Ministry of Higher Education and Scientific Research
Al-Kut University College
Department of Nursing
Subject: Epidemiology (Theory)

Class: 4 th
First Semester 2024-2025
1st Lecture
A. Professor: Dr. Ali F. Al-saadi

Epidemiology

Historical Backgrounds of Epidemiology

Hippocrates:

The Greek physician Hippocrates is sometimes said to be the father of epidemiology. He is the first person known to have examined the relationships between the occurrence and distribution of diseases and environmental influences.

James Lind (1700's):

Designed first experiments to use a concurrently treated control group.

Edward Jenner:

Pioneered clinical trials for vaccination to control spread of smallpox Jenner's work influenced many others, including **Louis Pasteur** who developed vaccines against rabies and other infectious diseases.

Epidemiology definition:

Epidemiology is "concerned with the distribution and determinants of health and diseases, morbidity, injuries, disability, and mortality in populations. and the application of the study to control of health problems."

Purpose of Epidemiology:

The primary purpose of epidemiology is to provide a basis of data for developing strategies of diseases control and prevention.

The Objectives of Epidemiology

- To identify the etiology or the cause of a disease and the risk factors.
- To determine the extent of disease found in the community and set up priorities for interventions.
- To study the natural history and prognosis of disease.
- To evaluate public health intervention, policies and modes of health care delivery

- ❖ To provide the foundation for developing public policy and regulatory decisions relating to environmental problems
- ❖ To communicate the findings to health professionals and the public.

Uses of epidemiology:

- ✓ To describe extents of disease.
- ✓ To know causation of disease.
- ✓ To know natural history of a disease.
- ✓ Description of health status in population.
- ✓ Health planning and identifying priorities.
- ✓ Evaluation of intervention of prevention and treatment.

Patterns of disease occurrence

Epidemic: A situation when there is a high incidence of new cases of a specific disease in excess of the expected. When the proportion of the susceptible are high compared to the proportion of the immunes. Epidemic potential an area becomes vulnerable to a disease upsurge due to causal factors such as climatic changes, ecologic changes, or socio-economic changes

Endemic: Habitual presence of a disease in a given geographic location accounting for the low number of both immunes and susceptible. E.g. Malaria is a disease endemic at Palawan.

The causative factor of the disease is constantly available or present to the area.

Sporadic: Disease occurs every now and then affecting only a small number of people relative to the total population Intermittent

Pandemic: Global occurrence of a disease (an outbreak of a disease that occurs over a wide geographic area (such as multiple countries or continents) and typically affects a significant proportion of the population: a pandemic outbreak of a disease).

Sources of epidemiological information

1. Population census: is collection of data from every member of a population; theoretically it should provide the most reliable data.

2. Registration of vital events: Birth, death and marriage.

3. Hospital/health center records.

4. Disease registers.

5. Epidemiologic studies.

6. Publications, Electronic sources

Epidemiology is concerned with three aspects:

1.Frequency (how many): Refers not only to the number of health events such as the number of cases of meningitis or diabetes in a population, but also to the relationship of that number to the size of the population. The resulting rate allows to compare disease occurrence across different populations.

2. Distribution (when and where): Refers to the occurrence of health-related events by time, place, and person.

Time patterns may be annual, seasonal, weekly, daily, hourly.

Place patterns include geographic variation, urban/rural differences, and location of work sites or schools.

Personal characteristics include demographic factors which may be related to risk of illness, injury, or disability such as age, sex, marital status, and socioeconomic status, as well as behaviors and environmental exposures.

3. Determinants (risk factors and causes of disease):

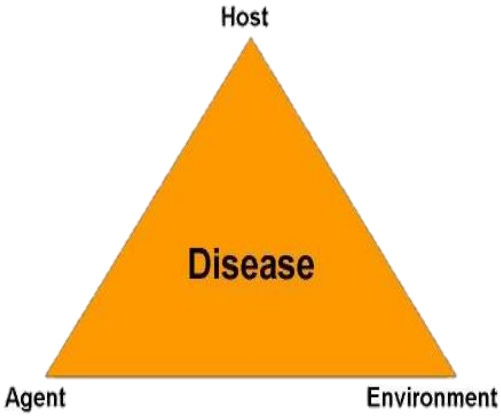
causes and other factors that influence the occurrence of disease and other health-related events. include factors that influence health biological, chemical, physical, social, cultural, economic, genetic and behavioral.

Concepts Basic to Epidemiology

The science of epidemiology depends on certain basic concepts and principles to analyze and understand patterns of occurrence among total health conditions.

Host, Agent, and Environment Model:

Through their early study of infectious diseases, epidemiologists began to consider disease states generally in terms of the epidemiologic triad, or the host, agent, and environment model. Interactions among these three elements explained infectious and other disease patterns.



Host

The host is a susceptible human or animal who harbors and nourishes a disease-causing agent. Many physical, psychological, and lifestyle factors influence the host's susceptibility and response to an agent.

Physical factors include age, sex, race, and genetic influences on the host's vulnerability or resistance.

Psychological factors, such as outlook and response to stress, can strongly influence host susceptibility.

Lifestyle factors also play a major role. Diet, exercise, sleep patterns, and healthy or unhealthy habits all contribute to either increased or decreased vulnerability to the disease-causing agent.

The concept of **resistance** is important for community health nursing practice. People sometimes have an ability to resist pathogens called **inherent resistance**.

Typically, these people have inherited or acquired this characteristic that make them less vulnerable.

Agent

An agent is a factor that causes or contributes to a health problem or condition. Causative agents can be factors that are present e.g., (bacteria that cause tuberculosis) or factors that are lacking e.g., (lack of iron in the body that cause anemia.

Environment

The environment refers to all the external factors surrounding the host that might influence vulnerability or resistance.

The physical environment includes factors such as geography, climate, weather, safety of buildings, water and food supply, and presence of animals, plants, insects, and microorganisms that have the capacity to serve as reservoirs (storage sites for disease-causing agents) or vectors (carriers) for transmitting disease.

