



Tishik International University

Nursing Department

Fundamental of Nursing

Infection Control

Assist prof: Halmat Authman Rasheed




INFECTION CONTROL



INTRODUCTION


- Nurses are responsible for providing quality care that incorporates infection-control principles. These principles are a major component of a **safe environment**.

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- Microorganisms exist everywhere: in water, in soil, and on body surfaces such as the skin, intestinal tract, and other areas open to the outside (e.g., mouth, upper respiratory tract, vagina, and lower urinary tract).



FLORA

- Flora are microorganisms that occur or have adapted to live in a specific environment, such as intestinal, skin, vaginal, or oral flora.
- There are two types of flora: **resident and transient.**

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- **Resident (normal) flora** are microorganisms that are always present, usually without altering the client's health; an example would be propionibacterium on the skin. Resident flora prevent the overgrowth of harmful microorganisms.

- **Transient flora** are microorganisms that are episodic (of limited duration); an example would be staphylococcus aureus.
- They attach to the skin for a brief period of time but do not continually live on the skin.
- Transient flora are usually acquired from direct contact with the microorganisms on environmental surfaces.

PATHOGENICITY AND VIRULENCE

- Disease-producing microorganisms are called pathogens.
- pathogenicity refers to the ability of a microorganism to produce disease.
- Virulence refers to the frequency with which a pathogen causes disease.

The factors affecting virulence are

1. The strength of the pathogen to adhere to healthy cells.
2. The ability of a pathogen to damage cells or interfere with the body's normal regulating systems.
3. and the ability of a pathogen to evade the attack of white blood cells (WBCs).



Pathogenic microorganisms

.1- Bacteria

.2- Viruses

.3- Fungi

.4- Protozoa


.5- Rickettsia

BACTERIA



Bacteria are small, one-celled microorganisms that lack a true nucleus.

Bacteria can be found in all environments, yet not all bacteria are harmful or cause disease. Only a small percentage of bacteria are actually pathogenic

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- Common bacterial infections include diarrhea, pneumonia, sinusitis, urinary tract infections, cellulitis, meningitis,


VIRUSES



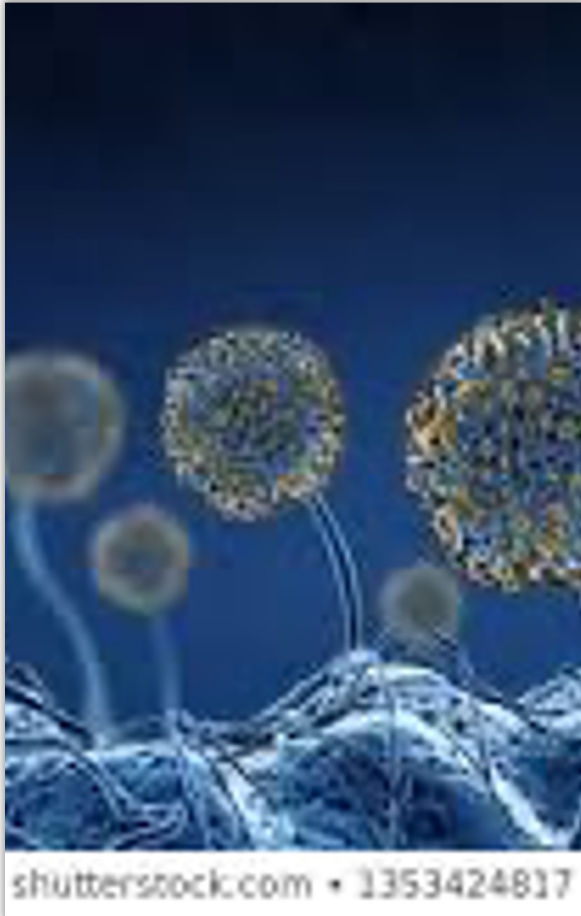
Viruses are organisms that can live only inside cells.

They cannot get nourishment or reproduce outside cells.

Viruses contain a core of deoxyribonucleic acid (DNA) or ribonucleic acid (RNA) surrounded by a protein coating.

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- Common viral infections include influenza, measles, common cold, chickenpox, hepatitis B, genital herpes, and HIV.


FUNGI



Fungi grow in single cells, as in yeast, or in colonies, as in molds.

Most fungi are not pathogenic and make up many of the body's normal flora.

Disease from fungi is found mainly in individuals who are immunologically impaired.

