



# Chapter 20

## Asepsis and Infection Control

# Chain of Infection #1

**Infectious agent:** Ability to cause disease depends on the agent's pathogenicity, virulence, invasiveness, and specificity.

**Source:** Sources of organisms, also called reservoirs, can be both animate and inanimate objects in the environment.

**Portal of exit:** Provides a means for the microorganism to leave the source.

# Chain of Infection #2

- **Mode of transmission:** How the organism moves or is carried from the source's portal of exit to a host.
  - Contact transmission: By direct or indirect contact with pathogens
  - Vehicle transmission: By way of contaminated items that transmit pathogens
  - Droplet transmission: By way of exposure to droplet secretions of an infected person who is coughing, sneezing, or talking



## Chain of Infection #3

- **Mode of transmission:** How the organism moves or is carried from the source's portal of exit
  - Airborne transmission: By exposure to fine particles suspended in the air for extended periods or when dust particles contain pathogens
  - Vector-borne transmission: By contact with biologic or mechanical vectors that carry infection

# Chain of Infection #4

**Portal of entry:** The means by which the organism gains entrance into the host

**Susceptible host:** A person whose own body defense mechanisms cannot withstand the invasion of pathogens when exposed

# Agents Causing Infection #1

- **Bacteria:** Single-celled, independently living microorganisms, some of which are capable of causing disease in humans
- **Viruses:** Living microorganisms composed of particles of nucleic acid and protein that reproduce inside living cells
- **Fungi:** Single-celled organisms that include molds and yeasts
- **Parasites:** Multicellular organisms that live on other organisms without contributing anything to their hosts

# Agents Causing Infection #2

- **Prions (transmissible spongiform encephalopathies [TSEs]):** Infectious agents composed primarily of proteins that cause an abnormal folding of proteins in brain and neural tissue, leading to brain and neural damage.
- **Multidrug-resistant organisms:** Microbial organisms that were once susceptible to drug therapy that have mutated into drug-resistant strains. Several preventable factors have contributed to the mutation process.

# Healthcare-Associated Infections (HAIs) #1

- A term that encompasses infections contracted in **any** healthcare setting
- Risk factors associated with HAI include:
  - Environment
  - Therapeutic regimen
  - Patient resistance



# Healthcare-Associated Infections (HAIs) #2

- Infection risks in various healthcare settings:
  - Acute care settings
  - Long-term care settings
  - Ambulatory care settings
  - Home care
  - Schools
  - Workplace

# Regulatory Agency Role in Infection Control

- State Boards of Health
- Centers for Disease Control and Prevention (CDC)
- The Joint Commission
- The Occupational Safety and Health Administration (OSHA)

# Healthcare Agency Role in Infection Control

- Infection Control Departments
- Personal Health and Safety Education
- Routine Health Screenings
- Immunization/Vaccination Programs
- Employee Health Services and Counseling
- Availability of Personal Protective Equipment (PPE)
- Needleless Systems
- Hazardous Waste Disposal Programs

# Healthcare Personnel Protection

- Masks and respirators
- Gowns
- Caps and shoe coverings
- Gloves
- Goggles or face shields



# Decreasing Transmission of Infection to Patients #1

- Techniques used to decrease transmission of infection to patients include:
- **Medical asepsis:**
  - Hand hygiene
  - Disinfection and sterilization

# Decreasing Transmission of Infection to Patients #2

- **Surgical asepsis:**
  - Skin preparation
  - Surgical handwashing
  - Maintenance of sterile fields
  - Use of sterile gloves



# Decreasing Transmission of Infection to Patients #3

- **Transmission-based precautions:**
  - Airborne
  - Droplet
  - Contact

# Aseptic Practices

- The two major categories of aseptic practice are *medical asepsis* and *surgical asepsis*.
  - **Medical asepsis** ("*Clean Technique*"): Measures taken to control and reduce the number of pathogens present
  - **Surgical asepsis** ("*Sterile Technique*"): Measures taken to prevent the introduction or spread of pathogens from the environment into the patient; to be free of all microorganisms





# Hand Hygiene

- **Hand hygiene:** Handwashing with soap and water or cleansing the hands with a waterless alcohol-based cleanser to prevent the spread of infection; microorganisms are transient flora until the hands are washed.
  - Hand hygiene practices can reduce the development of multidrug-resistant organisms.
  - The least expensive method for decreasing the risk of infecting oneself or others.

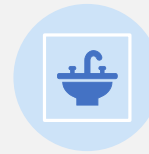
# Occasions for Hand Hygiene #1

- At the beginning and end of the shift
- Before contact and between contacts with patients
- Before and after contact with wounds, dressings, specimens, or bedclothes
- Before and after performing any invasive procedure
- Before and after administering medications
- After contact with any patient secretion, excretion, or body fluid

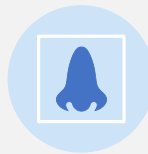
# Occasions for Hand Hygiene #2



After contact with the patient's environment



Before and after using the bathroom



After sneezing, coughing, or blowing your nose



After removing gloves every time



Before eating

# Factors Contributing to Poor Hand Hygiene Compliance


Lack of awareness of patient care activities that require hand hygiene




Misperception that wearing gloves and gowns can substitute for hand hygiene




Understaffing and high workloads leading to perceived time constraints



Inaccessibility of sinks or dispensers for soap or alcohol-based cleanser



Skin irritation and dryness



# Disinfection and Sterilization #1

- **Disinfection:** Chemical or physical processes used to reduce the number of pathogens on an inanimate object's surface.
  - Antiseptic: Chemical used on living objects
  - Bactericidal: A chemical that kills all forms of microorganisms but not spores
  - Bacteriostatic: An agent that prevents bacterial multiplication but does not kill all forms of organisms

# Disinfection and Sterilization #2

- **Sterilization:** The complete destruction of all microorganisms, including spores.
- Most common methods are:
  - Steam sterilization
  - Gas sterilization with ethylene oxide

# Isolation



**Isolation:** Techniques used to prevent or limit the spread of infection



Two-tiered system of isolation precautions includes:

**Standard precautions:** Used for all patients to protect personnel against blood and body fluid transmission of potential infective organisms.

**Transmission-based precautions:** Used to protect against the spread of highly transmissible or epidemiologically significant pathogens in patients with documented or suspected infection.

Transmission-based precautions are used in **addition to** standard precautions.

# Life Span and Cultural Considerations

## Life span considerations:

- Newborns and infants
- Toddlers and preschoolers
- School-age children and adolescents
- Adults and older adults

## Cultural considerations:

- Hand hygiene practices and the meaning of washing hands among cultures