The psychosocial environment refers to social, cultural, economic, and psychological influences and conditions that affect health, such as access to health care, cultural health practices, poverty, and work stressors, which can all contribute to disease or health.

Health-related states and events

Refer to diseases, causes of death, behaviors such as use of tobacco, positive health states, reactions to preventive regimes and provision and use of health services.

Specified populations: include those with identifiable characteristics, such as occupational groups.

Causal inference:

A major focus of epidemiology is informing efforts to prevent and control disease and promote health. To do this, we need to know the causes of disease or injury and the ways in which these causes can be modified.

Causality:

Refers to the relationship between a cause and its effect. A purpose of epidemiologic study has been to discover causal relationships to understand why conditions develop and offer effective prevention and protection.

Epidemiology and Public Health

Public health, broadly speaking, refers to collective actions to improve population health. **Epidemiology,** one of the tools for improving public health.

Public Health:

The science and act of preventing diseases, prolonging life, and promoting health and efficiency through organized community efforts.

- Public Health is an approach to fulfills health of the community as a whole.
- Public health is community health.
- It has been said that: "**Health care is vital to all of us some of the time, but public health is vital to all of us all of the time**."

Core Epidemiologic Functions:

In the mid-1980s, five major tasks of epidemiology in public health practice were identified:

- ✓ Public health surveillance,
- ✓ Field investigation,
- ✓ Analytic studies,
- ✓ Evaluation and
- ✓ Linkages.

1. Public health surveillance:

surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of health data to help guide public health decision making and action.

Surveillance is equivalent to monitoring the pulse of the community.

One of the first actions that results from a surveillance case report or report of a cluster is investigation by the public health department.

2. Field investigation:

The investigation may be as limited as a phone call to the health-care provider to confirm or clarify the circumstances of the reported case, or it may involve a field investigation requiring the coordinated efforts of dozens of people to characterize the extent of an epidemic and to identify its cause.

Steps in Epidemiological Investigation:

- ✓ Establish fact of presence of epidemic
- ✓ Establish time and space relationship of the disease
- ✓ Relate to characteristics of the group in the community
- ✓ Correlate all data obtained

Surveillance and field investigations are usually sufficient to identify:

- ✓ Causes.
- ✓ Modes of transmission.
- ✓ Appropriate control and prevention measures.

3. Analytic studies:

The hallmark of an analytic epidemiologic study is the use of a valid comparison group.

4. Evaluation:

is the process of determining, as systematically and objectively as possible, the relevance, effectiveness, efficiency, and impact of activities with respect to established goals.

5- Linkages:

During an investigation an epidemiologist usually participates as either a member or the leader of a multidisciplinary team. Other team members may be laboratorians, sanitarians, infection control personnel, nurses or other clinical staff, and, increasingly, computer information specialists.

Epidemiologists working in public health settings rarely act in isolation. In fact, field epidemiology is often said to be a “team sport.”

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Natural History of Health-related Conditions and Prevention of Diseases

Health: The most ambitious definition of health is that proposed by WHO in 1948: "Health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"

The main problem with this definition, is the lack of agreement on the meaning of the term ‖**complete**‖ which remained difficult to quantify but encouraged almost all countries to work towards the improvement of the health of their people.

A more practical definition of health may be as follows: Health is a state of successful adaptation of the body to stresses and stimuli to which it is subjected:

The successful adaptation may be very optimal and the attributes of optimal health are:

1.Anatomical integrity to ensure the physical aspect of health.

2. Ability to do normal duties at personal, family and community level.

3. Ability to deal with stress whether this stress is physical, mental or social.

4. Feeling of well-being: This is the mental or psychological dimension of health.

5. Freedom from disease and premature death.

6. Spiritual and moral stability

Disease (Dis- ease) is failure of the adaptive mechanism of the body to overcome external stress and stimuli to which it is exposed, resulting in abnormal structure and / or function of one or more of its tissues, organs or systems. Such abnormality is either reversible or irreversible.

The term disease broadly refers to any condition that impairs normal function.

Natural History of Disease: Natural course that a disease would take when it has not been affected by any treatment or any other intervention.

OR

It refers to a description of the uninterrupted progression of a health problem in an individual from the moment of exposure to causal agents until recovery or death.

The natural history of a disease is sometimes said to start at the moment of exposure to causal agents. Knowledge of the natural history of disease ranks alongside causal understanding in importance for disease prevention and control. Natural history of disease is one of the major elements of descriptive epidemiology.

The natural history of health conditions is divided in to three phases:

1. Pre-pathogenesis phase: Period of time in which the agent, host and environment may interact with each other.

2. Pathogenesis phase: Period of time in which the agent interferes with the host in the environment and the existence of the health problem and occurrence of clinical manifestations.

3. Post-pathogenesis phase: The period in which the host tries to culminate his condition in return to health, or continues of chronic condition and or death.

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

What are the Stages in the natural history of a disease? **There are four stages:**

1. Stage of susceptibility

2. Stage of pre-symptomatic (sub-clinical) disease

3. Stage of clinical disease

4. Stage of recovery, disability or death

1. 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.

Example: unvaccinated child is susceptible to measles.

2. Stage of pre-symptomatic (sub-clinical) disease

In this stage there are no manifestations of the disease but pathologic changes (damages) have started to occur in the body. The disease can only be detected through special tests since the signs and symptoms of the disease are not present.

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

3. The Clinical stage

At 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.