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- Fungi can cause infections of the hair, skin, nails, and mucous membranes.

PROTOZOA



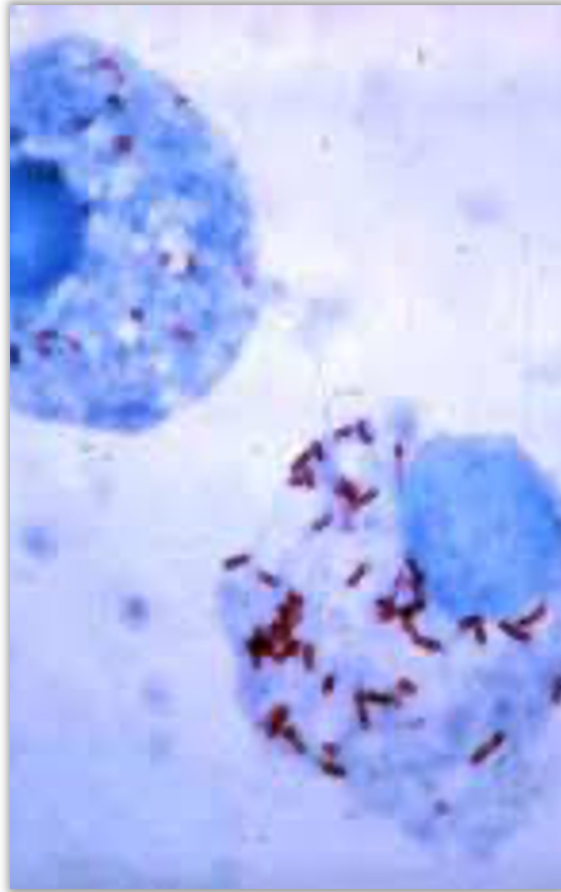
Protozoa are single-celled parasitic organisms.

Most protozoa obtain their nourishment from dead tissues.

Infection is spread through ingestion of contaminated food or water or through insect bites.

Common protozoan infections include malaria, gastroenteritis, and vaginal infections.

RICKETTSIA



Rickettsia are intracellular parasites that need to be in living cells to reproduce.

Infection from rickettsia is spread through fleas, mites, and lice.

Common rickettsia infections include Typhus.


COLONIZATION AND INFECTION

- **Colonization** is the multiplication of microorganisms on or within a host that does not result in cellular injury; an example of colonization is the normal flora (microorganisms) in the intestines.

