

4. Infection Control

A. Introduction to Infection Control

1. *Nosocomial infections* are acquired by 5-10% of hospitalized patients, resulting in increased cost of millions of dollars annually.
2. Center for Disease Control (CDC), the Joint Commission on Accreditation of Hospitals Organization (JCAHO), state regulatory agencies, and each health care institution are required to develop and implement infection control policies which include surveillance, reporting, isolation procedures, education and investigation of epidemics in the hospital.
3. Infection control department of the hospital hire nurses to perform this job and they in turn work very closely with the micro department.

B. Surveillance

1. Infection control program closely monitors the following:
 - a. Patients at high risk of infection.
 - b. Patients with already acquired infections.
 - c. Personnel/patients exposed to communicable diseases, contaminated equipment, or hazardous reagents.
 - d. Patients in certain areas of the hospital or in certain rooms.
 - e. Patients in ambulatory settings: home or long-term care facilities.
2. Phlebotomists must be aware of these special circumstances:
 - a. Take necessary precautions to avoid infecting yourself or the patient.
 - b. Mentally prepare yourself to deal in a professional, humane manner with special patients.
3. Surveillance is also involved in classifying infections according to prevalence rates and monitoring employee health including screening for diseases and offering immunizations.

C. Chain of Infection

1. Nosocomial infections occur when chain of infection occurs and requires the following: source, mode of transmission and susceptible host.
2. **Source**
 - a. In normal environment few things are sterile. Inanimate objects as well as people are colonized with microorganisms, many of which help with normal bodily functions.
 - b. Even when an organism is pathogenic some are more pathogenic than others, i.e., only a few *Shigella* organisms need to be ingested to cause a diarrheal infection, whereas *Salmonella* requires a large number of organisms to be ingested.

- c. Common sources of infection:
 - 1) People
 - 2) Contaminated needles or sharps
 - 3) IV catheters, Foley catheters, cardiac catheters
 - 4) Bronchoscope, respiratory therapy equipment
 - 5) Contaminated clothing
 - 6) Medical instruments used for surgery or diagnostic procedures are reusable but must be thoroughly sterilized.
 - 7) Some equipment such as tourniquets have low risk of causing infection.

2. **Mode of transmission**

- a. Infections can be transmitted by direct contact, air, medical instruments, other objects or **vectors**.
- b. Direct contact infections such as Staph, chicken pox, hepatitis, diarrheal diseases, can be avoided by hand washing.
- c. Airborne infections such as TB or Legionnaires disease may be transmitted by coughing, sneezing, shaking linen, sweeping or inadequate ventilation and can be prevented by using a mask.
- d. Inanimate objects such as toys, toilets, sinks, linens and water fountains may provide a means of transmission if contaminated.
- e. Mosquitos, ticks, fleas and mites transmit infections such as plague, rabies and malaria.
- f. Stop mode of transmission through appropriate use of infection control procedures.

3. **Susceptible host**

- a. Factors that affect host susceptibility are: age, drugs, degree and nature of illness, and status of the host's immune system.
- b. Underlying diseases such as diabetes, AIDS, and cancer may change status of host and increase chance of infection.
- c. Treatment of diseases such as chemotherapy, radiation and antibiotic therapy which may lower patient's resistance to infections.

4. Must break the chain of infection by strict adherence to policies involving :

- a. Hand washing
- b. Proper waste disposal
- c. Appropriate laundry service and housekeeping
- d. Control of insects and rodents
- e. Use of disposable equipment and supplies
- f. Isolation techniques

5. Proper treatment of patient will speed recovery and reduce host susceptibility:
 - a. Appropriate immunizations
 - b. Transfusion
 - c. Nutritional support
 - d. Proper medications
 - e. Physical exercise

D. OSHA Needlestick Safety and Prevention Act

1. Became law November 6, 2000
2. Requires employers to identify, evaluate and make use of effective safer devices.
3. For needle use it requires a built-in safety feature or mechanism that allows a single handed method of causing the needle to be permanently covered.
4. The law mandated that employers allow “front line” employees to evaluate and select the equipment they were most comfortable with.
5. Employers must maintain an injury log which will include the brand name of the device used which caused the injury.

