EXERCISE 1: INFECTION CONTROL

Skills: 10 points

Objectives:
1. Describe and perform proper hand washing, gowing, gloving, masking and double bagging technique
2. Describe Universal Precautions, Standard Precautions and Transmission Based Precautions.
3. State the purpose of soap, running water, and friction in the hand washing procedure.
4. List the three routes of transmission upon which Transmission Based Precautions apply and give an example of a disease/condition for each route.
5. State what the acronym “PPE” stands for.
6. List 6 times when hands should be washed during a routine work day.
7. Define healthcare associated infections and state the single best way to prevent them.
8. State the agency responsible for development of blood-borne pathogens recommendations.
9. Define aseptic and list 5 components of aseptic technique.

Discussion

As phlebotomists perform their routine daily activities there is the potential for coming in contact with body fluids potentially capable of containing pathogenic organisms. As a result a phlebotomist's hands are capable of spreading infectious agents to coworkers, patients and other health care workers. Healthcare associated infections (HAI), formerly known as nosocomial infections, are defined as infections caused by a wide variety of common and unusual bacteria, fungi, and viruses during the course of receiving medical care. This includes traditional hospital settings as well as outpatient surgery centers, long-term care facilities, rehabilitation centers, and community clinics. In the hospital setting these infections account for approximately 1.7 million infections, 99,000 associated deaths and $4-6 billion in health care costs.

Frequent, proper hand washing is the single best way to prevent the spread of infection, both to the phlebotomist and to any patients the phlebotomist may encounter. Hands should be washed at the following times:

1. When visibly contaminated with blood, body fluids, or tissues.
2. After every patient contact.
3. After removal of gloves and other protective wear or equipment.
4. Before eating, drinking, smoking, applying makeup, or changing contact lenses outside of the lab, and after using the lavatory facilities.
5. Before all other activities that entail hand contact with mucous membranes or a break in the skin.
6. Periodically during the day when routinely handling and testing bloody fluid.

For general purposes hand washing usually removes potential pathogens. Good technique involves soap, warm running water and friction.
- Soap removes oils that may hold bacteria to the skin.
- Warm running water washes away loosened debris and lathers the soap.
- Friction from rubbing ones hands together loosens and removes dead skin, oil and microorganisms.

The faucet is turned off using paper towels so as to avoid re-inoculation of microorganisms onto the hands.

Aseptic means “free of pathogenic organisms.” For the phlebotomist, every blood collection must be performed using aseptic technique, which includes proper hand hygiene, proper use of personal protective equipment (PPE), proper waste disposal, proper cleaning of the work area, and adherence to Standard Precautions.

Many diseases can be transmitted from patients to health care workers. The Centers for Disease Control (CDC) initially developed guidelines and recommendations called Universal Precautions. These guidelines were recommended because individuals with blood-borne pathogens such as HIV and Hepatitis B cannot always be readily detected, and dictate that all patients should be considered to be infectious.
The CDC recommended additional precautions in dealing with patients with potentially infectious diseases. 

Category specific precautions described the PPE to be utilized for different infections based on the route of infection, i.e., enteric, respiratory, etc. A small poster for the appropriate category would be posted on the patient’s door which illustrated the appropriate PPE to use prior to entering the patient’s room. An even more extensive disease-specific precaution list was available which listed the PPE required by disease.

To reduce confusion, the CDC has published a new isolation guide to help clarify infection control policies to be used in addition to Universal Precautions. There are two tiers of isolation precautions. In the first, and most important, tier are those precautions designed for the care of all patients in hospitals, regardless of their diagnosis or presumed infection status. Implementation of these "Standard Precautions" is the primary strategy for successful nosocomial infection control. In the second tier are precautions designed only for the care of specified patients. These additional "Transmission-Based Precautions" are for patients known or suspected to be infected by epidemiologically important pathogens spread by airborne or droplet transmission or by contact with dry skin or contaminated surfaces.