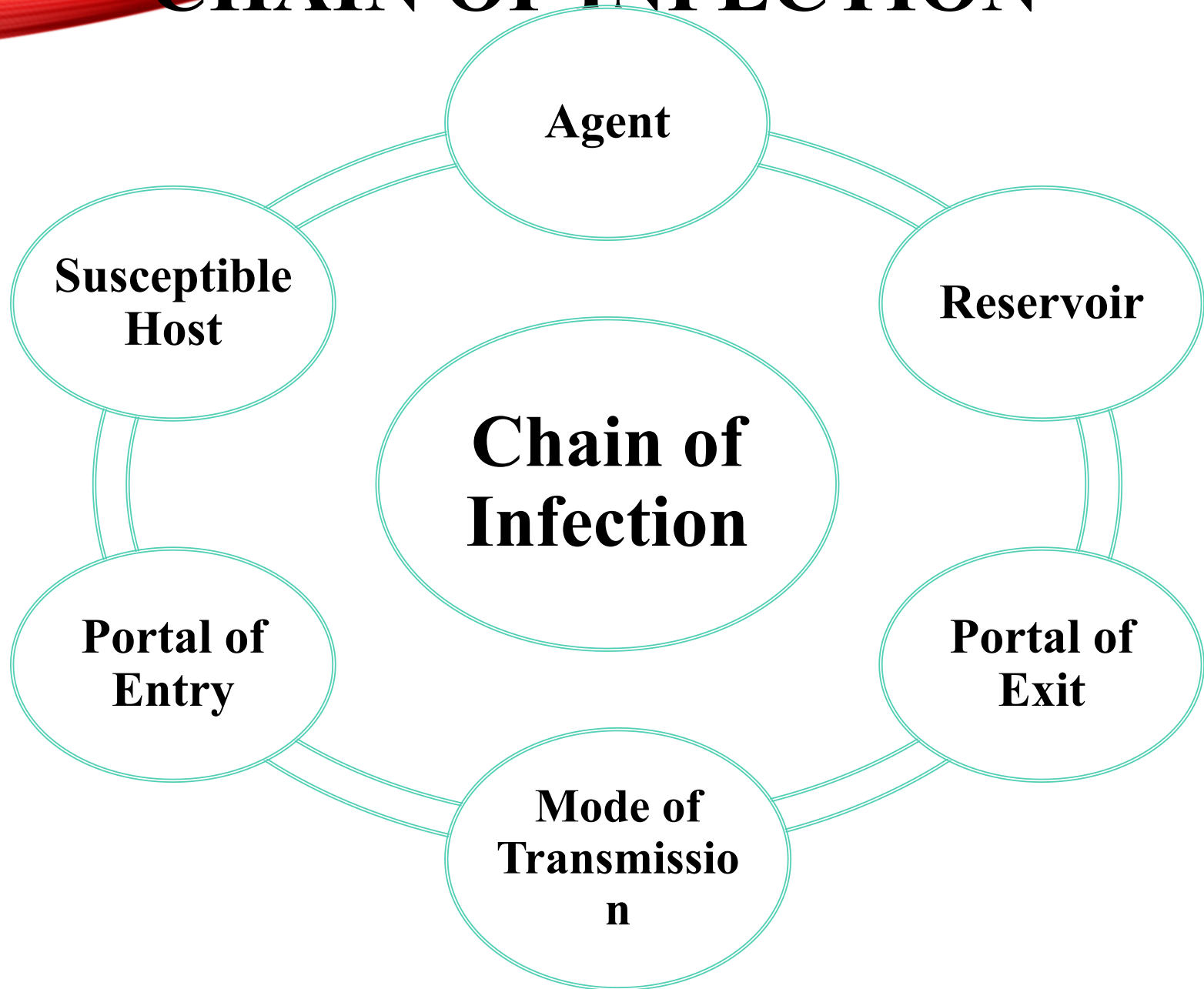


INFECTION

- An infection is the growth of microorganisms in body tissue where they are not usually found. Such a microorganism is called an infectious agent.


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- Infectious agents capable of being transmitted to a client by direct or indirect contact, through airborne route are called communicable agents. Diseases produced by these agents are referred to as communicable diseases.

CHAIN OF INFECTION



AGENT

- **An agent** is an entity that is capable of causing disease. Agents that cause disease may be as follows:
- **Biological agents:** Living organisms that invade the host, causing disease, such as bacteria, viruses, fungi, protozoa, and rickettsia

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- **Chemical agents:** Substances that can interact with the body, causing disease, such as food additives, medications, pesticides, and industrial chemicals
 - **Physical agents:** Factors in the environment that are capable of causing disease, such as heat, light, noise, and radiation.



RESERVOIR

- is a place where the agent can survive.

Colonization and reproduction take place while the agent is in the reservoir.

- **A reservoir** that promotes growth of pathogens must contain the proper
 1. nutrients (such as oxygen and organic matter),
 2. maintain proper temperature, contain moisture,
 3. maintain a compatible pH level (neither too acidic nor too alkaline),
 4. and maintain the proper amount of light exposure.


THE MOST COMMON RESERVOIRS ARE

Humans


Animals

Environment

Fomites

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- Fomites (objects contaminated with an infectious agent, such as bedpans, urinals, bed linens, instruments, dressings, specimen containers, and other equipment).



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- Humans and animals can have symptoms of the **infectious agents** or can be **carriers** of the agent.



PORTAL OF EXIT

- The portal of exit is the route by which an infectious agent leaves the reservoir to be transferred to a susceptible host.

THE AGENT LEAVES THE RESERVOIR THROUGH BODY SECRETIONS INCLUDING:



Sputum

Semen, vaginal secretions, or urine

Saliva and feces

Blood

Tears

MODES OF TRANSMISSION

- **Contact Transmission**
- contact transmission. This involves the transfer of an agent from an infected person to a host by direct contact with the infected person,
- indirect contact with the infected person through a fomite, or close contact with contaminated secretions
- Sexually transmitted diseases are spread by direct contact.



AIRBORNE TRANSMISSION

- Airborne transmission occurs when a susceptible host contacts droplet nuclei or dust particles that are suspended in the air.

