**Foundations of Nursing Science**2. Infection Control Outline

**Objectives**

* Define common terminologies related to the concept of infection control.
* Identify various microorganisms that causes infections.
* Compare the types of infection.
* Discuss the mechanism of the chain of infection.

**Outline**

* Defining common terminologies related to the concept
* Types of Microorganisms that Cause Infections
* Types of Infections
* Nosocomial and Health-care associated Infections
* Chain of Infection
* Method of transmission

**Common Terminologies**

**ASEPSIS**

Is the freedom from disease-causing microorganisms.

**SEPSIS**

Is the condition in which acute organ dysfunction occurs secondary to infection

**INFECTION**

Is the growth of microorganisms in body tissue where they are not usually found.

**INFECTIOUS AGENTS**

Microorganisms in body tissues

**DISEASE**

Detectable alteration in normal tissue function.

**ASEPTIC TECHNIQUE**

To decrease the possibility of transferring microorganisms from one place to another.

**COMMUNICABLE DISEASE**

The result of infectious agents that are transmitted to an individual by direct or indirect contact or as an airborne infection.

**Medical Asepsis**

Includes all practices intended to confine a specific microorganism to a specific area, limiting the number of growth, and transmission of microorganisms.

**Surgical Asepsis or Sterile Techniqe**

Refers to those practices that keep an area or object free of all microorganisms.

* Includes practices that destroy all microorganisms and spores.
* Used for all procedures involving the sterile areas of the body.

**Types of microorganisms that cause infections**

Four major categories of microorganisms that cause infection:

1. **Bacteria**
   * The most common infection-causing microorganism.
   * Can be transported through air, water, food, soil, body tissues and fluids and inanimate objects.
2. **VIRUSES** 
   * Consists primarily of nucleic acid and therefore must enter living cells in order to reproduce.
3. **FUNGI**
   * Include yeasts and molds
4. **PARASITES**
   * live on other living organisms.
   * Include protozoa such as the one that causes malaria, helminths and arthropods.

**Types of Infections**

**Local infection**

Limited to the specific part of the body where the microorganisms remain.

**Systemic infection**

Microorganisms spread and damage different parts of the body.

**COLONIZATION**

Is the process by which strains of microorganisms become resident flora.

**BACTEREMIA**

A condition called when a culture of the person’s blood reveals microorganisms.

**SEPTICEMIA**

Bacteremia resulting in systemic infection

**NOSOCOMIAL INFECTION**

A subgroup of healthcare-associated infections

* + Infections that originate in the hospital
  + It can either develop during a client’s stay in facility or manifest after discharge.
    - Endogenous – originate from the clients themselves
    - Exogenous – originate from the hospital environment

**IATROGENIC INFECTIONS**

* A nosocomial infection that is a direct result of diagnostic or therapeutic procedures.

**Chain of Infection**

Six Links That Make up the Chain of Inefection:

1. Etologic agent
2. Reservor ESERVOIR
3. Portal of Exit
4. Mode of Transmisson
5. Portal of Entry
6. Susceptaible Host

**ETIOLOGIC AGENT**

Any biological, physical or chemical entity capable of causing disease is called an agent ) micro-organism that can cause infection).

**RESERVOIR**

Sources of microorganisms.

* Common sources: humans, client’s own microorganisms, plants, animals, or the general environment.
* *Carrier: is a person or animal reservoir for a specific infectious agent that usually do not manifest clinical signs of disease.*

**PORTAL OF EXIT FROM THE RESERVOIR**

It is the path by which an infectious agent leaves the source.

**Common human portal of exit:**

Respiratory tract (e.g., lung, nose).

Gastrointestinal tract (e.g., mouth, anus).

Urinary tract (e.g. urethral meatus and urinary diversion).

Reproductive tract (e.g. vagina; vaginal discharge, urinary, semen, urine)

Blood-stream (open wound, needle puncture).