Standard Precautions for moist and potentially infectious body substances are to be used for all patients. 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 such as: blood, urine, saliva, feces, sputum, wound drainage and other body fluids. Standard Precautions synthesize the major features of Universal Precautions (Blood and Body Fluid Precautions), which was designed to reduce the risk of transmission of blood borne pathogens, and Body Substance Isolation (BSI), designed to reduce the risk of transmission of pathogens from moist body substances, and applies them to all patients receiving care in hospitals, regardless of their diagnosis or presumed infection status.

Standard Precautions apply to

1) blood;
2) all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood;
3) non-intact skin; and
4) mucous membranes. Standard Precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals.

The CDC recommends the procedure called Standard Precautions which includes the following:

1. All health care workers should routinely use appropriate barrier protection to prevent skin and mucous membrane exposure when contact with blood or body fluids is anticipated. Gloves must be worn during phlebotomy and changed after contact with each patient. Masks, protective eyewear, face shields, and/or gowns should be worn as indicated when there is a potential for splashing or splattering of blood and/or body fluids.
2. Wash hands immediately if contaminated with blood or body fluids and after removing gloves.
3. Take the necessary precautions to prevent injuries caused by needles, scalpels and other sharp instruments. Sharp items must be placed in a puncture-resistant container.
4. Mouth pieces, resuscitation bags, or other ventilation devices should be available for use in areas in which the need for resuscitation is predictable.
5. Health care workers with exudative lesions or weeping dermatitis should cover those areas with an occlusive bandage.
6. Pregnant health care workers are not known to be at any greater risk of contracting HIV infection than those who are not pregnant. Because the infection can be transmitted perinatally pregnant health care workers should be especially familiar with and strictly adhere to precautions to minimize the risk of acquiring HIV or Hepatitis B.
7. Immunization of employees is required for infectious agents (measles, mumps, rubella) transmitted by air.
Transmission-Based Precautions are designed for patients documented or suspected to be infected with highly transmissible or epidemiologically important pathogens for which additional precautions beyond Standard Precautions are needed to interrupt transmission in hospitals. There are three types of Transmission-Based Precautions: Airborne Precautions, Droplet Precautions, and Contact Precautions. They may be combined for diseases that have multiple routes of transmission. When used either singularly or in combination, they are to be used in addition to Standard Precautions.

**Airborne Precautions** are designed to reduce the risk of airborne transmission of infectious agents. Airborne transmission occurs by dissemination of either airborne droplet nuclei (5 µm or smaller in size) of evaporated droplets that may remain suspended in the air for long periods of time or dust particles containing the infectious agent. Microorganisms carried in this manner can be dispersed widely by air currents and may become inhaled by or deposited on a susceptible host within the same room or over a longer distance from the source patient, depending on environmental factors; therefore, special air handling and ventilation are required to prevent airborne transmission. Airborne Precautions apply to patients known or suspected to be infected with epidemiologically important pathogens that can be transmitted by the airborne route.

**Droplet Precautions** are designed to reduce the risk of droplet transmission of infectious agents. Droplet transmission involves contact of the conjunctivae or the mucous membranes of the nose or mouth of a susceptible person with large-particle droplets (larger than 5 µm in size) containing microorganisms generated from a person who has a clinical disease or who is a carrier of the microorganism. Droplets are generated from the source person primarily during coughing, sneezing, or talking and during the performance of certain procedures such as suctioning and bronchoscopy. Transmission via large-particle droplets requires close contact between source and recipient persons, because droplets do not remain suspended in the air and generally travel only short distances, usually 3 ft or less, through the air. Because droplets do not remain suspended in the air, special air handling and ventilation are not required to prevent droplet transmission. Droplet Precautions apply to any patient known or suspected to be infected with epidemiologically important pathogens that can be transmitted by infectious droplets.