E. Isolation Procedures

1. Isolation procedures vary and range from sterile rooms or wards to isolation procedures for one disease only.
2. *Isolation procedures* divide patients into two groups:
 - a. Patients with communicable diseases.
 - b. Patients who are extremely susceptible to infections..
3. *Isolation techniques* formally divided into two types: category-specific precautions and disease-specific precautions.
 - a. Category specific provided guidelines for dealing with infectious substances based on route of transmission (wound/drainage, enteric, respiratory, etc).
 - b. Disease Specific Isolation Precautions included specific procedures for dealing with more than 150 diseases.
4. Center for Disease Control (CDC) new isolation guidelines
 - a. New guidelines recommend **Standard Precautions** which combine Universal Precautions and isolation practices for moist, potentially infectious body substances (BSI) into a *single set of safeguards* to be used on all patients.
 - 1) BSI Practices based on the assumption that all body substances may carry infectious agents.
 - 2) Focuses on isolation of potentially infectious moist body substances: blood, urine, saliva, feces, sputum, wound drainage, all other body fluids, nonintact skin and mucous membranes.
 - 3) Designed to reduce risk of transmission of microorganisms.
 - b. Changes necessary to avoid inconsistent use of *Universal Precautions* and *Body Substance Isolation* (BSI).

- c. The old categories of disease-specific precautions will be collapsed into three categories: *airborne, droplet and contact*.

F. Standard Precautions Review

1. The focus is on applying a single set of precautions to be utilized for all non-intact skin, mucous membranes and potentially infectious moist body substances regardless of whether or not they contain visible blood
2. Designed to reduce the risk of transmission of blood borne pathogens
3. Applies to all patients receiving care in hospitals, regardless of diagnosis or presumed infection status
4. Standard Precautions apply to:
 - a. blood
 - b. all body fluids, secretions (saliva, sputum), excretions (urine, feces) *except sweat*
 - c. non-intact skin (wound drainage)
 - d. mucous membranes
5. Procedures to follow for *Standard Precautions* include the following:
 - a. Use appropriate barrier protection to prevent skin and mucous membrane exposure when contact with blood or body fluids is anticipated.
 - b. Wash hands and contaminated surfaces/equipment immediately if contaminated with blood or body fluids and after removing gloves.
 - c. Take the necessary precautions to prevent injuries caused by handling/disposing of needles, scalpels and other sharp instruments.
 - d. Use of special equipment to protect from saliva exposure during resuscitation.
 - e. Appropriate protection when exudative lesions or dermatitis is present.
 - f. Pregnant health care workers must strictly adhere to infection control policies.
 - g. Immunization of employees is required for infectious agents (measles, mumps, rubella) transmitted by air.
6. Additional precautions may need to be taken when patients have infectious conditions or illnesses and these are called *Transmission Based Precautions*
 - a. Airborne Precautions for diseases transmitted by *small* droplets,
 - b. Droplet precautions for diseases transmitted by *large* droplets
 - c. Contact precautions for disease transmitted by direct contact with the patient, ie, wounds, skin infections, enteric infections, etc.
 - d. There may be times when a patient requires more than 1 type of Transmission Based Precaution category.
7. Tuberculosis Isolation
 - a. Indicated for patient with infectious tuberculosis and is sometimes called AFB (acid fast bacilli) isolation.
 - b. Drug resistant TB is becoming more prevalent and the new guidelines emphasize the importance of wearing an appropriate mask that is fitted to the individual employee.

- c. OSHA requires the use of a National Institute for Occupational Safety and Health (NIOSH) approved high efficiency particulate air (HEPA) respirator as a minimum level for HCWs entering AFB isolation rooms.

8. Protective or reverse isolation

- a. Protect patient who is highly susceptible to infection.
- b. All articles entering room must be sterile.
- c. Gown, glove, mask
- d. Used supplies can be removed from room.

