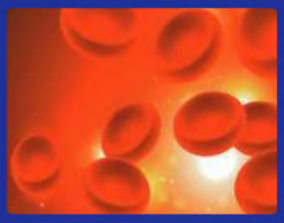
CHAPTER 2


Safety in Phlebotomy

OBJECTIVES

After studying this chapter, you should be able to:

1. Identify rules of safety that promote safety of the individual and patient.
2. Explain the principle of and procedures for infection control.
3. Describe the proper handwashing technique and when to use it.
4. Explain the infection concept.
5. Explain the differences between disease-specific and category-specific isolation.
6. List the three types of transmission-based precautions.
7. Explain the purpose and scope of standard precautions.
8. State the six major tactics to reduce the risk of exposure to blood-borne pathogens.
9. Explain the concerns regarding latex gloves.
10. Describe precautionary measures and actions to be taken with accidental needle punctures.
11. Explain the purpose of material safety data sheets (MSDSs).

NAACLS Competencies Relevant to Chapter 2

Demonstrate knowledge of infection control and safety.

- Identify policies and procedures for maintaining laboratory safety.
- Demonstrate accepted practices for infection control, isolation techniques, aseptic techniques, and methods for disease prevention.
  - Identify and discuss the modes of transmission of infection and methods for prevention.
  - Identify and properly label biohazardous samples.
  - Discuss in detail and perform proper infection control techniques, such as handwashing, gowning, gloving, masking, and double-bagging.
  - Define and discuss the term *nosocomial infection.*
- Comply with federal, state, and local regulations regarding safety practices.
  - Use Occupational Safety and Health Administration (OSHA) standard precautions.
  - Use prescribed procedures to handle electrical, radiation, biologic, and fire hazards.
  - Use appropriate practices as outlined in the OSHA hazard communications standard, including the correct use of the material safety data sheet (MSDS) as directed.
- Describe measures used to ensure patient safety in various patient settings, such as inpatient, outpatient, and pediatrics.
- Differentiate between sterile and antiseptic techniques.

KEY TERMS

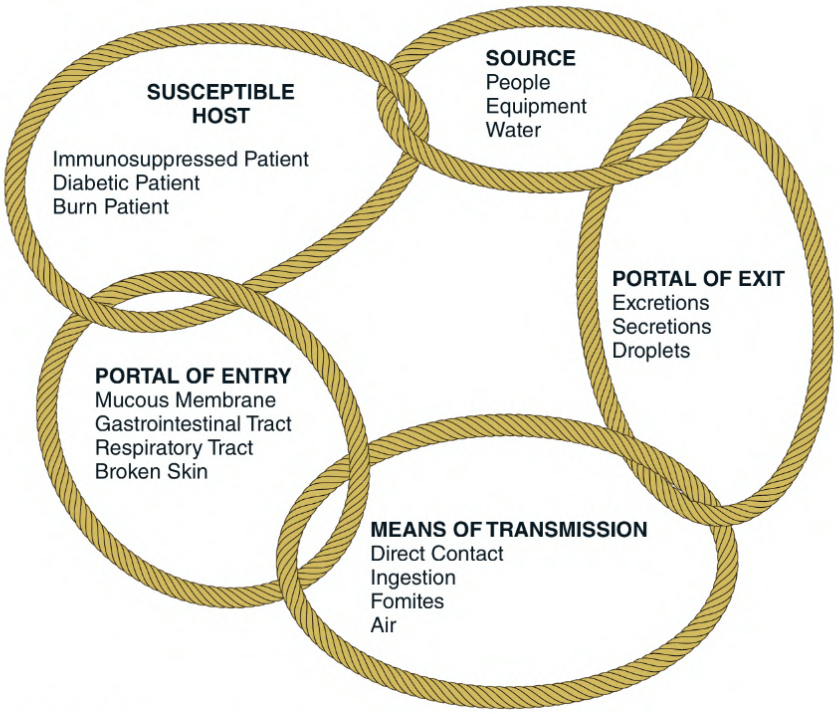
Autoclave	Instrument for sterilizing that uses steam under pressure.
Autogenous Infection	Infection from one's own flora.
Biohazard	Anything that is potentially hazardous to humans, living organisms, or the environment.
Blood-Borne Pathogen	A pathogen that is spread by blood and body fluids containing blood. Typically, the pathogens are hepatitis and human immunodeficiency virus (HIV).
Body Substance Isolation (BSI)	The type of isolation that expanded universal precautions to require glove use when contacting all body substances.
Category-Specific Isolation	Isolation based on the category (strict, respiratory, etc.) of isolation.
Chemical Hazard	Any element, chemical compound, or mixture of elements and/or compounds that causes physical or health hazards.
Communicable Disease	Disease that is spread from person to person.
Disease-Specific Isolation	Isolation based on the type of disease infecting the patient.
Employee Input	Involvement of nonmanagerial, frontline employees in decisions for the use of needle safety devices.
Engineering Controls	Controls that isolate or remove blood-borne pathogens hazardous for the workplace.
Exposure Control Plan	A plan that identifies those tasks and procedures in which occupational exposure may occur and identifies the positions whose duties include those tasks or procedures.
Irritant Contact Dermatitis	Irritation and redness of the skin by direct contact with a chemical irritant.
Latex Allergy	An allergy to natural rubber latex. It is an allergy to the latex proteins that are released in the use of latex-containing products.
Local Infection	An infection affecting only one area of the body.

Nosocomial Infection	Also known as health care–associated or hospital-acquired infection. Infection that develops in a patient 48 hours or more after admission to a hospital or health facility.
Other Potentially Infectious Material (OPIM)	Human body fluids, unfixed tissue or blood, and organs or other tissues from experimental animals infected with HIV or HBV.
Personal Protective Equipment (PPE)	Equipment that is used to protect the health care associate from exposure to blood and body fluids.
Recordkeeping	Maintaining information and records of any job-related injuries.
Sharps Container	Specially labeled puncture-resistant containers for the disposal of sharp items such as needles, scalpels, and syringes.
Standard Precautions	Assumes that all blood and most body fluids are potentially infectious. A principle maintaining that personal protective equipment must be worn for contact with all body fluids whether blood is visible or not.
Systemic Infection	An infection affecting the entire body.
Transmission-Based Precautions	Isolation precautions taken for patients diagnosed or suspected of a specific transmissible disease. The precautions are based on whether the disease is transmitted by airborne, droplet, or contact.
Universal Precautions	A principle to protect health care associates from infections as a result to exposure to body fluids. A term now replaced by *standard precautions.*

Chapter 2 discusses the safety and isolation techniques that are necessary for the phlebotomist. With the onset of acquired immunodeficiency syndrome (AIDS) and hepatitis, working in a safe environment is paramount in a phlebotomist's daily work activities. Understanding safety procedures will help the phlebotomist perform duties without concern. This chapter discusses in depth the procedures and equipment that will help create a safe environment for the phlebotomist.

INFECTION CONTROL

Maintaining a safe working environment is of primary concern for all who work in or have exposure to the health care industry. Standards and procedures need to be formalized to protect the health care associate and the patient. These procedures are often established to protect the health care associate from being infected by the patient. The procedures also protect the patient from being infected by the health care associate or other patients. A patient who comes to a hospital and develops an infection 48 hours or more after admission or within 30 days after discharge from a hospital or health care facility has obtained a **nosocomial infection**. This is also known as a health care–associated or hospital-acquired infection. If the infection occurs before 48 hours after admission, the infection is considered a community-acquired infection that was picked up prior to admission. A patient's infection can be a **local infection**, which is an infection restricted to one area of the body, or a **systemic infection**, which affects the entire body. If the organism that causes this infection and disease spreads from person to person, it is classified as a **communicable disease**. To understand the practices and standards used in a health care setting and how they work, you must understand the infection concept.



▲ FIGURE 2.1 Chain of infection.

Helpful Hint

If you have a cold and someone else in your family gets the cold, you were the source. The portal of exit was by sneezing. Your family member was the susceptible host. The portal of entry for the family member to acquire the infection was by breathing in your sneeze vapors or touching items you touched.

The spread of infection requires a source of infecting organisms, a susceptible host, and a means of transmission of the organism. Connecting these three factors are two different portals: a portal of exit from the source and a portal of entry into the susceptible host. What is created is a chain (Figure 2.1).

The source of an infection can be health care associates, other patients, or visitors. The source can be a person who has an active acute infection or who is carrying the infection and does not realize he or she has it. With the number of people contacting each other in a health care setting, the potential is great for the chain of infection to be started. The source and the host can be one and the same. The infection can come from the source's own flora (**autogenous infection**).

The susceptibility of the host to an infection varies greatly with the individual. A person who has never had chickenpox usually becomes infected when placed in contact with a source of chickenpox (varicella). A person who had chickenpox in childhood or who has been vaccinated against chickenpox usually will not become infected. The key to the infection concept is that the host must be susceptible to the infecting organism. Age, disease, medication, and immunosuppressive agents often change a host's susceptibility. When a host's body defense mechanisms are weakened by chronic illness, AIDS, or immunosuppressive agents, the host will not be able to fight many organisms that normally would not be infectious. Those organisms that we maintain as normal flora in the body, such as yeast or mycoplasma, are then opportunistic and can cause infection when conditions are right. For example, patients with human immunodeficiency virus (HIV) and patients on chemotherapy often develop opportunistic infections due to their immunosuppressed condition and the immunosuppressive drugs they are taking.

The means of transmission often follow one of five routes: contact (direct and indirect), droplet, vehicle, airborne, or vector borne (Figure 2.2). Contact can be either direct or indirect. Direct contact consists of a direct physical transfer of infective material from the source to the susceptible host; for example, a health care associate cleans up after a patient and then, without washing hands between patients, transfers a contaminant to the next patient.

TRANSMISSION OF INFECTION

Direct Contact—Physical transfer of infective material from the source to susceptible host

Indirect Contact—Transfer of infective material via an object, such as bed linens

Droplet—Droplets that travel 1 meter or less from the infected individual

Vehicle—Transfer of infective material through contaminated items, such as food

Airborne—Droplets that transfer on air currents, such as tuberculosis

Vector—Transmission by insects, such as malaria transmitted by mosquitoes

▲ FIGURE 2.2 Transmission of infection.