**Contact Precautions** are designed to reduce the risk of transmission of epidemiologically important microorganisms by direct or indirect contact. Direct-contact transmission involves skin-to-skin contact and physical transfer of microorganisms to a susceptible host from an infected or colonized person, such as occurs when personnel turn patients, bathe patients, or perform other patient-care activities that require physical contact. Direct-contact transmission also can occur between two patients (e.g., by hand contact), with one serving as the source of infectious microorganisms and the other as a susceptible host. Indirect contact transmission involves contact of a susceptible host with a contaminated intermediate object, usually inanimate, in the patient's environment. Contact Precautions apply to specified patients known or suspected to be infected or colonized (presence of microorganism in or on patient but without clinical signs and symptoms of infection) with epidemiologically important microorganisms than can be transmitted by direct or indirect contact.
Synopsis of the Types of Precautions and Patients Requiring the Precautions

**Standard Precautions**
Use Standard Precautions for the care of all patients.

**Airborne Precautions**
In addition to Standard Precautions, use Airborne Precautions for patients known or suspected to have serious illnesses transmitted by airborne droplet nuclei (less than 5 µm). Examples of such illnesses include:
- Measles
- Varicella (including disseminated zoster)
- Tuberculosis

**Droplet Precautions**
In addition to Standard Precautions, use Droplet Precautions for patients known or suspected to have serious illnesses transmitted by large particle droplets (greater than 5 µm). Examples of such illnesses include:
- Invasive *Haemophilus influenza* type b disease, including meningitis, pneumonia, epiglottitis and sepsis.
- Invasive Neisseria meningitides disease, including meningitis, pneumonia and sepsis.
- Other serious bacterial respiratory infections spread by droplet transmission, including:
  - Diphtheria (pharyngeal)
  - *Mycoplasma pneumonia*
  - Pertussis
  - Pneumonic plague
  - Streptococcal (group A) pharyngitis, pneumonia or scarlet fever in infants and young children.
- Serious viral infections spread by droplet transmission including:
  - Adenovirus
  - Influenza
  - Mumps
  - Parvovirus B19
  - Rubella

**Contact Precautions**
In addition to Standard Precautions use Contact Precautions for patients known or suspected to have serious illnesses easily transmitted by direct patient contact or by contact with items in the patient’s environment. Examples of such illnesses include:
- Gastrointestinal, respiratory, skin or wound infections or colonization with multidrug resistant bacteria judged by the infection control program, based on current state, regional or national recommendations, to be of special clinical and epidemiological significance.
- Enteric infections with a low infectious dose or prolonged environmental survival, including:
  - *Clostridium difficile*
  - For diapered or incontinent patients: enterohemorrhagic *Escherichia coli* O157:H7, *Shigella*, hepatitis A or rotavirus.
- Respiratory syncytial virus, parainfluenza virus or entroviral infections in infants and young children.
- Skin infections that are highly contagious or that may occur on dry skin including:
  - Diphtheria (cutaneous)
  - Herpes simplex virus (neonatal or mucocutaneous)
  - Impetigo
  - Major (noncontained) abscesses, cellulitis or decubiti
  - Pediculosis
  - Scabies
  - Staphylococcal furunculosis in infants and young children
  - Zoster (disseminated or in the immunocompromised host)
- Viral/hemorrhagic conjunctivitis
- Viral hemorrhagic infections (Ebola, Lassa or Marburg)

**NOTE:** Certain infections will require more than one type of precaution


Refer to your textbook for examples of conditions for which Transmission Based Precautions are utilized.
Personal Protective Equipment

PPE may include the use of masks, gowns and gloves. The PPE is usually located on a cart directly outside the patient’s room. Proper donning and removal of the PPE is important.

When entering an isolation room it is critical that the healthcare worker reads notices posted on the patient door which symbolizes the types of personal protective equipment (PPE) that may be required to enter the room. The following is an example of the poster for Contact Precautions.

