

Understanding Principles of Infection Control

Provide basic knowledge of how disease is transmitted and the main ways to prevent it

Microorganisms or Microbe

- Small living organism
 - > Not visible to the naked eye
 - > Must be viewed under a microscope
- Found everywhere in the environment, including on and in the human body
- Many Microorganisms are part of normal flora of the body
 - > Beneficial in maintaining certain body processes
 - > Called nonpathogens
- Other microorganisms cause infection and disease and are called pathogens or germs
- A microorganism that is beneficial in one body system can become pathogenic in another body system
 - > E. coli is part of the large intestines
 - > If E.coli enters the urinary system it causes an infection

Classes of Microorganisms

- Bacteria
 - Protozoa
 - Fungi
 - Rickettsiae
 - Viruses
-
- **WORKSHEET AND WORK TIME!!**

Bacteria

- Simple 1 cell organisms that multiple rapidly
- Classified by shape and arrangement
 - > Cocci
 - Round
 - Micrococci
 - Diplococci
 - Gonorrhoea, meningitis and pneumonia
 - > Streptococci
 - Chains
 - > Staphylococci
 - Clusters
 - Pus producing
 - infections

Bacteria

○ Bacilli

- > Rod Shaped
- > Single, pairs, chains
- > Flagella
 - Threadlike projection (tail)
 - Movement
- > Spores or thick-walled capsules
 - When growth conditions are poor
 - Hard to kill
- > Diseases such as
 - TB, Tetanus

Bacteria

- ◉ Spirilla
 - > Corkscrew shaped
 - > Diseases
 - Syphilis
- ◉ Antibiotics are used to kill
 - > Can be resistant

Protozoa

- One-celled animal like
- Decayed material and contaminated water
- Flagella
- Some are pathogenic
 - > malaria

Fungi

- ◉ Simple plantlike
- ◉ Live on dead organic matter
- ◉ Yeasts and molds
- ◉ Causes diseases
 - > Ring worm, athletes foot
- ◉ Antibiotics do not kill
 - > Use antifungal
 - expensive

Rickettsiae

- Parasitic

- > Can't live outside the cells of the living
- > Found on fleas, lice, ticks
- > Transmission through those insect bites
- > Causes diseases like Rocky Mountain spotted fever
- > Antibiotics are effective

Viruses

- ◉ Smallest microorganism
- ◉ Can not reproduce unless inside another living cell
- ◉ Spread through blood or body secretions
- ◉ Difficult to kill
 - > Resistant to many disinfectants
 - > Antibiotics do not work
- ◉ Disease
 - > Common cold, chicken pox, mumps, warts, flu

Factors required for growth

- Microorganisms need certain things to grow and reproduce
- Human body is ideal supplier of all of the requirements
- Most microorganisms prefer a warm environment, and body temperature is ideal
- Darkness is also preferred by most microorganisms, and many are killed quickly by sunlight
- Source of food and moisture is needed
- Need for oxygen varies
 - > Aerobic organisms required oxygen to live
 - > Anaerobic organisms live and reproduce in absence of oxygen

Types of infection

○ Endogenous

- > Means the infection or disease originates within the body
- > Includes metabolic disorders, congenital abnormalities, tumors, and infections caused by microorganisms within the body

○ Exogenous

- > Means that the infection or disease originates outside the body
 - Pathogenic organisms that invade the body, radiation, chemical agents, trauma, electric shock, and temperature extremes

Types of Infection Continued

● Nosocomial

- > Infections acquired by an individual in a health care facility such as a hospital or long-term care facility
- > Usually present in facility and transmitted by health care workers to the patient
- > Many of the pathogens transmitted in this manner are antibiotic-resistant
- > Can cause serious and even life threatening infection
 - Staphylococcus
- > Infection control programs are used in health care facilities to prevent and deal with nosocomial infections

Types of Infection Continued

- Opportunistic

- > Infections that occur when the body's defense is weak
- > Diseases do not usually occur in individuals with an intact immune system
 - Pneumonia in a person with AIDS

Dirty Doctors Clip

- <http://ezproxy.nwtc.edu:2048/login?url=http://digital.films.com.ezproxy.nwtc.edu:2048/PortalPlaylists.aspx?aid=1716&xtid=39385&loid=62060>