Indirect contact involves personal contact of the susceptible host to some type of object that has been contaminated, such as instruments, bed linens, furniture, or shared bathrooms. Drainage from a source patient can be deposited on furniture. The susceptible host could touch the drainage and then transfer it to an open wound or ingest it, thus infecting the susceptible host.

Droplet transmission can be considered a form of contact transmission. Centers for Disease Control and Prevention (CDC) guidelines treat droplet transfer as a separate type of transmission due to the distinct nature of the transmission. Droplet transmission is the transfer of the organism causing the infection to the nose, mouth, or eye by contact with the mucous membrane of a susceptible host. This is caused by the spread of infectious droplets through the air by the source person coughing, sneezing, or talking. The droplets travel only a short distance, no more than 1 meter.

The vehicle route is the transfer of the disease-causing organism through contaminated items. Vehicles of disease can be as simple as contaminated food that results in food poisoning. Contaminated water is often the vehicle that causes parasitic or cholera infections. Blood and body fluids are the vehicles transferring HIV or hepatitis to the host. Accidental needlesticks and the blood of patients (source) as vehicles for infection of the phlebotomist (susceptible host) are of concern to each phlebotomist. Treatments for accidental needlesticks are covered later in this chapter (see Procedure 2-5).

EXERCISE 1 Fill in the Blanks: Chain of Infection

Directions: Fill in the blanks using descriptions for links of the chain.

1. The mucous membrane, gastrointestinal tract, or broken skin can be a _____ of _____ for an infection.
2. People, equipment, or water can be the _____ of the infection.
3. Direct contact, ingestion, or the air can be a _____ of _____ for the agent of an infection.
4. An immunosuppressed patient or a burn patient is a likely _____ _____.
5. The _____ of _____ for an infection can be through excretions, secretions or droplets.

Airborne transmission is a concern in patients disseminating airborne droplets of infectious material as a result of coughing, sneezing, or talking. These droplets are inhaled or deposited on a susceptible host. It depends on the infectious agent as to what type of precautions must be taken to prevent the droplets from being inhaled by the susceptible host. Surgical masks are sufficient for most infectious agents because the agent is not infectious over long distances and is filtered out with the mask. Some agents such as *Mycobacterium tuberculosis* or Ebola necessitate special respirators and gowning precautions.

Vector transmission is the transmission of a disease by insects. The most widely known vector-transmitted disease is mosquito-transmitted malaria. This has been of little concern to hospitals in the United States. It recently has become more prevalent in the United States and industrialized nations due to individuals traveling. It is a major problem in developing tropical countries. Hospitals need to be concerned with flies, cockroaches, and other insects carrying microorganisms on their feet or other body parts. The insects can potentially be a problem to hospitals if they come in contact with infectious materials such as soiled dressings, bedpans, and so on.

Universal Precautions, Body Substance Isolation, and Standard Precautions

Universal precautions were developed in 1985 by the CDC as a response to the increase in blood-borne diseases such as AIDS and hepatitis B. This is the basis for what later became standard precautions. Under universal precautions, any patient has the potential to be infected with these **blood-borne pathogens**. Universal precautions assumed that all blood and most body fluids were potentially infectious. Because it is impossible to know if a patient is infectious, the health care worker treated all patients with universal precautions for infection.

Universal precautions included a variety of body substances. The body substances linked to the transmission of hepatitis and HIV were blood, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, human breast milk, and wound drainage (Table 2.1). Universal precautions also applied to all tissue samples before they are chemically fixed. Other fluids, such as stool, urine, vomitus, and oral secretions, are not included in universal precautions unless they contain visible blood. It was recommended that universal precautions were followed when working with any body fluid. There was always the possibility that blood-borne pathogens were present in all body fluids even when blood was not visible. Following proper precautions with blood and body fluids can nearly eliminate the threat of a health care associate being infected with hepatitis or HIV by a patient.

TABLE 2.1 Body Fluids and Their Sources

Fluid	Source
Amniotic	Fluid surrounding an unborn child
Pleural	Fluid from the lungs
Peritoneal	Fluid from the abdominal area
Edematous	Fluid that has built up in the body tissue
Pericardial	Fluid surrounding the heart
Seminal	Ejaculated fluid from the penis
Synovial	Fluid from the joints
Cerebrospinal	Fluid from the spinal column

Universal precautions evolved into a system called **body substance isolation (BSI)**. Like universal precautions, BSI assumed that each patient had the potential to spread disease through body substances. The key change was the requirement that gloves be worn when a health care provider is in contact with any body substance.

In 1996 the CDC revised universal precautions and released a new set of guidelines called standard precautions that creates a first tier of precautions for all patients regardless of their diagnosis or infectious status.

Standard precautions combine many of the basic principles of universal precautions with techniques from BSI. Standard precautions maintain that personal protective equipment and barrier controls must be worn for contact with all body fluids, whether or not blood is visible. The goal of standard precautions is to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection. Five main points must be followed in standard precautions:

- Wash hands when changing gloves and between patients.
- Wear gloves when likely to touch body substances, mucous membranes, or nonintact skin and during all blood drawing.
- Wear protective cover when clothing is likely to be soiled.
- Wear a mask and eye protection in addition to a protective body cover when likely to be splashed with body substances.
- Place intact needle/syringe and sharps in designated sharps containers. Do not bend, break, or cut needles.

EXERCISE 2 Fill in the Blanks: Transmission of Infection

Directions: Fill in the blanks using the letter matching the description for the means of transmission.

Transmission of Infection	Method of Transmission
_____ Direct contact	A. Droplets that travel 1 meter or less from the infected individual
_____ Indirect contact	B. Physical transfer of infectious material from the source to a susceptible host
_____ Droplet	C. Transmission by insects (e.g., malaria transmitted by mosquitoes)
_____ Vehicle	D. Transfer of infectious material via an object such as bed linens
_____ Airborne	E. Transfer of infectious material through contaminated items such as food
_____ Vector	F. Droplets that transfer on air currents (e.g., those containing tuberculosis)

REDUCING EXPOSURE RISK

Six major tactics reduce the risk of exposure to blood-borne pathogens:

1. Engineering controls
2. Work practices
3. Housekeeping
4. Hepatitis B virus (HBV) vaccination
5. Private rooms
6. Personal protective equipment

Engineering Controls

Engineering controls are physical and mechanical devices that are available to the health care associate to reduce or eliminate the potential to transfer infectious diseases. Examples of these are self-sheathing needles; autoclaves, which steam-sterilize contaminated materials; and puncture-proof **sharps containers** (Figure 2.3), which can be used for contaminated sharp objects such as needles and breakable contaminated objects such as glass blood collection tubes. These sharps containers are designed to be filled only to 80 percent of capacity to prevent accidental needle puncture by a health care associate overpacking the container. Blood collection tubes that are transported to the laboratory for testing must be placed in a self-sealing plastic bag (Figure 2.4). All samples and containers should have a biohazard warning (see Figure 2.10, later in this chapter) to indicate the potential infectiousness of the contents.

▲ FIGURE 2.3 Place used needles, point down, in puncture-proof sharps containers.

▲ FIGURE 2.4 Place blood tubes in a self-sealing plastic bag after collection.

Work Practice Controls

Work practice controls are practices that are incorporated into all health care associates' work habits to prevent the spread of infection. Handwashing is the single most important way to prevent the spread of infection. Hands must be washed after each patient contact or blood and body fluid exposure, even when gloves are used. Hands must be washed under running water with soap and vigorous rubbing. When rinsing the soap off, the water should flow from the wrists to the fingertips. Handwashing is the method of choice for removing any surface bacteria from the skin (see Procedure 2-1). Hands must be washed after removing gloves because the gloves may have defects, allowing contaminants (bacteria or viruses) to penetrate the imperfections of the gloves.

Alcohol-based hand cleaners are often used to clean the skin surface in place of handwashing. Alcohol-based hand cleaners are chemical solutions that reduce the number of bacteria on the skin surface. Handwashing and the use of hand cleaners both reduce bacteria and viruses but do not totally eliminate them.

Alcohol-based hand cleaners are acceptable in place of handwashing. The hand cleaners have become widely accepted because even when running water is available, people are more likely to use hand cleaner than to wash hands. It is very simple—when going from one patient to another, to rub hand cleaner into your hands. This takes less time than a proper handwashing. Because most people do not spend sufficient time washing their hands, the hand cleaner does a more thorough job.

Antiseptic technique is used on skin surfaces because the solutions are safe to human skin. Work practice controls dictate that to prevent infection of patients and health care workers, antiseptic solutions must be used before skin puncture. Types of antiseptics available are:

- 70 percent isopropyl alcohol either saturated into gauze or in prepackaged pads
- Tincture of iodine or povidone-iodine; these come as pads or swabs and are mostly used for skin preparation for blood cultures or arterial punctures
- 2 percent chlorhexidine gluconate and 70 percent isopropyl alcohol, used for skin preparation for blood cultures
- Benzalkonium chloride, an alternate skin cleanser
- Zephrin chloride, an alternate skin cleanser
- Hydrogen peroxide, an alternate for persons who are allergic to alcohol

Disinfecting hard surfaces such as countertops is accomplished with a sterile technique. Disinfecting solutions are too harsh for the skin, but they can kill up to 100 percent of contaminants. Total sterilization of human skin is not acceptable because of chemical harshness. Multiple solutions are available commercially for sterilization of work surfaces. Commercially available solutions usually come in spray bottles. The least expensive and most effective is 10 percent household bleach. This involves making a 10 percent bleach solution in water and then spraying it or wiping it on the surface. Bleach solution must be made daily. Whenever a 10 percent bleach solution is made, the container must be marked with the time and date the solution was made. If it has been more than 24 hours, the solution must be discarded and a new solution made with a new date and time documented on the container. Also available are spray solutions that do not need to be made daily. Some are spray disinfectants, whereas others have a bottle of water and a bottle of bleach. When you spray with this system, the water mixes with the bleach for a 10 percent bleach solution. Since it is not premixed, it does not need to be made daily (Figure 2.5).