![Contact Precautions Poster]

Double Bagging

Biohazardous trash removal is important in reducing the risk of transmission of potential pathogens. In the past double bagging was recommended. Double bagging requires two individuals, one in the room and one outside the room. The person outside the room does not have to wear PPE.

- The individual in the room bags all contaminated items, seals the bag and Person outside holds clean biohazard bag with ends of bag covering their hands.
- The person inside the room deposits the bag into a second bag held by the individual outside the room.
- The individual outside the room seals the outer bag and labels with appropriate warnings.
- The individual outside the room then disposes of the bag in a designated area or container for biohazard waste.

The Centers for Disease Control and Prevention (1996) has relaxed its recommendation concerning double bagging. Its revised position is that one bag is adequate if the bag is sturdy and the articles are placed in the bag without contaminating the outside of the bag. Otherwise double-bagging is used.
HANDWASHING

Materials

1. Sink
2. Antibacterial soap
3. Paper towels

Procedure

1. Release some paper toweling from the dispenser.
2. Turn the water faucet on and adjust temperature.
3. Dispense a small amount of soap into the palm of the hand.
4. Vigorously lather hands and rub together for at least 15 seconds.
5. Wash well between fingers, paying special attention to the fingernails and nail beds, and up the wrists.
6. Rinse well with a moderate stream of water in a downward motion.
7. Use paper toweling to thoroughly dry the hands.
8. Using the same piece of paper towel, turn off the water. DO NOT touch the faucet handle with your hands once they have been washed.

GOWNING/GLOVING/MASKING

Materials

1. Disposable gown
2. Disposable mask
3. Gloves

Procedure

1. Wash hands.
2. Pick up the gown from the inside, near the openings for the arms. Let it fall open, but do not allow it to touch the floor. Put one arm in and then the other, so the opening is in the back.
3. Tie the neck strings and then the waistband.
4. Determine which side of the mask should be placed next to the face. Some masks have the inside marked "inside". Other masks are manufactured with the outside of the mask a different color than the inside. It is important that masks are donned with the appropriate side out so the filtering system of the mask is operational.
5. Put on the mask, making sure the outside of the mask is to the outside of your body. Masks usually have a piece of wire (similar to the twist ties used to fasten bags) at the top of the mask. Bend the wire to fit snugly over the bridge of your nose.
6. Tie the upper ties high on your head and above the ears, or if it is a mask with rubber bands, secure the rubber bands behind your ears. Be sure to tie them securely, so the mask does not slip off. The bottom set of ties should then be tied securely at the base of the neck.
7. Put on gloves. Be sure the cuff of the glove is pulled up over the sleeve of the gown.
DOUBLE BAGGING

Materials

1. Full biohazard bag
2. Clean biohazard bag

Procedure

For the purposes of this part of the procedure pretend that one individual is INSIDE a patient room and one is OUTSIDE a patient room.

1. Person outside holds clean, impermeable bag with ends of bag covering their hands.
2. Person inside the room, wearing appropriate PPE, seals bag containing biohazard waste, brings that bag to the door and places it into the clean bag the second person is holding outside of the room.
3. Person outside the room seals and labels with appropriate warnings.
4. The bag is disposed of in a designated area or container for biohazard waste.

REMOVING ISOLATION CLOTHING

The order of removal is to remove the items that are most contaminated first.

Procedure

1. Slip a finger from one hand underneath the cuff of the glove on the opposite hand.
2. Pull the glove off, turning inside out as it is removed.
3. Deposit in the designated waste receptacle. Repeat the procedure on the opposite hand.
4. Untie the gown at the waist.
5. Untie the tie at the neck of the gown. Use the ties to pull the gown down toward the front of the body.
6. Pull one arm out of its sleeve, turning the sleeve inside out as you proceed. Repeat using the other arm. Be sure the front of the gown does not contact your hands or uniform. Deposit the gown in the designated waste receptacle.
7. Remove the mask by untying lower ties first, then upper ties or slipping the rubber bands from behind the ears. Be careful not to touch the front of the mask. Hold the mask by the ties or rubber bands and deposit in the designated waste receptacle.
8. Wash hands.
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Name_________________________________ Date _____________________ Points: ____/10