Examples:

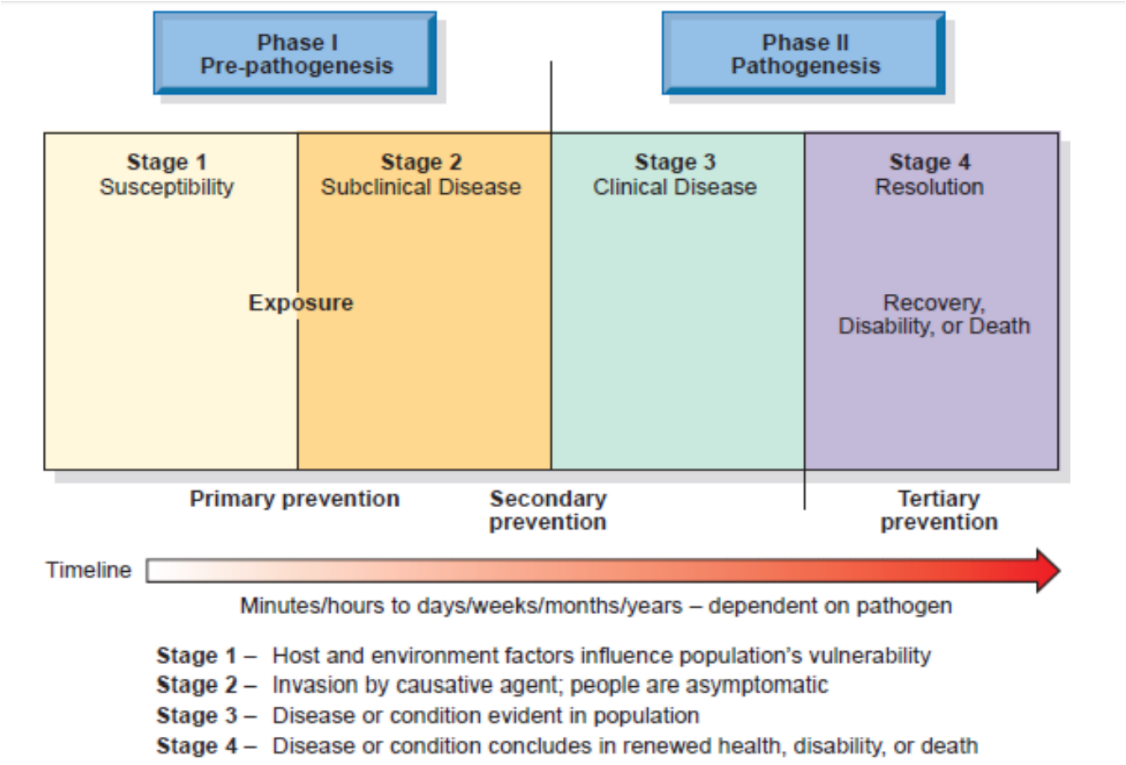
- ✓ Common cold has a short and mild clinical stage and almost everyone recovers quickly.
- ✓ Polio has a severe clinical stage and many patients develop paralysis becoming disabled for the rest of their lives.
- ✓ Rabies has a relatively short but severe clinical stage and almost always results in death.
- ✓ Diabetes Mellitus has a relatively longer clinical stage and eventually results in death if the patient is not properly treated.

4. Stage of recovery, 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.



Prevention

Prevention is to make the occurrence of something like disease, accident, which is anticipated, impossible.

This can be achieved at three levels (levels of prevention):

A- Primary prevention

All measures that are applicable before the onset of disease through health promotion and specific protection.

a- Health promotion: The process of enabling people to increase control over their health and its determinants, and thereby improve their health.

Health promotion consists of all the activities which are not aimed at any specific diseases but serve to improve the host factor in epidemiologic triangle.

1. Health education.

2. Environmental modification (reducing air pollution, safe water, sanitary latrines, control of insects and rodents, improving housing).

3. Engineering lifestyle (antismoking campaign.).

4. Genetic and marriage counseling (to prevent congenital diseases, i.e. Thalassemia).

5. Increasing the standard of living (i.e. the income, education and occupational status).

6. Health legislation, i.e. forming rigid standards of health care, sanitation and issues relating to health

b. Specific protection: The measures which target particular diseases. The idea of specific protection, especially that killer diseases could be stopped by simple interventions such as

1- Immunization.

2- Nutrient supplementation (vitamin A, iodine).

3- Chemoprophylaxis (prior medication to at risk population).

4- Protection against occupational hazards (masks for workers).

5- Avoiding allergens (for asthmatics).

6- Quality control of consumer products (**salt**—For iodine deficiency diseases, **drugs**—To avoid adverse drug reactions, **cosmetics**—To avoid allergy).

B- Secondary prevention

This is applied after the onset of disease through early detection and prompt treatment of disease.

a. Early detection

1. Screening tests are done in healthy population of a community.

2. Case finding means diagnosing something else in patient other than his chief complaint.

3. Special medical examination of risk groups.

b. Prompt treatment:

A quick cure, helps the patient as well as stops further spread of disease.

Disadvantages of secondary prevention:

Secondary prevention has the disadvantages of being more expensive, less effective in prevention/relief and it fail to prevent loss of productivity to community – as the individual is already diseased.

Advantages of secondary prevention:

Secondary prevention advantages it may reduce the length of illness, the length of infectiousness, the risk of complications and the economic losses by the individuals, their families and the society at large.

C- Tertiary prevention

through limitation of disability and rehabilitation. There are four dimensions of rehabilitation

1. Medical: If possible, restoration of function (i.e physiotherapy)
2. Vocational: Restoration of capacity to earn a livelihood (training and creating jobs)
3. Social: Reintroduction into family, kins and society as a whole and involving everyone to maintain the same relationship with this person.
4. Psychic: Restoration of self-esteem and confidence.