Helpful Hint

Have a clear understanding of the differences between antiseptic cleaning and disinfection cleaning. The agents used are not interchangeable.

Punctures with contaminated needles are a serious concern to all health care associates because of the potential for infection transmission and personal injury. The work practice of properly handling and disposing of contaminated sharps can eliminate a major source of occupationally acquired hepatitis and HIV. OSHA standards contained in the Needle Safety

▲ FIGURE 2.5 Self-mixing bottle of water and bleach to create a 10 percent bleach solution.

Act state that all needles must be covered with a safety device immediately after use and not recapped. The entire device with needle attached must be discarded. Proper use of these safety devices is discussed in Chapter 5.

Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas. Food and drink must not be kept in the same room where potentially infectious materials are present. Food and drink must be stored in refrigerators, freezers, and cabinets separate from potentially infectious materials. Food and drink must be consumed in a room separate from the work area. Before entering a room where food and drink are allowed, all protective garments must be removed.

Housekeeping

Good housekeeping is the responsibility of all health care associates. Each facility has its own requirements for housekeeping. General rules for housekeeping involve cleaning up spills and decontaminating soiled areas immediately with a disinfectant such as 10 percent bleach that has been made up fresh daily. Broken glass should not be picked up with the hands. A brush, dustpan, or tongs should be used.

Hepatitis B Vaccination

The HBV vaccine must be available at no charge to the phlebotomist. The vaccine is effective for 15 or more years in protecting the phlebotomist from contracting the disease or becoming a carrier. This vaccine does not protect the phlebotomist from all types of hepatitis, only hepatitis B.

Private Rooms

A private room reduces the possibility of transmission of infection by separating the patient with a disease from other patients and health care associates. The room should ideally have an anteroom where anyone entering or leaving the room can wash their hands and change protective garments.

Handwashing

Handwashing is the single most important way to prevent the spread of infection. Hand hygiene must be performed after each patient contact even when gloves are used. Disinfectant alcohol-based hand cleaners may be used in place of handwashing unless the hands are

visibly soiled. To further protect yourself, you should wash hands instead of a disinfectant hand cleaner before and after eating and before and after using the restroom. The handwashing outlined in Procedure 2-1 is for the phlebotomist. This is different from a surgical hand scrub that uses a 2-minute scrub and antimicrobial soap.

PROCEDURE 2-1

MEDICAL ASEPSIS HANDWASHING

Principle:

To clean the hands and reduce the number of organisms on the hands and wrists. The purpose is to decrease the transfer of organisms from a source to a susceptible host.

Materials:

Sink with running water, preferably with foot-operated controls or hand sensor automatic dispenser

Soap from a foot-operated container or a pump container (bar soap is discouraged)

Disposable paper towel

Nailstick and/or brush

Procedure:

1. Remove all rings, watches, and so on to prevent the jewelry from harboring microorganisms.
2. Have disposable towels ready or use an automatic towel dispenser so that you do not have to touch the towel dispenser.
3. Stand back from the sink so that you and your clothing do not touch the sink.
4. Turn on the water with the foot pedal or with a disposable towel if not foot controlled (Figure 2.6A). The temperature should be lukewarm.
5. Wet hands under the running water. Be careful to not touch the sides of the sink (Figure 2.6B).

▲ FIGURE 2.6A Prepare towels for use; turn on water.

▲ FIGURE 2.6B Wet hands under the running water.

6. Apply soap, and lather well. The lather and scrubbing action will remove dirt and dead skin. Scrub between fingers and around fingernails (Figure 2.6C). Continue to scrub for at least 15 to 20 seconds. Some facilities have a specific minimum time to scrub. Use a nailstick and a brush during the first handwashing of each day or when your hands become excessively soiled (Figures 2.6D and E).

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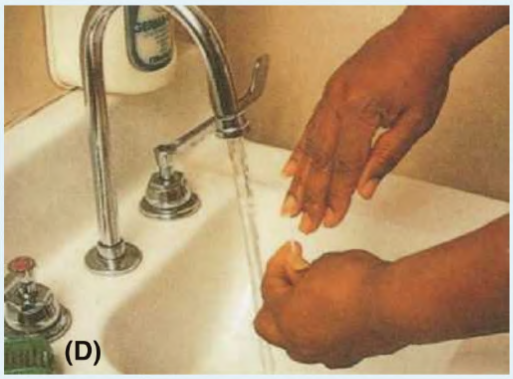
continued

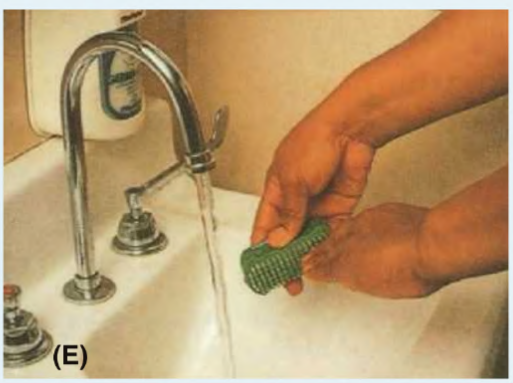
PROCEDURE 2-1 MEDICAL ASEPSIS HANDWASHING

7. Rinse hands with the water flowing downward off the fingertips. This will rinse the contaminated water off the fingertips and not onto the forearms (Figure 2.6F).
8. Complete the washing process again if this is the first handwashing of the day. (Repeat steps 6 and 7.)
9. Dry hands and wrists with the disposable towels.
10. Turn off water with the disposable towels if the sink is not foot controlled.

▲ FIGURE 2.6C Apply soap, and lather well.



▲ FIGURE 2.6D Use a nailstick under the fingernails.



▲ FIGURE 2.6E Use a brush to clean around fingernails.

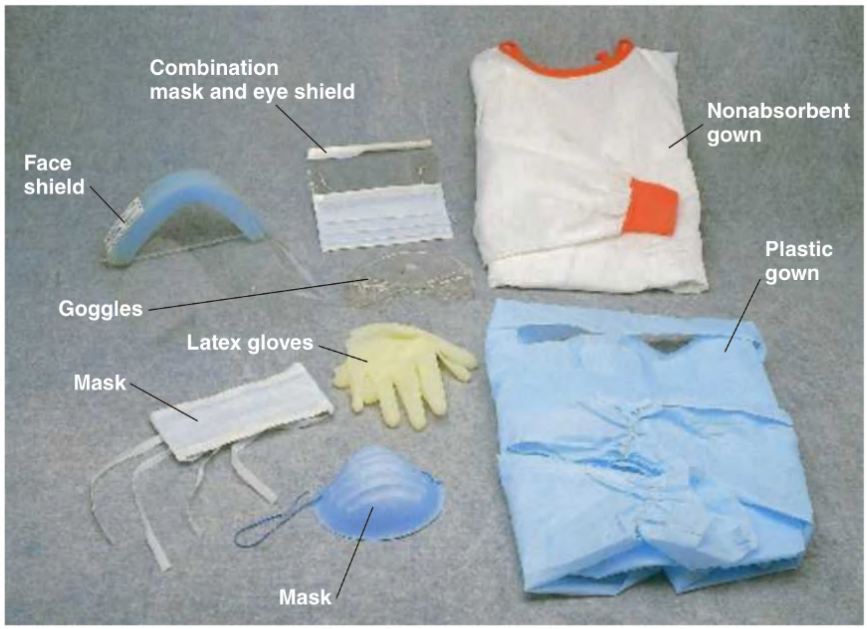
▲ FIGURE 2.6F Rinse hands with water flowing downward off hands and fingertips.

Personal Protective Equipment

Personal protective equipment (PPE) used by the phlebotomist may include masks, goggles, face shields, gowns, and gloves (Figure 2.7). This equipment is used to protect the phlebotomist from infectious material contacting street clothes, skin, or mucous membranes. Employers must provide this equipment free of charge and must maintain and clean the equipment at no charge to the phlebotomist.

Gloves

There are three reasons gloves should be worn. First, gloves prevent health care associates from transmitting their own microflora to the patient, such as during surgery or wound cleansing. Second, gloves prevent the transmission of microorganisms from one patient to



▲ FIGURE 2.7 Personal protective equipment.

EXERCISE 3 Fill in the Blanks: Medical Asepsis Handwashing Procedure Competency Assessment (Procedure 2-1)

Directions: Fill in the blanks in the procedure and reason/explanation steps.

Procedure Step	Reason/Explanation for the Step
Remove all rings and watches.	Rings and watches may harbor _____.
Stand back so that you and your _____ do not touch the sink.	Avoiding this will _____.
Scrub hands for a minimum of _____ to _____ seconds.	It takes this amount of time to _____.
Rinse hands with water flowing _____ _____.	This type of flow will help _____.
Turn off water with _____ towels.	Using this type of towel will avoid contamination from a previous user.

Helpful Hint

When first starting your job with a new employer, you may need to try several types and sizes of gloves before you find a type that is most comfortable. Phlebotomy should be performed only with tight-fitting gloves that do not irritate your hands.

another. Third, gloves prevent the associate from becoming infected with what is infecting the patient. Always remove gloves according to Procedure 2-2.

Masks

Masks are used to prevent the transmission of infectious agents through the air. The health care associate should wear a mask when entering the room of a patient in respiratory isolation. Paper masks are the most economical and efficient for the work of a phlebotomist. Fluid-proof masks are available for work conditions when spattering of body fluids is likely. The mask should be worn once and then discarded in an appropriate container. The mask should never be worn around the neck and moved up to cover the nose and mouth as you enter another room. Masks are no longer effective once they become moist from breathing. The length of time a mask is effective depends on the type of mask used. Check with the manufacturer to determine the acceptable length of time a particular mask can be worn.

A patient who is immunosuppressed or a patient in protective isolation needs to wear a mask during transport to another location. It is impossible to have everyone in the hospital hallways put on a mask, so the patient wears a mask to be protected from inhaling anything potentially infectious.

PROCEDURE 2-2

REMOVING CONTAMINATED GLOVES

Principle:

To remove gloves after use to avoid contamination of the health care associate. The purpose is to decrease the transfer of organisms from a source to a susceptible host.