**Instructions:** Give “A”, performed without assistance, “B” performed with coaching, “C” needed repeated coaching.

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<thead>
<tr>
<th>Skill Performed</th>
<th>Performed acceptably</th>
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<td>A, B or C</td>
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### Handwashing

1. Release paper toweling
2. Lather hands with water and soap, rub at least 15 seconds.
3. Wash well between fingers, scrub fingernails and nail beds, and up to wrist
4. Rinse well with water in downward motion.
5. Use paper toweling to dry hands, then turn off water with same towels

### Gowning/Gloving/Masking

1. Wash hands.
2. Pick up gown from inside, let fall open. Put on gown with opening in back
3. Tie neck strings, then waist.
4. Determine which side of mask goes toward face.
5. Put on mask with correct side to your face. Adjust wire on nose bridge
6. Ties mask high on head above the ears, or secure with rubber bands behind ears. Tie the bottom set of ties at the base of the neck.
7. Put on gloves, making sure they cover cuff of gown.

### Double Bagging

1. Person outside holds biohazard bag with ends covering their hands.
2. Person in room wearing PPE seals biohazard bag, brings it to “door”, places it in the bag the person outside is holding.
3. Person outside seals the outer bag and labels with appropriate warnings.
4. The bag is disposed of in a designated area/container for biohazard waste.

### Removing Isolation Clothing

1. Slip a finger from one hand underneath the cuff of the glove on the other hand. Pull the glove off turning it inside out as it is removed.
2. Deposit in designated waste receptacle. Repeat with the opposite hand
3. Untie the gown at the waist
4. Untie neck of the gown. Using ties, pull the gown down toward the front of the body
5. Pull one arm out of the sleeve, turning the sleeve inside out as you go.
6. Repeat with the other arm. **Do not touch front of the gown with your hands. Handle only by the inside.** Deposit gown in designated waste receptacle.
7. Remove mask by untying ties or slipping rubber bands over ears. **Do not touch front of mask.** Holding mask by ties only, deposit in designated waste receptacle.
8. Wash hands.
1. Define healthcare associated infections AND state the single best way these infections can be prevented (1.5 points).
   a. Define:
   
   b. Prevention:

2. List 6 times when hands should be washed during the course of your work day (3 points).
   A.  
   B.  
   C.  
   D.  
   E.  
   F.  

3. Good hand washing technique involves soap, running water and friction. State the purpose of each of these (3 points).
   A.  
   B.  
   C.  

4. Define aseptic AND when the phlebotomist must use aseptic technique. (1 point)
   a.  
   b.  

5. What is the recommendation of the CDC for handling blood-borne pathogens AND what is the name of the guidelines which describe this recommendation (1.5 points)?
   a. Recommendation:

   b. Name of guidelines:

6. To reduce confusion, the CDC has published a new isolation guide to help clarify infection control policies to be used in addition to Universal Precautions. There are two tiers of isolation precautions. State the 2 tiers and briefly describe each one. (2 points)
   a.

   b.

7. **Transmission-Based Precautions** are designed for patients documented or suspected to be infected with highly transmissible or epidemiologically important pathogens for which additional precautions beyond Standard Precautions are needed to interrupt transmission of infections. (3 points)

<table>
<thead>
<tr>
<th>List Each Transmission Based Precaution</th>
<th>Describe</th>
<th>State ONE condition requiring this precaution.</th>
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<tbody>
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<td>B.</td>
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<td>C.</td>
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8. Briefly describe the proper procedure for hand washing (3 points).
9. List the 4 steps in the double bagging procedure. (2 points)
   a. 
   b. 
   c. 
   d. 

10. Briefly describe the proper procedure for gowning, gloving and masking (3 points).

11. Briefly describe the proper manner of removing isolation clothing (2 points).