G. OSHA Standards for the Health Care Employer

- 1. Employers must provide measures that will protect workers exposed to biological hazards.
 - a. Mandatory training and compliance in the use of Standard/Universal Precautions.
 - b. Employers must provide appropriate PPE.
 - c. Engineering practice controls that isolate or remove blood-borne pathogen hazards, ie, sharps containers.
 - d. Work practice controls to reduce likelihood of exposure, ie, no recapping of needles, no eating, drinking, smoking in clinical lab.
 - e. Appropriate cleaning methods of contaminated surfaces.
 - f. Provide free Hepatitis B (HBV) vaccine.
 - g. Post-exposure follow up for employees exposed to HBV and HIV.
 - h. Training and education information on blood borne pathogens available for employees at no cost and accessible during working hours.
 - i. Labels and signs that warn of biological hazards and contaminated waste.

2. Blood Borne Exposure Procedures

- a. Health care facilities must provide a confidential medical evaluation, treatment and follow up for any employee with a blood borne exposure incident.
- b. Immediately after an exposure incident the employee must:
 - 1) Apply appropriate first aid
 - 2) Report the incident
 - 3) Be given appropriate medical evaluation, treatment and counseling.
- c. ***Medical evaluation involves the following five steps and is kept confidential:***
 - 1) HCWs blood is tested for HBV and HIV.
 - 2) Source individual tested for HBV and HIV, if permission is given.
 - 3) If source individual is HIV positive, or exposure is to an unknown specimen the HCW is counseled and *evaluated for HIV infection immediately, 6 weeks, 12 weeks and 6 months.*
 - 4) AZT therapy is provided to the exposed employee as soon as possible, preferably ***within 1-2 hours*** of exposure.
 - 5) If source individual refuses to consent to testing and is in a high-risk category, the exposed HCW is given immune globulin and HBV vaccination.

- 6) The HCW is counseled to be alert for acute viral symptoms within 12 weeks of exposure.

H. Infection Control in Hospital Units

1. Isolation for hospital outbreaks
 - a. May dictate need for special precautions, isolation procedures or screening of employees.
 - b. Examples: Staph outbreak in nursery, undiagnosed chicken pox, positive TB test on employee or inpatient.
2. Infection control procedures in a nursery unit
 - a. Infants immune system not developed and they have increased susceptibility to infection.
 - b. May pick up pathogens from mom, other babies or hospital personnel.
 - c. Hand washing procedure much stricter and must be adhered to.
 - d. Gloves must be worn.
 - e. Nursery usually provides gowns to be worn while in the nursery.
 - f. To decrease exposure each baby is assigned to one nurse.
 - g. Special case is infant whose mom has genital herpes.
 - 1) Baby and mother are isolated.
 - 2) Must use gown and gloves.
 - 3) Remove contaminated articles by double bagging.
3. Infection control in a burn unit
 - a. Patient is **highly susceptible** to infection.
 - b. Infection rate dramatically decreases if patient is in a completely closed environment.
 - 1) Bed surrounded by plastic curtain with sleeves, use sleeves to care for patient.
 - 2) Everything kept outside of curtain.
 - c. If facility lacks the curtain, house patient in special room.
 - d. Must use gown, gloves, double bagging of soiled articles and strict adherence to hand washing technique.
 - e. Sterilize/disinfect room frequently.
5. Infection control in an intensive care or postoperative unit:
 - a. Patients who are critically ill or have had surgery are more susceptible to infections.
 - b. Most hospital ICUs are big open rooms with numerous patients for easy monitoring.
 - c. Patients with known infections are isolated according to infection.
 - d. Strict hand washing, gowning and gloving policies are necessary.
6. Infection control in a dialysis unit:
 - a. Patients often immunosuppressed, increasing the risk of acquiring an infection, especially hepatitis.
 - b. Gown and gloves worn on unit.
 - c. Strict adherence to hand washing technique and glove use.