VEHICLE TRANSMISSION

- Vehicle transmission occurs when an agent is transferred to a susceptible host by contaminated inanimate objects
- such as water, food, milk, drugs, and blood. Cholera is transmitted through contaminated drinking water,



VECTOR-BORNE TRANSMISSION

Occurs when an agent is transferred to a susceptible host by animate means such as mosquitoes, fleas, ticks, lice, and other animals. Lyme disease, malaria,

MOSQUITOES, FLEAS



TICKS





PORTAL OF ENTRY

- A portal of entry is the route by which an infectious agent enters the host.

PORTALS OF ENTRY INCLUDE THE FOLLOWING:

Integumentary system

Respiratory tract

Genitourinary tract

Gastrointestinal tract

Circulatory system

Transplacental

HOST

- A host is an organism that can be affected by an agent. A human being is usually considered a host.
- A susceptible host is a person who has no resistance to an agent and thus is vulnerable to disease
- for example, an individual who has not received the measles vaccine.

CHARACTERISTICS OF THE HOST INFLUENCE THE SUSCEPTIBILITY TO AND SEVERITY OF INFECTIONS

Age

Stress

Immunization/vaccination status

Lifestyle

Occupation

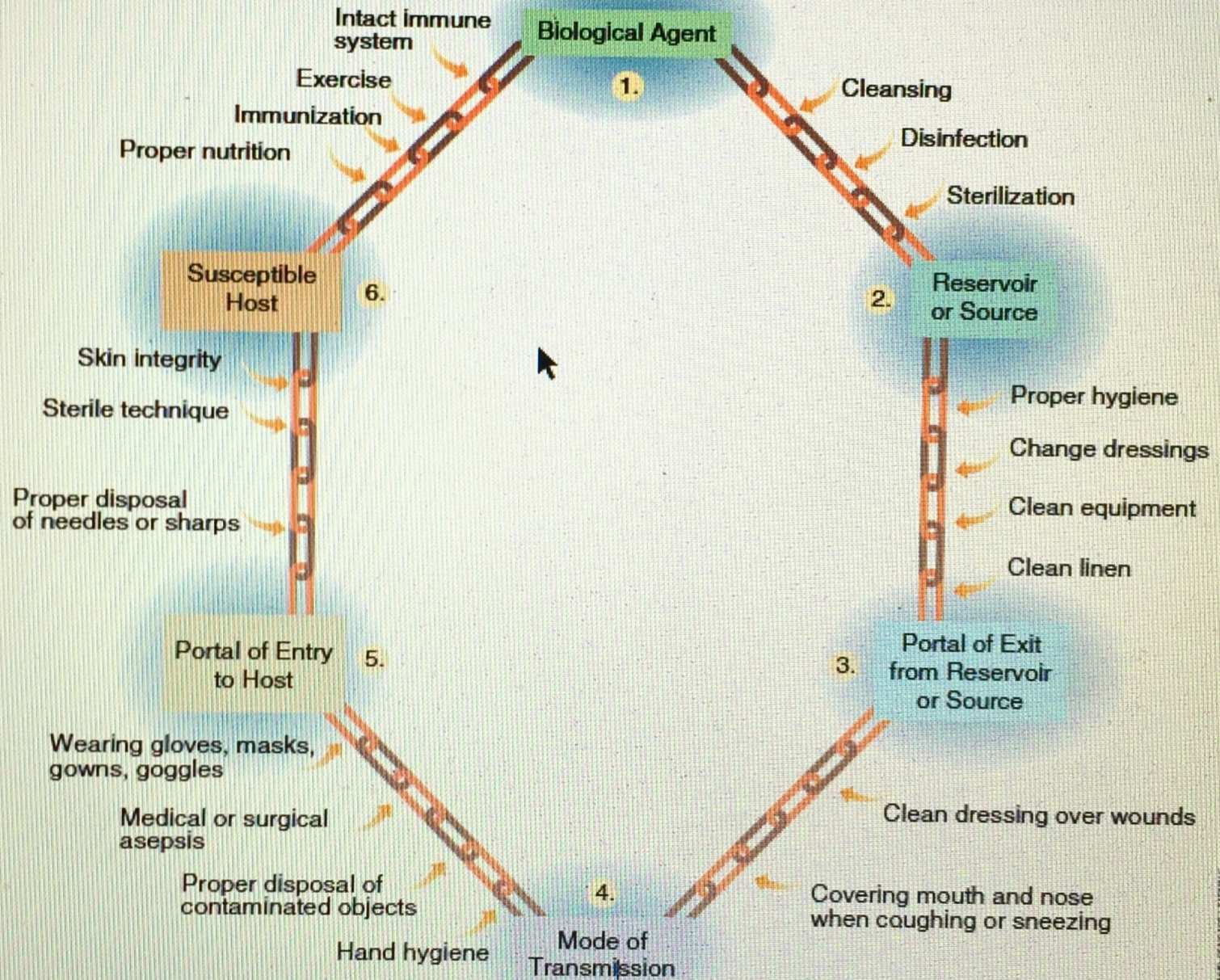
Nutritional status

Heredity



BREAKING THE CHAIN OF INFECTION

- Nurses focus on breaking the chain of infection by applying proper infection-control practices to interrupt the transmission of microorganisms.