Materials:

Biohazard waste container

Procedure:

1. Hold hands out in front away from the body.
2. Grasp the palm of one hand, and pull down on the glove to pull the glove inside out. A right-handed person would naturally pull the palm of the left hand. Do not touch the bare skin with the contaminated glove (Figures 2.8A–C).
3. The hand still having the glove on should then hold the removed glove (Figure 2.8D).

▲ FIGURE 2.8A Grasp the palm of the used glove.

▲ FIGURE 2.8B Begin removing the first glove.

▲ FIGURE 2.8C Pull down on the glove to pull it inside out. Do not touch the bare skin on the contaminated glove.

▲ FIGURE 2.8D Pull the left glove into the right glove.

continued

PROCEDURE 2-2 REMOVING CONTAMINATED GLOVES

4. Contain the inverted glove completely in the gloved hand (Figure 2.8E).
5. Insert two fingers of the ungloved hand under the cuff of the glove of the other hand (Figure 2.8F).
6. Pull down on this glove to turn the glove inside out (Figure 2.8G).
7. This will invert the glove and contain the other glove inside the inverted glove (Figure 2.8H).
8. Dispose of the gloves into a biohazard container.
9. Wash hands with running water.

▲ FIGURE 2.8E Hold the glove in the right hand.

▲ FIGURE 2.8F Insert two fingers under the cuff of the other glove.

▲ FIGURE 2.8G Use the two ungloved fingers to pull the glove inside out.

▲ FIGURE 2.8H One glove is now inside the other.

EXERCISE 4 Fill in the Blanks: Removing Contaminated Gloves Procedure Competency Assessment (Procedure 2-2)

Directions: Fill in the blanks in the procedure and reason/explanation steps.

Procedure Step	Reason/Explanation for the Step
Grasp the palm of the used glove.	This is done to pull one glove _____ the other glove.
Insert fingers under the _____ of the other glove.	This is done to avoid _____ the ungloved hand.
Pull the glove down off the hand.	This will leave the gloves _____ the other.

Helpful Hint

Different patient conditions will necessitate that different types of masks be worn. Check with your supervisor or the patient's nurse to determine what type of mask is appropriate.

Gowns

Gowns are necessary when soiling of clothes is possible while taking care of patients. Gowns should be fluid resistant to prevent any blood or body fluids from soaking through and getting on the health care associate. They are also used in caring for patients who have infections that can be transmitted easily, such as varicella (chickenpox). Gowns should be used only once and then disposed of in the appropriate receptacle. Removal of the gown should be from the inside out. The gown is pulled down off the shoulders, slid down the arms, and folded with the inside out before final removal. See Procedure 2-3 for donning and removing masks, gowns, gloves, and shoe covers.

PROCEDURE 2-3

DONNING AND REMOVING MASK, GOWN, GLOVES, AND SHOE COVERS

Principle:

Masks, gowns, gloves, and shoe covers provide a barrier of protection for the phlebotomist from blood and body fluids. The purpose is to decrease the transfer of organisms from a source to a susceptible host.

Materials:

Disposable mask

Disposable gown

Disposable cap

Disposable shoe covers (booties)

Gloves (sterile or unsterile)

Biohazard waste container

Procedure:

1. Determine the extent of necessary isolation precautions. Note the type of isolation either from the isolation signage or by consulting the patient's nurse.
2. Remove all rings, watches, and jewelry that are not necessary for providing patient care.
3. Place any items that you will need for patient care outside of the patient's room. Do not take the phlebotomy tray or cart into the room.
4. Wash hands and don disposable clothing. If you have been wearing a laboratory coat, remove it first and leave it outside the room.
   a. Apply the mask by placing the top of the mask over the bridge of the nose (the top part of the mask has a metal strip) and pinch the metal strip to fit the nose. Tie the top strings of the mask so the strings are positioned above the ears. Last, tie the lower strings behind the neck.
   b. If necessary, apply the cap to cover hair and ears. Pull long hair up under the cap.
   c. If necessary for the procedure, use shoe covers to cover shoes.
   d. Apply the gown to cover outer garments completely. Place the gown in front of your body and place your arms through the sleeves of the gown (Figure 2.9A).
   e. Tie the top strings on the gown behind the neck (Figure 2.9B).
   f. Tie the lower strings of the gown behind your back (Figure 2.9C).
   g. Put on gloves.

continued

PROCEDURE 2-3 DONNING AND REMOVING MASK, GOWN, GLOVES, AND SHOE COVERS

5. Perform sample collection according to Procedure 2-4, Blood Collection in an Isolation Room.
6. Once sample collection is complete, the disposable clothing must be removed.
   a. Remove the contaminated gloves according to Procedure 2-2. Discard the gloves into the biohazard container. Wash hands and then untie the waist tie of the gown (Figure 2.9D).

▲ FIGURE 2.9A Place the gown in front of your body and place your arms through the sleeves of the gown.

▲ FIGURE 2.9B Tie the top strings on the gown behind the neck.

▲ FIGURE 2.9C Tie the lower strings of the gown behind your back.

▲ FIGURE 2.9D Remove the contaminated gloves according to Procedure 2-2. Discard the gloves into the biohazard container. Wash hands and then untie the waist tie of the gown.

continues

continued

PROCEDURE 2-3 DONNING AND REMOVING MASK, GOWN, GLOVES, AND SHOE COVERS

b. Untie the mask by untying the top ties first and then the bottom ties (Figure 2.9E). Hold the mask by the ties and drop it into a biohazard waste container.

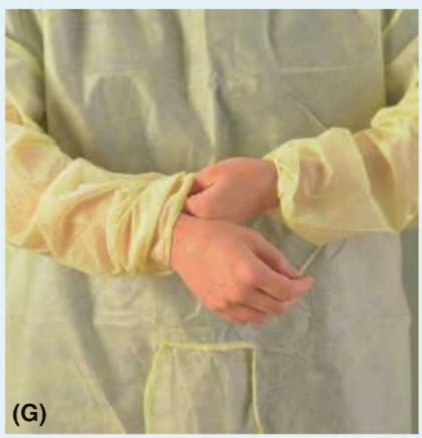
c. Untie the neck ties of the gown (Figure 2.9F).

d. Slip the fingers of one hand inside the cuff of the gown and pull the gown over the hand (Figure 2.9G).

e. Using the hand covered by the gown, pull the gown down over the other hand (Figure 2.9H).

▲ FIGURE 2.9E Untie the mask by untying the top ties first and then the bottom ties.

▲ FIGURE 2.9F Untie the neck ties of the gown.



▲ FIGURE 2.9G Slip the fingers of one hand inside the cuff of the gown and pull the gown over the hand.

▲ FIGURE 2.9H Using the hand covered by the gown, pull the gown down over the other hand.

continued

PROCEDURE 2-3 DONNING AND REMOVING MASK, GOWN, GLOVES, AND SHOE COVERS

f. Pull the gown off your arms. Hold the gown away from you and roll it into a ball with the contaminated side on the inside of the ball (Figure 2.9I). Dispose of the gown in the biohazard container.

g. Remove the cap and shoe covers.

7. Wash hands and retrieve the items that were left outside the room.

▲ FIGURE 2.9I Pull the gown off your arms. Hold the gown away from you and roll the gown into a ball with the contaminated side on the inside of the ball.

Goggles/Face Shields

Goggles or face shields are needed anytime there is the potential for splattering of blood or body fluids. A face shield should be constructed so that the eyes and mouth are protected. The shield should cover the face to prevent any splatter from getting into the mouth or eyes through the sides or bottom of the shield. The shield can be a face shield the health care associate wears, or it can be a freestanding or movable shield that positions between the health care associate and the work.

Goggles can also be used for eye protection from splattering. Glasses can be used as long as side shields are attached to prevent blood or body fluids from entering from the side. Whenever a procedure warrants the use of goggles to protect the health care associate, a mask must also be used to prevent splatter from entering the mouth. Masks that have an eye shield attached to protect both the mouth and eyes are available.

Bagging of Articles

Blood tubes must be enclosed in an impervious self-sealing bag (see Figure 2.4) before they are removed from the patient's room. This bagging prevents associates' exposure to the contaminated materials. Any contamination (blood splatters) on the outside of the tubes is then contained in the bag. If contaminated tubes were placed on a clean counter without bagging, the contamination would spread to the counter. If the tubes should break or the top come off the tubes, any spillage would be contained in the bag. This is especially important when samples are transported to other locations.

ISOLATION TECHNIQUES

Helpful Hint

Even though they are no longer used, knowing the types of category-specific isolation will help the phlebotomist understand why some patients are isolated.

Isolating a patient occurs to help the health care team break the chain of infection. By isolating the patient, the means of transmission in the chain is the break point. Isolation limits the amount of contact time a patient has to spread an infection. This isolation can be used to prevent the patient from spreading an infection to associates, other patients, or visitors. Isolation can also be used to prevent the spread of an infection to the patient. Handwashing or using alcohol-based hand cleaners between patients and using a new pair of gloves with each patient are the most critical behaviors used to prevent the spread of infection. Hand cleaning and new gloves must be used with each patient contact, even if the patient is not in isolation.

A description of isolating patients to prevent the spread of disease was first published in 1877. Infectious patients were separated from noninfectious patients. However, this practice still allowed nosocomial transmission of disease because aseptic techniques were not practiced. By 1910 a cubical system of isolation was introduced whereby patients were separated, and hospital personnel were instructed to wash hands and disinfect items contaminated by the patients. By 1960, patients with infectious disease were placed in single-patient isolation rooms or in regular single rooms.

In the 1970s the CDC recommended that hospitals use one of seven isolation categories, a practice called **category-specific isolation**.

Category-Specific Isolation

Category-specific isolation required knowing that a patient needed to be isolated (Table 2.2). Often a patient would come to the hospital with an illness that was later determined to be a disease requiring patient isolation. This would occur after many people had already been exposed.