Chain of Infection

- Conditions that must exist for disease to occur and spread from one to another
 - > Causative agent
 - > Reservoir
 - > Portal of exit
 - > Mode of transmission
 - > Portal of entry
 - > Susceptible host

Causative agent

- Pathogen such as a bacterium or virus that can cause a disease

Reservoir

- Place where causative agent can live
- Common reservoir
 - > Human body
 - > Animals
 - > Environment
 - > Fomites- objects contaminated with infectious material that contains the pathogens, such as doorknobs, bedpans, urinals, linens, instruments, and specimen containers

Portal of Exit

- Way for causative agent to escape from the reservoir
- Pathogens can leave the body through urine, feces, saliva, blood, tears, mucous discharge

Mode of Transmission

- Way that causative agent can be transmitted to another reservoir or host where it can live
 - > Direct contact
 - Person-person
 - Contact with body secretions containing pathogens
 - Contaminated hands are one of the most common sources of direct transmission
 - > Indirect contact
 - Pathogen is transmitted from contaminated substances such as food, air, soil, insects, feces, clothing, instruments, and equipment
 - Touching contaminated equipment and spreading the pathogens on the hands
 - Breathing in droplets carrying airborne infections
 - Receiving the bite of an insect carrying the pathogens

Portal of entry

- Way for the causative agent to enter a new reservoir or host
 - > Breaks in the skin
 - > Respiratory tract
 - > Digestive tract
 - > Genitourinary tract
 - > Circulatory system

Susceptible Host

- Person who can contract the disease
 - > Usually human can fight off causative agent and not contract disease if defense mechanisms are intact and the immune system is functioning
 - > Body defenses
 - Mucus membrane
 - Cilia –tiny hairs
 - Coughing and sneezing
 - Tears
 - Fever
 - Swelling
 - > Human becomes susceptible host in some instances
 - Large number of the pathogen invade body
 - Body defense are already weak

Health Care workers NEED to Know the CHAIN!

- Knowing the chain allows “us” to interrupt and break the chain to help prevent the disease from spreading
- REMEMBER PATHOGENS ARE EVERYWHERE
- PREVENTING PATHOGEN TRANSMISSION IS A CONTINUOUS PROCESS

Aseptic Techniques

- Major way to break the chain of infection
 - > Terms
 - Asepsis- absences of disease-producing microorganisms or pathogens
 - Sterile- free from all organisms, both pathogenic and nonpathogenic, including viruses and spores
 - Contaminated- any object or area that may contain pathogens
- Directed toward maintaining cleanliness and eliminating or preventing contamination
 - > Hand washing
 - > Good Personal Hygiene
 - > Using disposable gloves when coming in contact with bodily secretions
 - > Proper cleaning of instruments and equipment
 - > Thorough cleaning of the environment

Levels of aseptic control

○ Antisepsis

- > Antiseptics prevent or inhibit the growth of pathogenic organisms
- > Not affected against spores or viruses
- > Can usually be used on skin
- > Ex. Alcohol, betadine

Levels of Aseptic Control

○ Disinfection

- > Process that destroys or kills pathogenic organisms
- > Not always affective with viruses and spores
- > Chemical disinfectants are used
- > Can irritate or damage the skin and are used mainly on objects, not people

Levels of Aseptic Control

○ Sterilization

- > Process that destroys all microorganisms
 - Both pathogenic and nonpathogenic
 - Includes viruses and spores
- > Steam under pressure, gas, radiation, and chemicals can be used to sterilize objects

Methods of aseptic Control

○ Ultrasonic

- > Uses sound waves to clean instruments and other items
- > Sound waves produce bubbles in a cleaning solution
- > Bubbles explode with they hit the object, forcing cleaning solution on it
- > Dirt and residue are removed from item
- > DOES NOT kill viruses or spores
- > NOT a method of sterilization

Methods of aseptic control

○ Chemical Disinfection

- > Doesn't kill virus or spores = disinfected not sterilized
- > Read label before using chemical...some need to be diluted
- > Clean and dry item before using chemical disinfectant
- > Soak item in disinfectant for recommended amount of time

Methods of Aseptic Control

- Autoclave

- > Steams under pressure, gas, or dry heat to sterilize
- > Destroys all!
- > Items must be cleaned before autoclaved