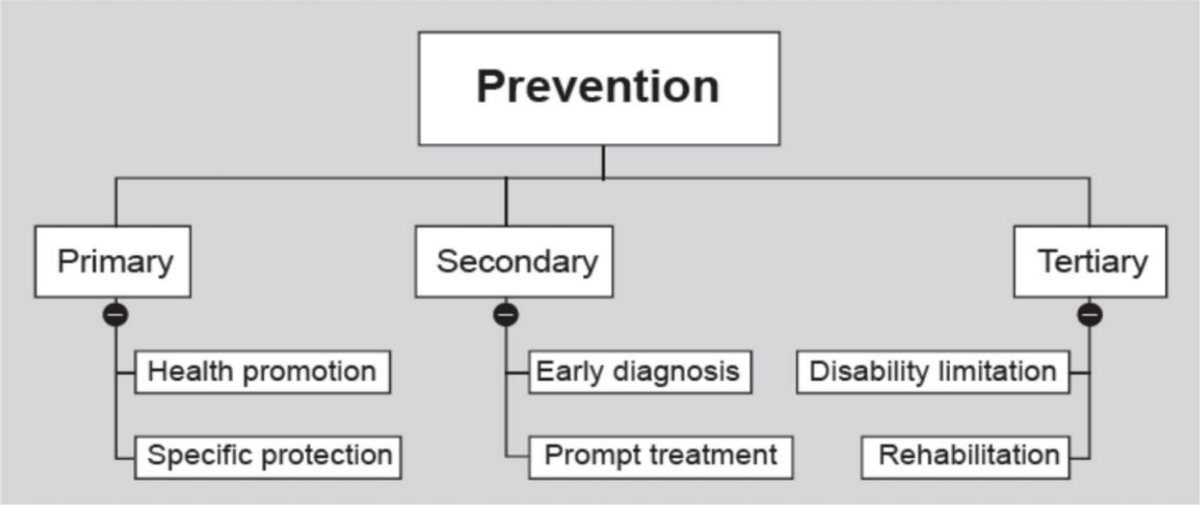


Figure 1.6. Three levels of prevention

Disease Process and Outcome of Diseases

Disease: This is a pathological process and its manifestations which indicate a departure from the state of perfect health

Impairment: Any loss or abnormality of psychological, physiological or physical structure or function e.g: Loss of foot, defective vision

Disability: Any restriction or inability to carry out certain function, activity due to impairment in a manner or within the range considered normal for a human being. eg..Unable to walk, blindness, etc.

Handicap: A disadvantage for a given individual resulting from disability or impairment that limits or prevents the fulfillment of a role that is normal for that individual eg. Unemployed due to Disability

Disability limitation:

- ✓ Prevention or delay of consequences of clinically advanced diseases.
- ✓ At this late level of disease, the preventive measures are primarily therapeutic, directed towards host to arrest the disease process and prevent further complications or squeal.

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Epidemiology of Diseases

Communicable Diseases and Noncommunicable Diseases

Communicable diseases, also known as infectious diseases or transmissible diseases, are illnesses that result from the infection, presence and growth of pathogenic (capable of causing disease) biologic agents in an individual human or other animal host.

Communicable Disease: an infectious disease caused by germs spread from one person to another (contagious). Often spread through direct contact with an individual, contact with the bodily fluids of infected individuals, or with objects that the infected individual has contaminated. Some communicable diseases are preventable by vaccination/immunization.

Infectious Disease: a disease that damages or injures the host so as to impair host function. Caused by the presence and activity of a pathogenic microbial agent (e.g. viruses, bacteria, fungi, protozoa, parasites). Transmission occurs by several pathways such as through contact with infected individuals, by water, food, airborne inhalation, or through vector-borne spread.

Communicable diseases are a **major cause** of mortality and morbidity in disaster situations, particularly, where there is:

- ❖ Population displacement
- ❖ Collapsing health services
- ❖ Lack of disease control programmers'
- ❖ Poor access to health care in urban and/or rural areas
- ❖ Malnutrition
- ❖ Interrupted supplies and logistics
- ❖ Poor coordination among agencies

A person may develop a communicable disease after becoming infected by the pathogen. This may happen through:

1. direct contact with a person carrying the pathogen.
2. Contact with bodily fluids containing pathogens.
3. inhaling pathogen-containing droplets from another person's cough or sneeze.
4. receiving a bite from an animal or insect carrying the pathogen
5. consuming contaminated water or foods.

Common Characteristics of Communicable Diseases:

1.They are very common.

2.Some of them cause death and disability.

3.Some of them cause epidemics.

4.Most of them are preventable when using fairly simple interventions.

5.Many of them affect infants and children.