Disease-Specific Isolation

Disease-specific isolation precautions were established in 1983 to overcome the shortcomings of category-specific isolation. Requirements of the categories were modified and a new category was added. The category of blood and body fluid precaution was added so that it could include substances other than blood. The protective or reverse isolation category was eliminated because studies indicated it was not efficient. Under these guidelines, tuberculosis isolation was updated to recommend the use of a private room with negative air pressure and the use of high-efficiency particulate air (HEPA) filter respirators instead of surgical masks.

Transmission-Based Precautions

The isolation guidelines were revised again in 1996 to work with patients on two tiers of isolation. The first tier is the standard precautions, discussed earlier in this chapter, which are functional for a large number of patients who previously would have needed to be isolated. This eliminates the costly overisolation of patients. The second tier of precautions, called **transmission-based precautions**, is intended for patients diagnosed with or suspected of having a specific transmissible disease.

The old categories were condensed into three sets of precautions to reduce the risk of airborne, droplet, and contact transmission of pathogens. These are used in addition to the standard precautions. These precautions list specific syndromes in both adult and pediatric

TABLE 2.2 Types of Category-Specific Isolation

Strict Isolation
A patient with a contagious disease such as chickenpox, diphtheria, or pneumonia is placed in strict isolation.
Contact Isolation
A disease that is transmitted by direct contact with the patient requires the patient to be placed in contact isolation. Scabies, caused by infestation with the mite *Sarcoptes scabiei,* is an example of this type of disease. It is transmitted primarily through direct contact with the infested patient.
Respiratory Isolation
A patient with a disease transmitted through the air, such as mumps, pertussis, or rubella, may be placed in respiratory isolation. Anyone who is susceptible to the infection must wear a mask upon entering the room.
Tuberculosis Isolation
Tuberculosis isolation, sometimes called AFB (acid-fast bacillus) isolation, is the isolation of a patient with tuberculosis. The isolation techniques are similar to those of respiratory isolation. Tuberculosis is an opportunistic type of disease. It infects individuals whose immune system has been weakened by some other disease process, such as AIDS or simply old age.
Drainage/Secretion Precautions
Drainage/secretion precautions, sometimes called wound and skin precautions, are used for patients with open wounds. These are usually the result of abrasions, accidental skin cuts, surgery incisions, or bedsores that have become infected. The fluid that oozes from the wound contains the infection. The dressings that have absorbed the fluid and any fluid touched provide potential for transmission of that infection to the health care associate or to another patient.
Enteric Precautions
Enteric precautions are for patients with severe diarrhea due to contagious bacteria such as *Salmonella, Shigella,* or *Vibrio cholerae*. These types of infections are transmitted by contact with the infected patient's feces.
Protective or Reverse Isolation
The six examples of category-specific isolation previously mentioned protect the health care worker from the infected patient. Protective or reverse isolation does the opposite by protecting the patient from the health care worker.

Source: Centers for Disease Control and Prevention (CDC). (2007). *Isolation guidelines.* Retrieved December 16, 2015 from http://www.cdc.gov/ncidod/hip/isolat/isopart2.htm.

Helpful Hint

Personal protective equipment used will vary depending on the patient's illness. A patient with a skin infection will require different protective equipment than a patient with *Mycobacterium. tuberculosis* or Ebola. Check with your supervisor or the patient's nurse before entering an isolation patient's room. Only certain specially trained individuals who have been trained in the use of special equipment may be allowed to enter a room.

Helpful Hint

Check with your supervisor or the patient's nurse before collecting a blood sample in an isolation room. Some health care facilities have variations to the standard operating procedure for collection in an isolation room. Always follow the health care facility's policy.

patients who are highly suspicious for infection. Temporary precautions are identified that can be used in cases where a specific diagnosis cannot be immediately made.

Airborne precautions are for patients known or suspected to have illness transmitted through small-particle (5 micrometers or smaller) airborne droplets, which may remain suspended in the air, or dust particles containing the infectious agent.

Droplet precautions are for patients known or suspected to have illness transmitted through larger droplets (larger than 5 micrometers in size) containing microorganisms. These droplets travel only short distances of 1 meter or less. This droplet transmission involves contact with the conjunctivae or the mucous membrane of the nose or mouth of the susceptible person.

Contact precautions are for patients known or suspected to have illness transmitted through the transfer of microorganisms by direct or indirect contact. Direct contact involves skin-to-skin contact. Indirect contact is through transfer of microorganisms from one person to another via something the infectious person had contacted. Methicillin-resistant *Staphylococcus aureus* (MRSA) has become prevalent in health care settings. This infection is an excellent example of how contact precautions need to be in place to prevent the spread of infection. Table 2.3 lists specific information about transmission-based precautions.

The largest problem with isolation procedures is that health care associates do not always fully comply with the proper isolation procedures. If health care associates take shortcuts in the procedures, the potential is there for transmission of an infection. When entering a patient's room, protective equipment must be used correctly and isolation methods performed according to the established standards, or the health care associate will be at risk.

EXERCISE 5 Requisition Exercise

A phlebotomist goes to a patient's room with the following requisition that has special instructions. How is the phlebotomist to approach the patient?

Hometown Hospital USA
125 Goodcare Avenue
Small town, USA

Laboratory Requisition

Clinic or room number: 3425
Physician Name: Nancy Gooddoctor
Diagnosis code: 748.16

Sample Collection
Date: xx/xx/xxxx
Time: 1230
Initials: _____

Patient Name: Smith, Joe
MRN: 12345678
DOB: 12/31/1975
Sex: F

Special Instructions: Tuberculosis Isolation

Chemistry

_____ Basic Metabolic Panel
_____ Electrolyte Panel
_____ Hepatic Function Panel
X Comprehensive Panel
_____ Ethanol
_____ Acetaminophen
_____ Salicylate
_____ Glucose, Fasting
_____ Glucose Tol. _____ hr
_____ Hgb A1C

Other Tests

Hematology

_____ CBC without diff
X CBC with diff
_____ Reticulocyte count
_____ Sedimentation rate, ESR
_____ Sickle cell screen
_____ Protime, PT
_____ APTT

Urine

_____ Urinalysis
_____ Urine protein
_____ UUN, urea nitrogen
_____ urine electrolytes

Microbiology

_____ Culture, urine
_____ Culture, throat
_____ Culture, stool
_____ Ova and Parasite, stool

Serology

_____ Syphilis RPR screen
_____ Mononucleosis screen
_____ ANA screen
_____ Rheumatoid factor screen

TABLE 2.3 Transmission-Based Isolation Precautions

	Airborne Precautions	Droplet Precautions	Contact Precautions
Example of Diseases Involved	Measles (rubeola), varicella (chickenpox), tuberculosis	Diphtheria, mycoplasma, pneumonia, pertussis, influenza, mumps, rubella	*Clostridium difficile*, *Escherichia coli*, *Shigella*, hepatitis A, herpes simplex, scabies, *Staphylococcus* (open wound)
Private Room	Yes	Yes	Yes
Respiratory Protection	Yes, with tuberculosis	No	No
Mask	Persons susceptible to measles or varicella should avoid contact	Yes, if working within 3 feet or 1 meter of patient	No
Patient Transport	Use surgical mask on patient	Avoid contact with other persons or equipment	Use surgical mask on patient
Gloves	Follow standard precautions	Yes, if contacting contaminated material	Follow standard precautions
Gown	No	If you suspect clothing will be contaminated	No

A detailed procedure on how to protect the patient and health care worker is shown in Procedure 2-4.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION STANDARDS

OSHA is an agency of the federal government that investigates the possibility of unsafe practices in the work environment. OSHA was a result of the Occupational Safety and Health Act of 1970. The goal of OSHA is to promote safety for health care workers and their environment. This is done by the following OSHA functions:

- Develop and promote health and safety standards for all occupations
- Develop and issue regulations
- Determine the level of compliance with health and safety regulations
- Level fines for noncompliance with health and safety regulations

OSHA is notorious for leveling fines against hospitals for noncompliance with federal regulations. OSHA inspectors usually do not travel from hospital to hospital looking for noncompliance. They are often invited by an associate who feels he or she is working under unsafe conditions. Once they are in the hospital, the inspectors investigate more than just the area of complaint. They investigate the safety status of the entire hospital. This process can sometimes take months to complete. The investigation includes inspection of records, observation of work performance, and associate and management interviews.

PROCEDURE 2-4

BLOOD COLLECTION IN AN ISOLATION ROOM

Principle:

To protect the patient or health care associate from the transmission of disease-causing organisms.

Materials:

Blood collection equipment as required per collection technique

Procedure:

1. Remove all rings, watches, or bracelets.
2. Prepare to take only essential items into the isolation room. Do not take your phlebotomy tray or cart into the isolation room.
3. Check the isolation card on the door or check with the patient's nurse for isolation instructions. The card should have specific information regarding the isolation attire needed.
4. When entering the anteroom, remove three paper towels from the paper towel dispenser. Spread the paper towels open, and lay one on top of the other. Place the phlebotomy equipment in the center of the top towel. If there is no anteroom, this must be done outside the patient's room.
5. Wash your hands with soap and water after entering the anteroom. Rinse by letting the water run from the wrists to the fingertips (see Procedure 2-1).
6. Dress according to Procedure 2-3. First, put on the mask, making certain it covers the nose and the mouth. If necessary, apply the cap to cover the hair and ears. Pull long hair up under the cap. Put on shoe covers. Put on the gown next, being careful so that it does not touch the floor. Last, put on the gloves.
7. Check to see if a tourniquet is already in the room. Carry the towels with the equipment you will need into the patient's room.
8. Check the patient's armband, and draw the samples according to the required procedure.
9. Discard needles, syringes, and all contaminated equipment in the sharps container. Leave the tourniquet in the room.
10. Open a new alcohol wipe, and wipe off the outside of each tube and stopper. Before laying down the cleaned tubes, discard the top paper towel. Now place the tubes on the second towel. Pick up the second towel with the tubes wrapped inside and discard the third (bottom) towel.
11. Carry the tubes and towel into the anteroom.
12. Label tubes before leaving the anteroom.
13. Place tubes, discarding the last towel, in a self-sealing sample transport bag.
14. Remove isolation attire according to Procedure 2-3 in the following order:

    First: Remove gloves.
    Second: Wash hands.
    Third: Remove your face mask, touching only the strings.
    Fourth: Remove your gown by touching only the inside. Fold the gown so the inside of the gown now faces out and place the gown in a biohazard container.