Tissue (e.g. drainage from a cut or wound)

**Method of Transmission**

* **DIRECT TRANSMISSION**
  + Involves immediate and direct transfer of microorganisms from person to person through touching, biting, kissing or sexual intercourse.
  + Droplet spread is also a form of direct transmission that occurs only if the course and the host are within 1 m ( 3ft) of each other.
* **INDIRECT TRANSMISSION**
  + can be either:
    - Vehicle-borne transmission
      * vehicle is any substance that serves as an intermediate means to transport and introduce an infectious agent into a susceptible host through a suitable portal of entry
    - Vector-borne transmission
      * vector is an animal, or flying or crawling insect that serves as an intermediate means of transporting the infectious agent.
* **AIRBORNE TRANSMISSION** 
  + May involve droplets or dust.
  + Droplet nuclei – is a residue of evaporated droplets emitted by an infected host (TB)

**Portal of Entry to the Susceptible Host**

The route by which the infectious agent moves into (enters) susceptible host.

* Respiratory tract (e.g., lungs).
* Genitourinary tract (e.g., vagina, penis).
* Mucous membranes (e.g., eyes, nose, mouth).
* Gastrointestinal tract (e.g., mouth ,anus).
* Blood-stream .
* Broken skin (e.g., puncture, cut, surgical site).
* Trans-placental (mothers –to- fetus).

**Susceptible Host:**

* **SUSCEPTIBLE HOST:**  Any person who is at risk for infection
* **COMPROMISED HOST**: A person at increased risk, an individual who are more likely than others to acquire an infection

**Characteristics that influence susceptibility & severity of disease are:**

Age

Sex

Socio-Economic status

Disease history

Nutritional status

**Body Defenses Against Infection**

**NONSPECIFC DEFENSES :**Anatomical and physiological defenses

* + - Intact skin and mucous membranes are the body’s first line of defense against microorganisms.
    - Nasal passages have a defensive function
    - Each body orifice also has protective mechanisms.

**Inflammatory response**

Inflammation is a local and nonspecific defensive response of the tissues to an injurious or infectious agent.

* + - An adaptive mechanism that destroys or dilutes injurious agent, prevents further spread of injury, promotes the repair of damaged tissues.

**Five signs of inflammation:**

* + - * Pain
      * Swelling
      * Redness
      * Heat`
      * Impaired function of the part ( if the injury is severe)

**SPECIFIC DEFENSES**

* + Anti-body mediated defenses, also known as humoral immunity
    - Antibodies – also called immunoglobulins are part of the body’s plasma proteins.

**2 major types of immunity:**

* + - * + **Active immunity** – the host produces antibodies in response to natural antigens ( e.g. infectious microorganisms) or artificial antigens ( e.g. vaccines).
        + **Passive ( acquired) immunity** - the host receives natural ( e.g. from a nursing mother) or artificial ( e.g. from an injection of immune serum) antibodies produced by another source.

**Supporting Defenses of a Susceptible Host**

* HYGIENE
* NUTRITION
* FLUID
* SLEEP
* STRESS
* IMMUNIZATION

**How can we break the chain of infection?**

**1-Infectious or Causative Agent**

* Accurate and rapid identification of microorganisms.
* Early recognition of sign and symptoms of infection

**2-Reservoirs**

* Employee health examinations and screening
* Environmental sanitization including floors, walls, exam tables and beds
* Disinfection/Sterilization of equipment and instruments
* Standard Precautions
* Medical Asepsis
* Proper Hygiene - bathing and hand washing
* Clean gowns, linens and towels
* Clean wound dressings

**3-Portal of Exit**

* Hand washing
* Use of Personal Protective Equipment such as gloves, gowns, facemask.
* Clean dressings over wounds
* Medical Asepsis or Clean Technique
* Control of excretions and secretions
* Covering the mouth and nose when coughing or sneezing
* Proper trash and waste disposal
* Standard Precautions