Classification of Communicable Diseases

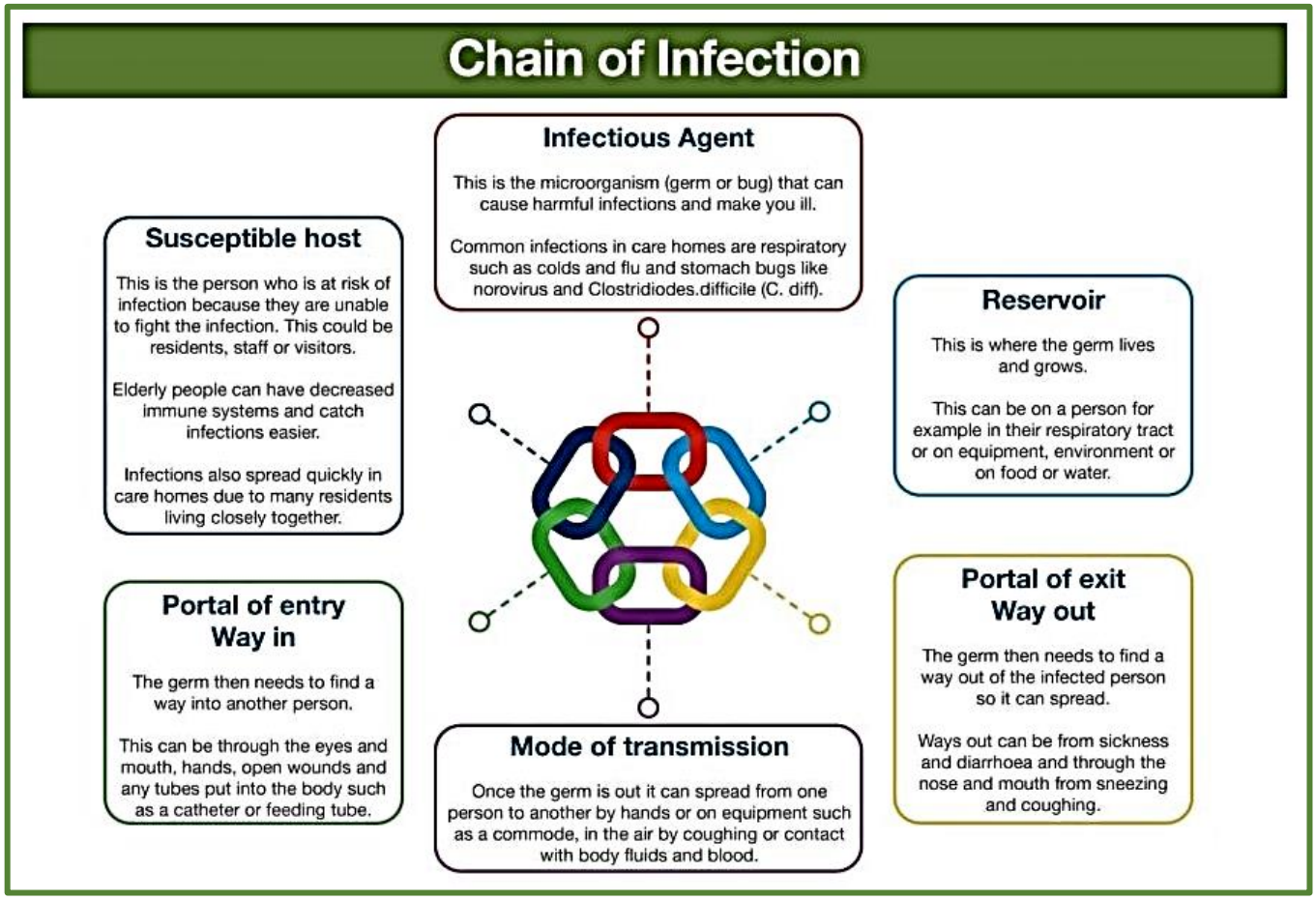
- ✓ **Contact diseases** such as scabies, pediculosis, fungal skin infections, trachoma, acute bacterial conjunctivitis.
- ✓ **Sexually transmitted diseases and HIV/AIDS**
- ✓ **Vector borne diseases** such as relapsing fever, bancroftian filariasis, onchocerciasis, yellow fever, trypanosomiasis, plague, schistosomiasis, dracunculosis, leishmaniasis and malaria.
- ✓ **Diseases caused by Fecal – oral contamination** such as acute gastro-enteritis, bacillary dysentery, campylobacter jejuni, giardiasis, amoebiasis, cholera, enteric fevers, food poisoning, poliomyelitis, viral hepatitis.
- ✓ **Helminthic diseases** such as ascariasis, anaerobiosis, trichiniasis, hookworm, strongyloidiasis, taeniasis, hydatidosis.
- ✓ **Airborne diseases** such as acute respiratory infections, meningitis (bacterial and fungal) tuberculosis and leprosy.
- ✓ **Zoonotic diseases** (diseases of contact with animals or animal products) such as anthrax, brucellosis, rabies, hydatidosis, tetanus.

Source of infection

This refers to any environment, in which infective agents can live, parasitize and breed. It includes humans (e.g. patients, carriers and people with latent infections).

livestock, insects and soil. The source of infection will normally form the basis for infective agents to infect humans.

Chain of infection: Series of events or conditions that lead to the development of communicable diseases. **Figure 1.**



Links in the chain are; the infectious agent (Pathogenic Microorganism),

the reservoir, the agent's portal of inters the mode of transmission of the agent, a susceptible host, and the agent's portal of exit.

Pathogenic Microorganism:

The species capable of causing human disease are termed pathogens or pathogenic microorganism. There are five basic categories of biological etiologic agents: Protozoa, Metazoan, Bacteria, viruses and fungi. Factors that enhance their capabilities to cause

disease vary among the categories of biological agents as well as between members of any single category; this is according to their characteristics.

Characteristics of the infectious agent:

1. Morphology: Color, shape and size
2. Spores: The ability to produce capsules in order to survive.
3. Life cycle: The nature of life that the agent spends in the host body.
4. Viability: The ability to survive.
5. Pathogenicity: The ability to cause a disease and create pathological changes in the host body.
6. Virulence: The severity and damage that is created to the host tissue.
7. Infectivity: the ability to have access to the host system.
8. Tissue selectivity.
9. Host selectivity.
10 Toxicity: the ability to produce toxin.

Reservoir: The natural habitat, in which an agent lives, grows and multiplies.

Types of Reservoirs:

1. Human: persons with symptomatic illness, or may be unapparent or chronic carriers.
2. Animals - cows, pigs, sheep, raccoons, bats, dogs, cats, birds, rodents etc.
3. Environmental - plants, water, food and soil.

Modes of Transmission:

It is the means by which the infectious agent which cause the disease transferred to a susceptible host.

Types for Modes of Transmission:

1.Air-borne transmission: The infectious agent is present in the air and inhaled (inspired) by susceptible host during respiration. Ex. Measles.

2. Feco-oral transmission: Ex. Hepatitis A, Salmonella.

3. Skin to skin contact: Ex. Dermatological diseases and STDs.

4.Transmission by direct inoculation, transmission through blood. Ex. AIDS, Hepatitis B, C and D.

5. Transmission by vectors. ex. Scabies, Malaria.

Portal of Entry: The means by which an infectious agent invades the host. This may include the respiratory tract, ingestion, dermal, blood borne, mucous membranes, etc.

The Susceptible Host: This describes the person who is vulnerable to infection. Infection can be prevented by breaking the Chain of Infection.

Incubation Period: It is the time between the entry of the infectious agents and the occurrence of clinical features.

Disease Distribution Factors

Let us now examine more carefully Figure 2. We find that the disease distribution factors are three: persons, time and place. In other words, we look at who was affected, when and where.

Furthermore, with reference to the first factor, **persons affected by the disease**, we consider their age, sex, race, occupation etc. as well as any other common characteristics relating to those persons affected by the disease.

The second factor, **time**, relates to when the diseases is most likely to strike e.g. an epidemic, endemic, seasonal, cyclic, etc.

Finally, the third factor, **place**, refers to the geographical distribution of a disease and the common characteristics that are favorable for that disease in the given locality. Some diseases are localized, regional, pandemic, etc.

Disease Determinant Factors

Disease determinant factors include the agent, host and environment.