15. Wash hands thoroughly.

The interviews are the most difficult part because the inspectors are trying to prove that the associates are performing according to the written procedures.

The rules and regulations that health care institutions must comply with are published in a government publication called the *Federal Register.* In December 1991 a revision of the regulations created strict standards that must be maintained by all health care institutions. After a 6-month introduction period, all rules and regulations had to be in compliance by July 6, 1992.

In November 2001 OSHA issued new directives to its inspectors. These new directives gave the inspectors new enforcement procedures for occupational exposure to blood-borne pathogens. This standard affects not only phlebotomy but also all blood-borne hazards associated with medical equipment. What is being addressed is risk of injury or exposure from needles and sharps, catheters, lancets, scalpels, and suture needles. In reality, all items that could expose the health care worker to the risk of infection, such as glass capillary tubes, are being removed from use and replaced with safer products such as plastic capillary tubes. In an effort to reduce the percutaneous injuries due to contaminated sharps, the more stringent standard was developed by the CDC. These new directives began to be enforced in April 2002.

The directive implements changes made to the standard that focus on the requirement that employers select safer needle devices as they become available and involve employees in identifying and choosing those devices. The standard also requires most employers to maintain a log of injuries from contaminated sharps.

The directive requires that the health care institution comply with the directive. The CDC inspector will look for the following proof of compliance:

1. Evaluation and implementation of safer needle devices as part of the reevaluation of appropriate engineering controls during an employer's annual exposure control plan
2. Documentation of the involvement of nonmanagerial, frontline employees in choosing safer devices
3. Establishment and maintenance of a sharps injury log for recording injuries from contaminated sharps

No one safer medical device is appropriate for all situations; employers must consider and implement devices that are appropriate, commercially available, and effective. The directive also includes detailed instructions on inspections of multiemployer work sites, including employment agencies, personnel services, home health services, physicians and health care professionals in independent practices, and independent contractors.

Included in the directive are engineering control evaluation forms, a Web site resource list, and a model exposure control plan that incorporates the most current guidelines from the CDC regarding management of occupational exposure to the hepatitis B and C viruses and HIV.

The complete OSHA standard and directive contains multiple pages of information related to all areas of health care. The standards contain information on what needs to be done by each health care facility.

To better understand safety in phlebotomy, one must understand several OSHA definitions:

1. *Blood*—The term *human blood components* refers to plasma, platelets, and serosanguineous fluids (e.g., exudates from wounds). Also included are medications derived from blood, such as immune globulins, albumin, and factors 8 and 9.
2. *Blood-borne Pathogens*—While HBV and HIV are specifically identified in the standard, the term includes any pathogenic microorganism that is present in human blood or **other potentially infectious material (OPIM)** (Table 2.4) and can infect and cause disease in persons who are exposed to blood containing the pathogen.

TABLE 2.4 Other Potentially Infectious Material (OPIM)

• Semen
• Vaginal secretions
• Cerebrospinal fluid (fluid surrounding the brain and spinal cord)
• Synovial fluid (fluid surrounding bone joints)
• Pleural fluid
• Pericardial fluid
• Peritoneal fluid
• Amniotic fluid
• Saliva encountered during dental procedures
• Any body fluid that is visibly contaminated with blood
• All body fluids in situations where it is difficult or impossible to differentiate between types of body fluids
• Any unfixed tissue or organ from a human or nonhuman primate (living or dead)
• HIV-containing cell or tissue cultures, organ cultures, cell medium, or other solutions
• Any pathogenic microorganism

Source: Clinical Laboratory Standards Institute (CLSI). (2005). *Protection of laboratory workers from occupationally acquired infections; approved guidelines* (3rd ed.) (CLSI Document M29-A3). Wayne, PA: Author.

3. *Exposure Incident*—An exposure can include nonintact skin, which consists of skin with dermatitis, hangnails, cuts, abrasions, chafing, acne, and so on.
4. *Exposure Control Plan*—This requires the employer to identify those tasks and procedures in which occupational exposure may occur and to identify the positions with duties that include those tasks and procedures identified as having occupational exposure.
5. *Engineering Controls*—These are controls that isolate or remove blood-borne pathogen hazards from the workplace. Examples include safer medical devices, such as sharps with engineered sharp injury protection (SESIPs) and needleless systems.
6. *Needleless Systems*—This term refers to a device that does not use needles for (a) the collection of bodily fluids or withdrawal of body fluids after initial venous or arterial access is established; (b) the administration of medication or fluids; or (c) any other procedure involving the potential for occupational exposure to blood-borne pathogens due to percutaneous injuries from contaminated sharps. Needleless systems provide an alternative to needles for the specified procedures, thereby reducing the risk of percutaneous injury involving contaminated sharps. Examples of needleless systems include, but are not limited to, intravenous medication delivery systems that administer medication or fluids through a catheter port or connector site using a blunt cannula or other nonneedle connection, and jet injection systems that deliver subcutaneous or intramuscular injections of liquid medication through the skin without use of a needle.
7. *Occupational Exposure*—The term *reasonably anticipated contact* refers to the potential for contact as well as actual contact with blood or OPIM. Reasonably anticipated contact includes, among others, contact with blood or OPIM (including regulated waste) and needlesticks. For example, in order to substantiate occupational exposure, a compliance officer may document incidents in which an employee observes a contaminated needle on a bed or comes into contact with other regulated waste.

8. *Sharps with Engineered Sharps Injury Protections*—SESIPs are defined as "a nonneedle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident." This term encompasses a broad array of devices that make injury involving a contaminated sharp less likely. They include, but are not limited to, syringes with guards or sliding sheaths that shield the attached needle after use, needles that retract into a syringe after use, shielded or retracting catheters used to access the bloodstream for intravenous administration of medication or fluids, intravenous medication delivery systems that administer medication or fluids through a catheter port or connector site using a needle that is housed in a protective covering, blunt suture needles, and plastic (instead of glass) capillary tubes. These are described in more detail in Chapter 5.

Interpretation of the Standards

The standards are complex to read, and it is difficult to understand all the details. The standards focus on certain basic requirements that must be followed in order to remain compliant. Each of these requirements must be incorporated into a health care facility plan of action. Details of these requirements are discussed later. The basic requirements are as follows:

1. An **exposure control plan** must be developed.
2. **Engineering controls** specific to a safer device must be used when feasible. A device without engineering controls can be used only when no other device is available. Whether a device is available and compatible is up to the discretion of the inspector.
3. **Employee input** must be sought when choosing safer devices.
4. There must be **recordkeeping** of any injuries.

Exposure Control Plan

Employers with employees that have occupational exposure to potentially infectious materials must establish a written exposure control plan designed to eliminate or minimize employee exposure. This plan should be accessible to OSHA inspectors and employees and must be reviewed and updated annually. Each job is classified according to what type of occupational exposure could occur. A method of implementing the program and a method of communicating the potential hazards to all employees must be in place.

The exposure control plan requirements include an annual review and update to consider changes in technology that might offer new devices that can further reduce exposure to blood-borne pathogens. The April 2002 directives dictate that the employer must do the following:

1. Consider any new developments in technology or procedures that can reduce exposure to blood-borne pathogens
2. Document the consideration and use of commercially available safer devices (e.g., describe the devices identified as candidates for use, the method used to evaluate those devices, and justification for the eventual selection)
3. Review the exposure plan annually to take advantage of changes in technology
4. Involve nonmanagement workers in evaluating and selecting safety devices and document their input
5. Maintain an injury log that ensures employee confidentiality

In considering newly available devices, the employer must find those that do not compromise the safety of the employees and that will make an exposure incident involving contaminated sharps less likely to occur.

The exposure control plan is a key provision of the standard because it requires the employer to identify the individuals who will receive the training, protective equipment, vaccinations, and other protections of the standard.

Engineering Control Plan

No one medical device is appropriate in all circumstances of use. Employers must implement safer medical devices that are appropriate, commercially available, and effective. The design features these devices have should include the following characteristics:

1. A fixed safety feature provides a barrier between the hands and the needle after use; the safety feature should allow or require the worker's hands to remain behind the needle at all times.
2. The safety feature is an integral part of the device and not an accessory.
3. The safety feature is in effect before disassembly and remains in effect after disposal to protect users and trash handlers and for possible environmental safety.
4. The safety feature is as simple as possible and requires little or no training to use effectively.

Part of this evaluation should include information regarding whether all commercially available devices were considered. There must also be evidence that other engineering controls were evaluated to reduce exposures.

Employee Input

Any decision to change to a new safer device cannot be done in a vacuum. One individual or management group cannot make the decision. There must be employee input. This employee input must be from those employees who will be using the devices. To determine if this was done, the OSHA inspector will question some employees to determine how their input influenced choosing the new safer device. This input must also be documented in the exposure control plan:

1. List the employees involved and describe the process by which input was requested
2. Present other documentation, including references to the minutes of meetings, copies of documents used to request employee participation, or records of responses received from employees

To determine employee input, the employer should select several devices that would be acceptable to the work practice. The employer or committee can make an initial selection based on the availability of the product or compatibility of the tested system with other systems.

Compatibility of the device with other systems may be an issue, such as when a mobile phlebotomist starts using a device and the entire device is discarded after use but the sharps container is not large enough to hold the device. In this case, a larger sharps container would be needed.

All employees do not need to be involved in the testing. The best way is to develop a survey for the employees to complete about the tested devices and to tally the results at the end of the test period.

The information on who completed the survey and the results must be available for an inspector to see. Final selection can then be made based on the results of the survey.

Recordkeeping

Any occupational injuries to employees or occupational illness of employees must be documented in the exposure control plan. This documentation was required in the old plan. This documentation has been expanded to require documentation of all sharps injuries. Confidentiality of the employee must be maintained at all times. The log must contain at least the following information:

1. Type and brand of device involved in the incident
2. Location of the incident (e.g., department or work area)
3. Description of the incident

Needles and Sharps

Contaminated needles and other contaminated sharps should not be recapped, bent, cut, broken, or removed. All needles and sharps must be placed in containers that are puncture resistant, leakproof, and labeled or color coded as **biohazard**.