**4-Method or Mode of Transmission**

* Hand washing
* Standard Precautions
* Rooms with air flow control
* Safe Food handling
* Isolation
* Transmission-based precautions
* Sterilization of equipment and supplies
* Medical and Surgical Asepsis
* Use of Personal Protective Equipment such as gloves, gowns, facemask.
* Proper disposal of contaminated objects

**5-Portal of Entry**

* Sterile technique or Surgical Asepsis (dressing, injections, catheterization).
* Medical Asepsis or Clean Technique
* Catheter Care
* Wound care
* Proper Disposal of needles or sharps
* Maintaining skin integrity
* Standard Precautions

**6-Susceptible Host**

* Treatment of Disease
* Recognition of clients at risk
* Immunization
* Exercise
* Proper Nutrition
* Patient Education

**Part 2. Standard Precaution**

**Hand Hygiene**

* It is the process for the removal of dirt and transient microorganisms(E.g. E. COLI) from the hands. (it is considered the most effective infection control measure).

**Types of the Hand Washing**

**Routine Hand Washing** :It is accomplished by vigorously rubbing together all surfaces of lathered hands followed by thorough rinsing under a stream of water.

* + This should take 10-15 seconds to complete.
  + The hands should be dried with a paper towel.

**Surgical Scrub**

The process that begins with washing hands and forearms thoroughly to remove dirt and transient bacteria.

* + - A nail cleaner should be used to clean under the nails.
    - It should take about 5 minutes.
* **Indications for Hand Washing**
  + When coming on duty.
  + After removing gloves.
  + When hands are soiled including after sneezing, coughing, or blowing your nose.
  + Between patients’ contacts.
  + Before & after medication administration.
  + After personal use of the toilet.
  + Before performing invasive procedures
  + Before taking care of particularly susceptible patients, such as who are severely Immuno-compromised & Newborns.
  + Before and after touching wounds.
  + Before & after eating.
  + After touching objects that are likely to be contaminated with pathogenic microorganisms.
  + After taking care of infected patients or patients who are likely to be colonized with microorganisms for special clinical or epidemiologic significance. (E.g. Multi-drug resistant bacteria-M.D.R.O).

**Use of Personal Protective Equipment**

**Gloves**:

* + worn for three reasons:
    - Protect the hands when the nurse is likely to handle any body substances ( e.g. blood, urine, feces, sputum and nonintact skin)
    - Reduce the likelihood of nurses transmitting their own endogenous microorganisms to individuals receiving care.
    - reduce the chance that the nurse’s hands will transmit microorganisms from one client or an object to another client

**Gowns**

* Clean or disposable impervious (water-resistant) gowns or plastic aprons that are worn during procedures.
* Single use gown technique - using a gown only once before it is discarded or laundered).

**Face masks**

* + - Worn to reduce the risks for transmission of organisms by the droplet contact and airborne routes and by splatters of body substances.

**Disinfecting and Sterilizing**

**Antiseptic**

* + - Is a chemical preparation used on skin or tissue ( e.g. phenol or iodine compounds) used on inanimate objects.

**Disinfectant**

* Frequently caustic and toxic to tissues.
* more concentrated solution.

**Sterilization**

* + A process that destroys all microorganisms, including spores and viruses.(Moist hea, Gas, Boiling water and Radiatio)

**Isolation**

* The measures designed to prevent the spread of infections or potentially infectious microorganisms to health personnel, clients, and visitors.
  + **Category-specific isolation precautions:**
    - Strict isolation, contact isolation, respiratory isolation, tuberculosis isolation, enteric precautions, drainage/secretions precautions, blood/body fluid precautions
  + **Disease-specific isolation precautions** 
    - Precautions for specific diseases.
    - Delineates use of private rooms with special ventilation,
    - Have client share a room with other clients infected with the same organism
    - Gowning to prevent gross soilage of clothes for specific infectious diseases.