BETWEEN AGENT AND RESERVOIR

- The keys to eliminating infection at this point in the chain are
- cleansing,
- disinfection,
- and sterilization

CLEANSING

- Cleansing is the removal of soil or organic material from instruments and equipment used in providing client care.
- Nurses often cleanse instruments after assisting or performing invasive procedures.
- the objects are cleansed before sterilization or disinfection.

THE STEPS FOR PROPER CLEANSING ARE:

1. Wet the object with cold water; warm water coagulates the proteins in organic material and makes them stick.
2. Apply detergent and scrub the object under running water using a soft-bristled brush.
3. Rinse the object under warm running water.
4. Dry the object before sterilization or disinfection.

DISINFECTION

- Disinfection is the elimination of pathogens, except spores, from inanimate objects.
- Disinfectants are chemical solutions used to clean inanimate objects.
- Common disinfectants are alcohol, sodium hypochlorite,

STERILIZATION

- Sterilization is destroying all microorganisms including spores. Equipment that enters normally sterile tissue or blood vessels must be sterilized.
- Methods of achieving sterilization are moist heat (steam), dry heat, and ethylene oxide gas.

AUTOCLAVE

Autoclaving sterilization, which uses moist heat or steam, is the most common sterilization technique used in the hospital setting



BETWEEN RESERVOIR AND PORTAL OF EXIT

- **Proper Hygiene**
- Clean skin, hair, and nails maintain the body's normal flora and eliminate transient flora from the client's system
- Bathing and hand hygiene are important ways to eliminate the potential for infection.
- Clients should be encouraged to practice daily bathing and teeth brushing.

CHANGE DRESSINGS

- Any open injury or other break in skin integrity represents a potential reservoir for infectious agents and portal of exit for a pathogen to be transferred to another individual.
- Dressings on open wounds must be changed regularly.

CLEAN LINENS

- Bed linens, gowns, and towels are catchalls for bodily secretions. Infectious agents can be easily transferred from one individual to the next through contact with a client's linens.
- Linens must be changed regularly, and soiled linens must be properly disposed.

CLEAN EQUIPMENT


- All equipment used in the care of a client must be cleansed and disinfected after each use.
- Although many items such as disposable gowns can be discarded after use,
- items such as beds must be thoroughly cleansed after each use. Clients should be instructed never to share care items.

BETWEEN PORTAL OF EXIT AND MODE OF TRANSMISSION

- The goal in breaking the chain of infection between the portal of exit and the mode of transmission is to prevent the exit of the infectious agents.
- Clean dressings must be maintained on all wounds.
- Clients should be encouraged to cover their mouths and noses when sneezing or coughing,

BETWEEN MODE OF TRANSMISSION AND PORTAL OF ENTRY

- asepsis must be ensured and barrier protection worn.
- Gloves, masks, gowns, and goggles are barrier protection that can be used.
- Proper hand hygiene

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- disposal of contaminated equipment and linens are ways to prevent transmission of microorganisms to other clients and health care workers.

BETWEEN PORTAL OF ENTRY AND HOST

- Maintaining skin integrity and using sterile technique for client contacts are methods of breaking the chain of infection between portal of entry and host.
- Avoiding needle sticks by properly disposing of sharps also reduces the potential for infection by denying a portal of entry.

BETWEEN HOST AND AGENT

- Breaking the chain of infection between host and agent means eliminating infection before it begins.
- There are many ways to reduce the risk of acquiring infection: Proper nutrition, exercise, adequate rest and sleep, and immunizations.

PROPER NUTRITION

- Proper nutrition assists the body's immune system to function properly.
- Clients need adequate amounts of protein in their diets to maintain and repair tissue as well as to produce the antibodies needed to fight infection.
- A balanced diet also allows the body to maintain appropriate acid–base balance.



