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