I. Infection Control in the Clinical Laboratory

1. Performed primarily by microbiology personnel.
 - a. Maintains lab records for surveillance purposes.
 - b. Reports infectious agents, drug resistant microorganisms and outbreaks.
 - c. Evaluates effectiveness of sterilization or decontamination procedures.
2. Acquisition of infections is prevented by:
 - a. Prohibiting eating, drinking, mouth pipetting or smoking in the lab.
 - b. Proper hand washing at the appropriate times.
 - c. Use of appropriate barrier protection such as gloves, protective clothing, and eye protection.
 - d. Decontamination of work surfaces periodically during the day and prior to leaving.
 - e. Proper disposal of sharps, including broken glass.
 - f. Proper handling of equipment.
3. Phlebotomists play an important role in preventing the spread of infection during the blood collection process:
 - a. Must use proper technique during blood collection.
 - b. Must strictly adhere to infection control policies and procedures specifically appropriate use of gowns, gloves and masks.
 - 1) Pay close attention to posted signs which illustrate special PPE.
 - 2) Know how to put on and remove gown, gloves, and mask.
 - 3) Know where to dispose of the materials used in the patient room.
 - c. One phlebotomist may collect specimens from 50 patients, the potential is there to spread infections all over the hospital.

J. Entering and Exiting Patient's Rooms

1. Take only supplies needed into the room.
 - a. Use tourniquet in the room or leave yours
 - b. Label specimen in room and leave the pen.
 - c. Place specimens in isolation bag.
2. Dispose of PPE (mask, gloves and /or gown) and used supplies in the room.
3. After washing hands use a clean, dry paper towel to open door, use foot to hold open as you exit.

K. Double Bagging

1. ***All items in isolation removed by double bagging technique which requires 2 people to perform, one person in the room, one outside the room.***
 - a. Person outside holds clean, impermeable bag with ends of bag covering their hands.
 - b. Person inside the room seals the bag and places into the clean bag.
 - c. Person outside the room seals and labels with appropriate warnings.
2. The bag is disposed of in a designated area/container for biohazardous waste.

L. Prevention of Laboratory Acquired Infections

1. The occurrence of an infection from a biohazardous specimen depends upon the virulence of the infecting organism **and** the susceptibility of the host.

2. The following are possible routes of infection from **collected** specimens and, therefore, should be considered when collecting or processing specimens for laboratory assays.

a. ***Skin contact***

- 1) Organisms may enter through abrasions, cuts or conjunctiva of eye.
- 2) Avoid needles and never handle broken glass with your hands.
- 3) Wear PPE and cover all cuts appropriately.
- 4) Avoid rubbing eyes or mouth.

b. ***Ingestion***

- 1) Caused by failure to wash contaminated hands prior to eating, drinking or smoking.
- 2) Comply with lab safety rules.

c. ***Airborne***

- 1) Aerosols may be created by careless handling or centrifugation.
- 2) Popping stoppers off of vacuum tubes can create aerosols.
- 3) Use correct procedures for processing and separating patient specimens.

M. Sterile Techniques for Phlebotomists

1. Responsibilities

- a. Must realize bacteria and other microorganisms can be found **everywhere**.
- b. **All** hospital personnel are responsible for cleanliness, including:
 - 1) Maintaining sterility when handling instrument or equipment that contact the patient.
 - 2) Cleaning up small messes when noticed, or notify appropriate personnel in a timely fashion if you are unable to handle it.

2. Site preparation:

- a. Use sterile supplies for skin and venipuncture.
- b. Rubbing alcohol (70% isopropyl) for routine destruction of organisms on the site.
- c. Blood cultures require sterile site:

3. Disinfectants and antiseptics:

- a. ***Disinfectant*** is a chemical compound used to **remove or kill** pathogenic organisms, they are regulated by the EPA.
- b. ***Antiseptics*** are chemicals used to ***inhibit the growth and development*** of microorganisms, but not necessarily kill them. May be used on human skin.
- c. Disinfectants are used on surfaces and instruments, but are too caustic for direct use on human skin.
- d. Intermediate level disinfectants which are HIV-cidal or TB-cidal should be used to cleanse tourniquets and other contaminated articles.