EXERCISE

- Exercise maintains the body's metabolic rate and, therefore, allows the body to maintain the antibodies and energy necessary to ward off infection

REST AND SLEEP


- Rest and sleep are basic to a client's health and well-being. The quality of rest and sleep can have a significant impact on a person's health.
- Adequate levels of rest and sleep provide a restorative function needed for physiological and psychological healing.

IMMUNIZATION

- Immunization is the process of creating immunity, or resistance to infection, in an individual.
- Many immunizations are given in early childhood (e.g., measles, mumps, and rubella). Immunization for the flu must be given every year

BODY DEFENSES

- A host's immune system is a defense against infectious agents. The immune system is able to recognize “self” and “nonself”;
- the immune system recognizes what is not consistent with the genetic composition of the host (self).

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- These agents are called antigens (nonself). An immune response against an antigen protects the body from infection.

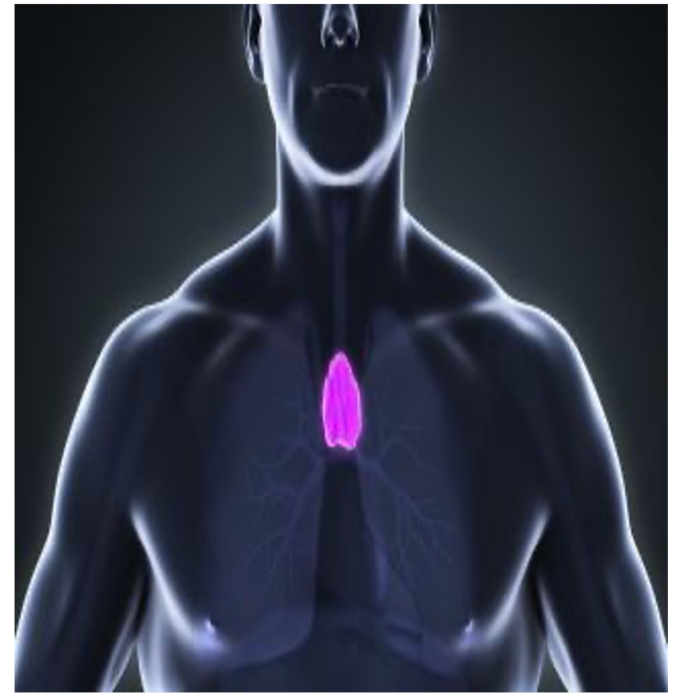
NONSPECIFIC IMMUNE DEFENSE


- The nonspecific immune defense protects the host from all microorganisms.
- Nonspecific immune defenses are skin and normal flora; mucous membranes; coughing, sneezing, and tearing reflexes; elimination and acidic environment; and inflammation.


SPECIFIC IMMUNE DEFENSE


- The specific immune defense is a response specific to the invading antigen.
- It is activated when phagocytes fail to completely destroy the antigen.

- This causes production of T lymphocytes (T cells), which regulate the immune response by activating other cells.
- The T cells move to the injured area and release chemical substances called lymphokines.



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- Lymphokines attract other phagocytes and lymphocytes to the injured area and assist in antigen destruction.
 - The T cells also stimulate the production of B cells, which become plasma cells, producing **antibodies** specific to the antigen.

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- Antibodies are protein substances that destroy the antigen. The stimulation of B cells and the production of antibodies are collectively known as **humoral immunity**.


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- Memory B cells are formed to remember the antigen and prepare the host for future antigen invasion. When the antigen enters the body again, the immune response occurs faster by rapidly producing antibodies.


TYPES AND STAGES OF INFECTIONS

- 1- Localized infections are limited to a defined area or single organ with symptoms that resemble inflammation. (redness, tenderness, and swelling), such as a cold sore.
- 2- Systemic infections affect the entire body and involve multiple organs, such as AIDS.

HOSPITAL-ACQUIRED INFECTIONS

- A hospital-acquired infection is an infection acquired in a hospital or other health care facility that was not present or incubating at the time of the client's admission.
- They also include those infections that become symptomatic after the client is discharged and infections passed among medical personnel.

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- Hospital-acquired infections are also called nosocomial infections or health care–associated infections. These types of infections typically fall into four categories: urinary tract, surgical wounds, pneumonia, and septicemia.

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- Most hospital-acquired infections are transmitted by health care personnel who fail to practice proper hand hygiene or who fail to change gloves between client contacts.