Agent refers to the disease-causing organism characteristics such as habitation, breeding, migration, infectivity, climatic and environmental factors favoring its existence.

Host refers to the biological makeup of the individuals that makes them vulnerable to the specified illness such as physical condition, genetic make-up, habits, etc.

Environment refers to the ecological conditions that favor the interaction of host and agent, for example swampy areas, bushes within households, sanitation etc.

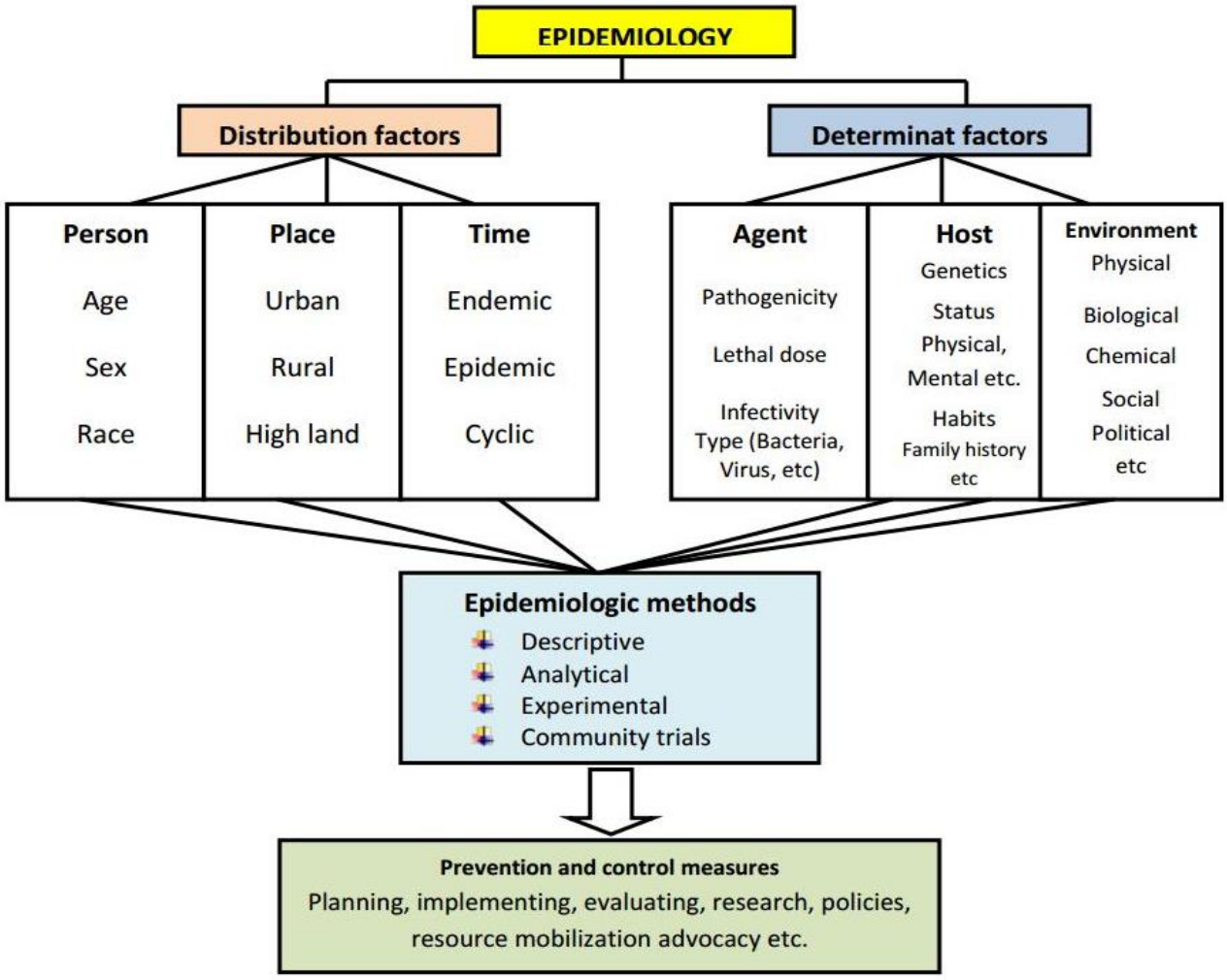


Figure 2.

Principle of control of communicable disease

There are a number of factors crucial to the spread of communicable diseases. They include the infective agent, the source of infection, the mode of transmission and the host the so-called "chain of infection". Hence, the control of the spread of communicable diseases should focus on controlling these 4 factors so as to break the chain.

Factors of transmission	Control measures
Infective agent Source of infection	✓ Disinfection to kill the infective agents ✓ Early detection, isolation and treatment of patients and removal of breeding sites.
Mode of transmission	✓ Maintain good environmental, personal and food hygiene; adopt infection control measures appropriate to the different modes of transmission.
Host (susceptible population)	✓ Build up personal immunity by immunization and healthy lifestyles.

General rules for the management of communicable diseases

Isolation

The principles of isolation are described. If you have a suspicion that the disease with which you are dealing is infectious it is advisable to invoke isolation precautions as soon as possible.

Treatment

An essential element in treatment is maintaining the patient's well-being. This is achieved through good general nursing and it is important to ensure that the patient does not become dehydrated.

Advice on specific medical treatment for infectious diseases which are likely to respond to specific drugs is given under the sections on treatment for the individual diseases. You may also be advised to administer drugs to prevent secondary infection occurring.

Diet

Diet will very much depend on the type of disease and severity of fever. Serious fever is invariably accompanied by loss of appetite and this will automatically tend to restrict diet to beverages such as water flavored with lemon juice and a little sugar or weak tea with a little milk and perhaps sugar.

Non-communicable Diseases

Non-communicable Diseases: are those diseases that are not caused by a pathogen and cannot be shared or transferred from one person to another.