The biohazard labels must be fluorescent orange or orange-red with lettering or symbols in a contrasting color (Figure 2.10). The warning labels must also be affixed to containers of regulated waste and refrigerators or freezers containing blood or OPIM. Any containers used for transport or storage must also be labeled, and such containers must be of a sealed and leakproof construction. Blood is transported in a leakproof container. This includes the phlebotomist transporting blood from the patient to the laboratory. The required mode of transport is in a container, so if the tube containing the blood should break, the blood would be contained in the transport container. Various containers can fill this requirement for transport of samples within the health care setting. Self-sealing bags are the most convenient, but Tupperware-type containers, paint buckets, or plastic buckets with a sealable lid can also be used. For transport of potentially infectious materials through the mail, a separate set of standards is used by the postal service and other shipping companies.

Laboratory Techniques

All procedures involving blood or potentially infectious materials are to be performed to minimize splashing, splattering, or generation of droplets. The Hemogard-type blood tube, as described in Chapter 5, was created to meet this requirement.

Mouth pipetting or mouth suctioning of any potentially infectious material is prohibited. Pens, pencils, and fingers should not be placed in the mouth.

While working with any potentially infectious material, the health care associate must wear gloves and protective clothing. This standard must also be followed by all phlebotomists. The protective equipment is to be supplied at no cost to the associate. Any laundering or disposal of the protective equipment is to be done by the health care institution.

OSHA regulations are for the protection of the associate in the health care setting. Often they seem to be written in ways to make the job slower and more tedious. However, they are simply commonsense items that prevent the health care associate from acquiring a job-related injury or infection.

Material Safety Data Sheets

The clinical laboratory contains a large array of hazards ranging from the previously mentioned biologic hazards to chemical and electrical hazards. OSHA has focused on

▲ FIGURE 2.10 Universal biohazard symbol.

chemical hazard awareness since 1987, when MSDSs were first introduced in the passage of the Hazard Communication Act. The MSDSs are information sheets that must be kept on file and that indicate the hazards of the chemicals used in each section of the laboratory. This file does not need to be a paper file. It can be an Internet file that the health care worker can access from any computer. Chemicals used in the laboratory must also contain labels indicating the identity of the chemical and showing warnings appropriate for employee protection. The Hazard Communication Act is better known as the "right to know" law.

This act requires that the MSDSs be readily accessible to all associates. New associates must receive training in the chemical hazards before starting work and have this training documented. A documented annual retraining of each associate must also occur.

Hazard Identification

Hazards can be identified on the container by a hazard emblem designed by the National Fire Protection Association (Figure 2.11). The system consists of a diamond-shaped diagram further subdivided into smaller diamonds. Health hazards are identified on the left, flammability at the top, and reactivity on the right. The bottom space is used to identify other hazards or to alert fire-fighting personnel to the possible hazard of using water. The hazards are identified by color: blue for health hazards, red for flammability, and yellow for reactivity. The diamonds are identified by number on a scale of 0 to 4 to indicate the severity of the hazard. Containers labeled "0" have no unusual hazard, and those labeled "4" are extremely dangerous.

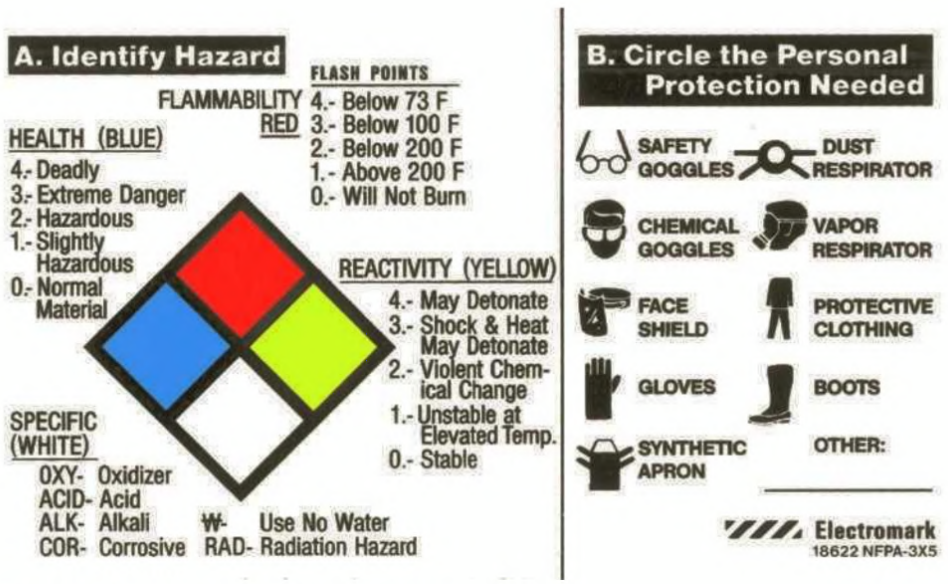
Fire Safety

Fire safety is taught periodically by each institution. Fire escape routes and individual responsibility in a fire are specific for the institution. Fire extinguishers are classified according to the type of fire on which they are to be used.

Class A fire extinguishers are used on Class A fires and include foam, loaded-stream, and multipurpose dry chemical extinguishers. Class A includes fires of ordinary combustible materials in the laboratory, such as wood, plastics, and paper—that is, elements that require the cooling action of water to extinguish the fire.

Class B includes fires of flammable liquids and gases—that is, elements that require the blockage of oxygen from the fire to extinguish it. Class B fire extinguishers include carbon dioxide, dry chemical, foam, and loaded-stream extinguishers.

Fires in energized electrical equipment are classified as Class C fires. The use of nonconductive media is needed to prevent electrical shock when putting out the fire. Class C



▲ FIGURE 2.11 Hazard identification system.

fire extinguishers include carbon dioxide and dry chemical extinguishers. The carbon dioxide extinguisher seems to be the best universal fire extinguisher for the laboratory around computer equipment. It puts out the fire without damaging the computer circuits.

Class D includes fires of combustible and reactive metals such as sodium, potassium, magnesium, and lithium. These fires pose special problems, since explosion and spreading can easily occur. Class D fire extinguishers used on these types of fires contain a dry powder medium that does not react or combine with the burning materials.

Most fire extinguishers found in the laboratory are of a universal ABC type. The laboratory generally does not have metals that would require the use of a Class D fire extinguisher.

If there is a fire, the National Fire Protection Association's key word for action is "**RACE.**"

R = **Rescue** anyone in danger.
A = Sound the **Alarm**.
C = **Contain** the fire by closing doors and/or windows.
E = **Extinguish/Evacuate**. Extinguish the fire if possible; if the fire is too large to extinguish, start to evacuate anyone in the fire's path.

Chemical Safety

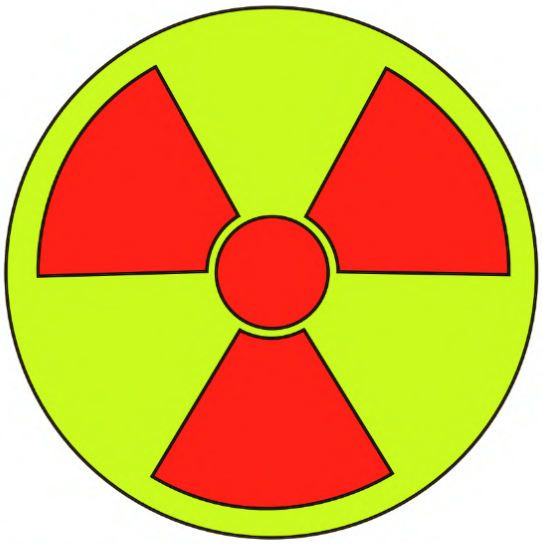
The health care worker must understand the hazards of the chemicals in use. Chemicals that produce a toxic or irritant vapor must be used only in an approved chemical hood. When there is a danger of splashing, a chemical-resistant apron and face shield should be worn.

In the event of a chemical spill or splash to the eyes or other body parts, a safety shower and eye wash station must be available (Figures 2.12 and 2.13). A person using the eye wash will need another person to help in holding the eye open and removing any contact lens that might be in the eye. The affected body part should be flushed with water for 15 minutes. Then the person must be evaluated for medical treatment by the emergency department or occupational health facility.

Spills or splatters that only contaminate surfaces and do not contact an individual's skin or clothing can be handled with a spill cleanup procedure. Using a commercial spill kit for the specific chemical spilled is the best way to clean the contamination.

▲ FIGURE 2.12 Safety shower.

▲ FIGURE 2.13 Eye wash.



▲ FIGURE 2.14 Radiation hazard symbol.

Radiation Exposure

Phlebotomists are exposed to radiation. Radiation is present in nuclear medicine, radiology, and patients with radioactive implants. Whenever phlebotomists encounter the radiation hazard symbol (Figure 2.14), they must be aware of the institution's radiation safety procedures. Most procedures limit the exposure by limiting the time the phlebotomist is exposed. The phlebotomist may need to be shielded with a special apron or cover gown. The only other method of protection is staying away from the radiation hazard. Monitoring devices for exposure may include a badge to detect exposure to radioactivity if the phlebotomist is collecting frequently from patients treated with radioactive implants or those returning from nuclear medicine scans.

Electrical Safety

The phlebotomist is exposed to electrical hazards whenever electrical equipment is used. The most common electrical equipment a phlebotomist uses is a centrifuge. Other electrical equipment includes computers, fans, and space heaters. Before any electrical equipment is introduced onto the job site, the equipment must be tested for safety and proper operation. For example, a centrifuge must be checked to determine if it has enough force to spin the blood. Space heaters and fans are often not allowed in the workplace because of the hazard of fire or injury. Phlebotomists should always check with their supervisor before bringing any equipment from home to determine if it is permitted. Usually only equipment provided by the employer may be used.

Hazards to look for with any electrical equipment are frayed cords, a removed grounding prong on the plug, and any type of shock when the equipment is used. Phlebotomists should not try to repair the equipment. Unplug the equipment if there is any concern about the safety of the equipment. The equipment should not be used until a supervisor has been notified and the equipment has been checked.

