development of disease in man.

• Followings are the modes of intervention-

- Health promotion** → primary prevention
- Specific protection** → primary prevention
- Early diagnosis and treatment** → secondary prevention
- Disability limitation** → tertiary prevention
- Rehabilitation** → tertiary prevention

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Health promotion

- **Health promotion** is the process of enabling people to increase control over and to improve their health.
- The well-known interventions are-
 - Health education**
 - Environmental modifications**
 - Nutritional interventions**
 - Lifestyle and behavioural changes**

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Health promotion

- **Health education:** The targets may include the general public, patients, priority groups, health providers, community leaders and decision-makers.
- **Environmental modifications:** Provision of safe water; installation of sanitary latrines; control of insects and rodents; improvement of housing.
- **Nutritional interventions:** Child feeding programmes; food fortification; nutrition education, etc.
- **Lifestyle and behavioural changes:** It involves organizational, political, social and economic interventions designed to facilitate environmental and behavioural adaptations that will improve or protect health.

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Specific protection

- The following are some currently available interventions-
 - Immunization**
 - Use of specific nutrients**
 - Chemoprophylaxis**
 - Protection against occupational hazards**
 - Protection against accidents**
 - Protection from carcinogens**
 - Avoidance of allergens**
 - Control of environmental pollution**

Health protection

- **Health protection** is defined as the **provision of conditions** for normal mental and physical functioning of the human being individually and in the group.
- It includes the **promotion of health, the prevention of sickness and curative and restorative medicine** in all its aspects.
- In fact, health protection is conceived as an integral part of an overall community development programme, associated with activities such as literacy campaigns, education and food production.
- Thus, **health protection covers a much wider field** of health activities than specific protection.

Early diagnosis and treatment

- Early detection and treatment are the **main interventions of disease control**.
- Early diagnosis or detection is done by screening.
*"Screening is the **presumptive identification of unrecognized disease or defect** by the application of **tests, examinations, or other procedures** which can be **applied rapidly**".*
- It is done in **detectable pre-clinical phase (DPCP)**.

Disability limitation

- The sequence of events leading to disability and handicap is-
Disease → impairment → disability → handicap
- **Impairment** is any loss or abnormality of psychological, physiological or anatomical structure or function.
- **Disability** is any restriction or lack of ability to perform an activity in the manner or within the range considered normal for a human being.
- **Handicap** is a disadvantage for a given individual, resulting from an impairment or disability that limits or prevents the fulfilment of a role that is normal for that individual.
- E.g. **accident → loss of foot → cannot walk → unemployed**

Rehabilitation

- 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.
 - **Medical rehabilitation:** restoration of function
 - **Vocational rehabilitation:** restoration of the capacity to earn
 - **Social rehabilitation:** restoration of family and social relationship
 - **Psychological rehabilitation:** restoration of personal dignity and confidence

Surveillance

- **Surveillance** is the **ongoing systematic collection, analysis and interpretation** of health data essential for planning, implementing and evaluating public health activities.
- It has been **defined** as “the **continuous scrutiny** of all aspects of occurrence and spread of disease that are pertinent to effective control.”
- It includes **laboratory confirmation** of presumptive diagnosis; finding out the **source of infection**, routes of transmission, **identification of all cases and susceptible contacts**; and still others who are at risk in order finally to prevent the further spread of the disease.

Surveillance

- Surveillance may comprise:
 - Individual surveillance:** This is surveillance of infected persons until they are no longer a significant risk to other individuals
 - Local population surveillance:** e.g., surveillance of malaria
 - National population surveillance:** e.g., surveillance of smallpox after the disease has been eradicated
 - International surveillance:** At the international level, the WHO maintains surveillance of important diseases (e.g., influenza, malaria, polio, etc.) and gives timely warning to all national governments.

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