Noncommunicable diseases (NCDs), such as heart disease, cancer, chronic respiratory disease, and diabetes, are the leading cause of death worldwide and represent an emerging global health threat. Deaths from NCDs now exceed all communicable disease deaths combined. **NCDs kill 41 million people** each year, equivalent to over 7 out of 10 deaths worldwide. Changing social, economic, and structural factors such as more people moving to cities and the spread of unhealthy lifestyles have fueled the NCD crisis that **kills 15 million people** prematurely—before the age of 70—each year. The high burden of NCDs among working age people leads to high healthcare costs, limited ability to work, and financial insecurity.

Causes of Non-communicable Diseases:

1. The environment.
2. Nutritional deficiencies.
3. Lifestyle choices.
4. Genetic inheritances.

Environmental diseases:

Unlike communicable diseases, non-communicable diseases are not communicable or contagious, although some kinds can be passed down genetically to the children of a carrier.

NCDs include many environmental diseases covering a broad category of avoidable and unavoidable human health conditions caused by external factors, such as sunlight, nutrition, pollution, and lifestyle choices.

The diseases of affluence are non-infectious diseases with environmental causes. Examples include:

- ✓ Many types of cardiovascular disease (CVD).
- ✓ Chronic obstructive pulmonary disease (COPD) caused by smoking tobacco.
- ✓ Diabetes mellitus type II.
- ✓ Lower back pain caused by too little exercise
- ✓ Malnutrition caused by too little food, or eating the wrong kinds of food (e.g. scurvy from lack of Vitamin C).
- ✓ Skin cancer caused by radiation from the sun
- ✓ Obesity.

Inherited diseases

See also: List of genetic disorders

Genetic disorders are caused by errors in genetic information that produce diseases in the affected people. The origin of these genetic errors can be:

- ✓ Spontaneous errors or mutations to the genome.
- ✓ A change in chromosome numbers, such as Down syndrome.
- ✓ A defect in a gene caused by mutation, such as Cystic fibrosis.
- ✓ An increase in the amount of genetic information, such as Chimerism or Heterochromia.

Cystic fibrosis is an example of an inherited disease that is caused by a mutation on a gene. The faulty gene impairs the normal movement of sodium chloride in and out of cells, which causes the mucus-secreting organs to produce abnormally thick mucus. The gene is recessive, meaning that a person must have two copies of the faulty gene for them to develop the disease. Cystic fibrosis affects the respiratory, digestive and reproductive systems, as well as the sweat glands. The mucus secreted is very thick and blocks passageways in the lungs and digestive tracts. This mucus causes problems with breathing and with the digestion and absorption of nutrients.

Inherited genetic errors from parents:

- Dominant genetic diseases, such as Huntington's, require the inheritance of one erroneous gene to be expressed.
- Recessive genetic diseases require the inheritance of erroneous genes to be expressed and this is one reason they work together.

Characteristics of Non- infectious Agents:

1. The extent to exposure to the agent (Infective dose) affects the ability to cause a health problem. EX. Alcohol, stress.
2. Infectivity of the agent (Asbestos, stress).
3. Pathogenicity (stress has low pathogenicity).
4. Virulence (stress-from mild stomach upset to suicide).
5. Chemical composition (poisoning).
6. Latency period.

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Strategies for Identifying

Communicable Diseases and Noncommunicable Diseases

1. Screening: early detection for health problems to improve health outcomes, this measure involves application of a test to an apparently healthy population who isn't yet symptomatic for the purpose of classifying them with respect to them likelihood of having the diseases.

The primary purpose of screening tests is to detect early disease or risk factors for disease in large numbers of apparently healthy individuals.

The purpose of a diagnostic test is to establish the presence (or absence) of disease as a basis for treatment decisions in symptomatic or screen positive individuals (confirmatory test). Some of the key differences are tabled below:

Table 1. Differences between screening and diagnostic tests

	Screening tests	Diagnostic tests
Purpose	To detect potential disease indicators	To establish presence/absence of disease
Target population	Large numbers of asymptomatic, but potentially at-risk individuals	Symptomatic individuals to establish diagnosis, or asymptomatic individuals with a positive screening test
Test method	Generally chosen towards high sensitivity not to miss potential disease	Chosen towards high specificity (true negatives). More weight given to accuracy and precision than to patient acceptability
Positive result	Essentially indicates suspicion of disease (often used in combination with other risk factors) that warrants confirmation	Result provides a definite diagnosis

Cost	Cheap, benefits should justify the costs since large numbers of people will need to be screened to identify a small number of potential cases	Higher costs associated with diagnostic test maybe justified to establish diagnosis.

Types of Screening:

a. Mass screening: screening is aimed at large population groups that vary widely in their risk of the disease. Screening for PKU is an example of mass screening detected at newborns. Screening for visual impairment in elementary schools are another example of mass screening. In both cases everyone in the group is screened regardless of the probability of having the disease or condition.

b. Multiple screening: This type of screening employs multiple screening tests at the same time. Thus, it may be used to detect the possibility of more than one disease or condition. Paramilitary exams, for example, may use multiphase screening to test for possible diabetes, hypertension, and hearing impairment.

c. Targeted screening: This form of screening is applied only to groups at high risk for the disease. Screening for elevated blood lead levels among inner-city children are an example of selective screening. So is screening for tuberculosis among prison inmates. Selective screening would be expected to detect more potential cases of a given disease than mass screening because of the difference in risk profiles between the populations being screening. Selective screening is sometimes referred to as targeted screening.

d. Case-findings:

Case finding is a strategy for targeting resources at individuals or groups who are suspected to be at risk for a particular disease. It involves actively searching systematically for at risk people, rather than waiting for them to present with symptoms or signs of active disease.

This type of screening occurs in a clinical setting when patients visit them physician (or other health provider) for general consultation or unrelated problems, and physician takes the opportunity to request one or more routine screening tests.

Unlike mass or selective screening where individuals with abnormal test results are generally referred for follow-up, case finding places the responsibility for follow-up on the physician performing or supervising the screening test. Therefore, case finding is more likely to result in follow-up than other types of screening. Many individuals identified as having elevated blood pressure during a mass screening, for example, may not seek the

recommended follow-up, but a physician finding elevated blood pressure during a routine examination will ordinarily schedule additional tests. Examples of case finding include screening for cervical cancer using Pap tests, heart abnormalities using an electrocardiogram, weight changes using a calibrated scale, and diabetes using blood tests or urine samples. In addition, optometrists and ophthalmologists routinely screen patients for glaucoma. Case finding has been referred to as opportunistic screening.

2.Surveillance: A continues and systematic monitoring of the occurrence and distribution of diseases and their determinants for their effective control and prevention. surveillance means to watch over with great attention, authority and often with suspicion.

Surveillance is defined as "the continuous scrutiny (inspection) of the factors that determine the occurrence and distribution of disease and other conditions of ill-health.

Monitoring:

Monitoring is "the performance and analysis of routine measurements aimed at detecting changes in the environment or health status of population" (Thus we have monitoring of air pollution, water quality, growth and nutritional status, etc.).

It also refers to on -going measurement of performance of a health service or a health professional, or of the extent to which patients comply with or adhere to advice from health professionals.

Monitoring includes the collection, analysis and interpretation of relevant data and the distribution of information to all who need to know.

Objectives of Surveillance:

The main objectives of surveillance are:

The core functions in surveillance of any health event are:

a) To provide information about new and changing trends in the health status of a population, e.g., Morbidity, mortality, nutritional status or other indicators and environmental hazards, health practices and other factors that may affect health.

b) To provide feed-back which may be expected to modify the policy and the (and‹system itself and lead to redefinition of objectives.

c) Provide timely warning of public health disasters so that interventions can be (mobilized).

The core functions in surveillance of any health event are:

1. Case Detection
2. Reporting
3. Investigation & Confirmation
4. Analysis & Interpretation
5. Action
6. Control / Response
7. Policy
8. Feedback

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Viral hemorrhagic fevers\1

Viral hemorrhagic fevers are infectious diseases that can cause severe, life-threatening illness. They can damage the walls of tiny blood vessels, making them leak, and can hamper the blood's ability to clot. The resulting internal bleeding is usually not life-threatening, but the diseases can be.

Causes

Viral hemorrhagic fevers are spread by contact with infected animals or insects. The viruses that cause viral hemorrhagic fevers live in a variety of animal and insect hosts. Most commonly the hosts include mosquitoes, ticks, rodents or bats.

Some viral hemorrhagic fevers can also be spread from person to person.

Risk factors

Living in or traveling to an area where a particular viral hemorrhagic fever is common will increase your risk of becoming infected with that particular virus. Other factors that can increase your risk include:

- Working with infected people
- Slaughtering or eating infected animals
- Sharing needles to use intravenous drugs
- Having unprotected sex
- Working outdoors or in rat-infested buildings
- Being exposed to infected blood or other body fluids

Some viral hemorrhagic fevers include:

- ✓ Dengue
- ✓ Ebola
- ✓ Lassa
- ✓ Marburg
- ✓ Yellow fever

These diseases most commonly occur in tropical areas. In the United States, people who get them usually have recently traveled to one of those areas.

There's no cure for viral hemorrhagic fevers. There are vaccines for only a few types. Until additional vaccines are developed, the best approach is prevention.

Symptoms

Signs and symptoms of viral hemorrhagic fevers vary by disease. In general, early signs and symptoms can include:

- ✓ Fever
- ✓ Fatigue, weakness or general feeling of being unwell
- ✓ Dizziness
- ✓ Muscle, bone or joint aches
- ✓ Nausea and vomiting
- ✓ Diarrhea

Symptoms that can become life-threatening

More-severe symptoms include:

- ✓ Bleeding under the skin, in internal organs, or from the mouth, eyes or ears
- ✓ Nervous system malfunctions
- ✓ Coma
- ✓ Delirium
- ✓ Kidney failure
- ✓ Respiratory failure
- ✓ Liver failure

Methods of transmitted

Some viral hemorrhagic fevers are spread by mosquito or tick bites. Others are spread by contact with infected body fluids, such as blood, saliva or semen. A few varieties can be inhaled from infected rat feces or urine.

If you travel to an area where a particular hemorrhagic fever is common, you can be infected there but not develop symptoms until after you return home. Depending on the type of virus, it can take from two to 21 days for symptoms to develop.

Complications

- ✓ *Viral hemorrhagic fevers can cause:*
- ✓ Septic shock
- ✓ Multiorgan failure
- ✓ Death

Prevention

Preventing viral hemorrhagic fevers is challenging. If you live in, work in or travel to areas where these diseases are common, protect yourself from infection by using appropriate protective barriers when working with blood or body fluids. For example, wear gloves and eye and face shields. Precautions also include careful handling, disinfection and disposal of lab specimens and waste.

Get vaccinated

The yellow fever vaccine is generally considered safe and effective. However, in rare cases, serious side effects can occur. The yellow fever vaccine isn't recommended for children younger than 9 months of age; pregnant women, especially during the first trimester; or people with compromised immune systems.

There's also an Ebola vaccination that protects against one type of Ebola. Check with the Centers for Disease Control and Prevention about the status of the countries you're visiting some require certificates of vaccination for entry.

Avoid mosquitoes and ticks

Do your best to avoid these insects, especially when traveling in areas where there are outbreaks of viral hemorrhagic fevers. Wear light-colored long pants and long-sleeved shirts or, better yet, permethrin-coated clothing. Don't apply permethrin directly to the skin.

Avoid being outside, if possible, at dusk and dawn when mosquitoes are most active, and apply mosquito repellent with a 20% to 25% concentration of DEET to your skin and clothing. If you're staying in tented camps or in hotels, use bed nets and mosquito coils.

Guard against rodents

If you live where there are outbreaks of viral hemorrhagic fevers, take steps to keep rodents out of your home:

- ✓ Keep pet food covered and stored in rodent-proof containers.
- ✓ Store trash in rodent-proof containers, and clean the containers often.
- ✓ Dispose of garbage regularly.
- ✓ Make sure doors and windows have tightfitting screens.
- ✓ Keep woodpiles, stacks of bricks and other materials at least 100 feet from your house.
- ✓ Mow your grass closely and keep brush trimmed to within 100 feet of your house.