Latex Allergy

Latex, which is made from the natural rubber of trees, can be found in many household and health care products. Balloons, toys, garden hoses, rubber gloves, tourniquets, intravenous tubing, blood pressure cuffs, and bandages are a few of the products that can contain latex. **Latex allergy** has been on the increase, as there is more exposure to latex products. Phlebotomists are at high risk if their facility is still using latex tourniquets and latex gloves. Patients are also showing an increased sensitivity to latex due to environmental exposure. Signs should be placed for patients to remind them to tell the phlebotomist if they have a latex allergy.

Reactions to latex can vary with the individual. The reaction to the skin can range from itchy irritation to redness and swelling that progresses to thickened skin, pimples, or skin blisters that ooze. This is the typical less serious type IV allergy to latex due to **irritant contact dermatitis**. The symptoms begin 24 to 72 hours after exposure and can continue for several days. With each additional exposure, the symptoms become more advanced. For some patients, the latex allergy becomes so severe that they cannot go into a room where latex items have been used.

Type I latex allergy is more serious. This is an immunologic reaction that is caused by the penetration of the natural latex proteins into the skin. These proteins cause production of antibodies to latex, which increase with each subsequent exposure. As the allergy becomes more severe, the symptoms may include nausea, low blood pressure, and respiratory distress. If the latex allergen is introduced directly into the blood, then anaphylactic shock is possible. This can be life threatening.

To prevent allergic reactions from occurring, exposure to latex must be eliminated. There is no cure for latex allergy, only prevention of exposure. This prevention of exposure is not only for the phlebotomist but also for the patient. If the phlebotomist has a latex allergy, the phlebotomist must not work with latex gloves or tourniquets. If the patient has a latex allergy, the phlebotomist must avoid any type of latex coming into contact with the patient. This includes the tourniquet, latex gloves, blood pressure cuffs, and bandages.

Latex allergies do not always come in the form of direct contact to the skin. The powder in the gloves disperses the latex into the air, and then the phlebotomist or the patient inhales the powder, causing a respiratory reaction. A less serious form of powder allergy is to get the powder in the eyes, which become irritated and swollen. Most health care providers have switched to powder-free gloves to avoid problems.

Helpful Hint

Ask the patient if he or she has any allergies before drawing blood.

Most facilities have gone to totally latex-free devices. This reduces the safety concern for patients and employees. The more latex exposure there is, the more likely a latex allergy will develop. Removing all latex items, such as gloves and tourniquets, will reduce this exposure.

DISPOSAL OF USED MATERIALS

The disposal of potentially infectious materials is controlled by state laws more than by federal regulations. General requirements are standard in most states. A health care institution cannot just set the trash out on the curb and wait for the garbage truck to pick it up.

There are two requirements for disposal of medical waste. The first is to alter the product so no one can remove used needles or syringes or other devices for their own personal use or be injured by an exposed sharp. Second, the waste must be rendered noninfectious so that people handling the waste will not become infected and the environment will not be contaminated. There are three methods of disposal that meet these requirements: (1) incineration, (2) chemical treatment, and (3) autoclave.

The most common method of disposal of infectious waste is incineration. The waste is burned to an ash and then the ash is taken to the municipal disposal area. This method kills any potentially infectious organisms and makes the items within the waste nonusable. Most large hospitals have incinerators to destroy waste and generate steam as a by-product.

If a health care institution does not have its own incinerator that meets environmental standards, it must rely on a commercial medical waste handler to dispose of the waste. The commercial medical waste handler will charge the health care institution based on the weight of the waste. It is critical that only hazardous waste be placed in the biohazard waste receptacle. Items such as the paper towels you dry your hands with after washing should be not placed in the biohazard waste. Any increase in weight also increases the cost of disposal.

Commercial waste handlers often use the chemical treatment method of waste destruction. This method consists of grinding or chopping the waste into small pellets and then

treating the pellets with a disinfectant chemical to kill any infectious organisms. The grinding process renders the waste unusable, while the disinfectant permits the waste to be sent to the municipal disposal site.

The autoclave method can be used in small operations where only a small amount of waste is generated. The **autoclave** is similar to a pressure cooker. The waste material is placed in the autoclave. Control tapes are placed on the biohazard bags to ensure adequacy in the sterilization. The control tapes change color if the sterilization has reached the proper temperature and pressure. The door is sealed shut after all items to be sterilized have been added. The door looks similar to a miniature submarine door with a wheel in the center. Once sealed, the autoclave is injected with steam under high pressure for 15 minutes to "cook" the waste under pressure. The plastics in the waste melt together to make the waste useless, and the infectious organisms are killed. Like the other methods, the waste can now be disposed of as normal trash.

Disposal of contaminated waste can be expensive. If you are working for a small office, the contaminated waste must be separated from general household-type trash. Too often, noninfectious materials are thrown into the infectious waste and then must undergo special processing. Special containers should be established for infectious waste, just as there are special disposal containers for sharps.

EXERCISE 6 **Labeling**

Directions: Indicate whether the item or practice is an engineering control (E), or work practice Control (W).

_____ Handwashing

_____ Sharps containers

_____ Disinfecting of hard surfaces

_____ Self-sheathing needles

_____ Self-sealing plastic bags

_____ Use of alcohol-based hand cleaners

_____ Not eating or drinking in contaminated areas

IMPORTANCE OF FOLLOWING SAFETY GUIDELINES

The importance of following safety guidelines is twofold: for the patient's safety and for the phlebotomist's safety. The patient does not want to come into the health care setting and acquire a nosocomial infection. The phlebotomist does not want to come to work and acquire an infection from patient contact. These are the basic reasons safety guidelines have been established.

OSHA has helped health care institutions to realize the importance of following its safety rules and regulations. If infractions are found during an OSHA inspection, the OSHA inspector can charge the health care setting up to $7,000 per infraction. For example, if the OSHA inspector watched phlebotomists drawing blood and on seven occasions the phlebotomists did not wear gloves, the health care setting could be fined $49,000. Taking shortcuts in safety not only puts the phlebotomist at risk for infection, it can also cost the employer a considerable amount of money. By being notorious for large fines, OSHA has been able to enforce strong compliance to its rules and regulations.

Patients are also aware of specific safety rules and regulations. Patients often ask if a needle is new, or if the gloves a phlebotomist is putting on are clean. Patients who develop

an infection due to negligence on the part of a health care associate who did not follow safety rules can sue. These lawsuits can take years to settle and often cost phenomenal amounts of money.

The most prevalent hazard for the phlebotomist is the accidental needlestick. Some simple guidelines to follow for the prevention of this hazard are listed here:

- Eliminate the use of needles when safe and effective alternatives are available.
- Implement the use of devices with safety features and evaluate their use to determine which are most effective and acceptable.
- Analyze needlestick- and sharps-related injuries in the workplace to identify hazards and injury trends.
- Set priorities and strategies for prevention by examining local and national information about risk factors for needlestick injuries and successful intervention efforts.
- Ensure that health care workers are properly trained in the safe use and disposal of needles and sharps.

The special procedure detailed in Procedure 2-5 must be followed after any exposure from needlestick or splash. This procedure is dependent on the facility. Each health care facility has variations to the procedure. Use this procedure for general information.

PROCEDURE 2-5

RESPONSE TO ACCIDENTAL BIOHAZARD EXPOSURE

Principle:

An accidental biohazard exposure is defined as any exposure the health care associate has to blood, body fluids, or tissues. The exposure can be to nonintact skin, a mucous surface, or the conjunctiva. This exposure may be via splash, splatter, needlestick, abrasion, or laceration. If an incident occurs, following is the general procedure for exposure. Some health care facilities have variations to the standard operating procedure Always follow the health care facility's policy.

Materials:

Equipment to collect blood samples for testing

Proper documents for documentation of circumstances about incident

Procedure:

1. Immediately wash the exposed area with soap and water. If the mouth area is exposed, rinse with water or mouthwash. If eyes are exposed, flush with large amounts of warm water.
2. Report the incident to your supervisor immediately. Be prepared with information about the circumstances of the exposure. The supervisor will be required to document all information about the incident.
   a. Which patient did the body fluid come from during the exposure? What is the source of the body fluid if known?
   b. What area of your body was exposed (e.g., eyes; right index finger punctured with a needle)?
   c. What is the severity of the exposure?
   d. What are the exact time and date of the exposure?

continues

continued

PROCEDURE 2-5 RESPONSE TO ACCIDENTAL BIOHAZARD EXPOSURE

3. The exposed associate must be tested for HIV and HBV only if the associate gives consent. An associate may refuse to have blood drawn, or he or she may have blood drawn and stored for 90 days while deciding if the blood should be tested.
4. The source individual's blood is tested for HIV and HBV if the source individual gives consent.
5. The associate may be given the results of the testing if not prohibited by law.
6. If the source patient refuses testing, is HIV or HBV positive, or is in a high-risk category, the associate may elect to receive prophylactic treatment as outlined in step 8. The associate is counseled and given follow-up testing at periodic intervals.
7. All exposed associates are counseled to be alert for viral symptoms for 12 weeks after exposure.
8. Prophylactic treatment may be offered to associates after an exposure such as a contaminated needle or deep-injury laceration. Prophylactic treatment should be considered if (a) there has been an exposure to a patient who is HIV positive; (b) the patient has a high-risk history (e.g., drug abuse); or (c) the source is unknown (e.g., needle in trash).
9. The Medical Care Criteria Committee of the CDC now recommends tenoforvir plus emtricitabine, plus either raltegravir or dolutegravir, as the preferred initial regimen because of its excellent tolerability, proven potency in established HIV infection, and ease of administration. Zidovudine is no longer recommended in the preferred postexposure prophylaxis (PEP) regimen because it is believed to have no clear advantage in efficacy over tenofovir while having significantly higher rates of treatment-limiting side effects. The treatment regimen usually lasts 28 days.
10. Practitioners should follow CDC guidelines or any new updates or recommendations published by the CDC. Practitioners are encouraged to contact the PEP hotline at (888) 448-4911, 24 hours a day, for postexposure prophylactic drug selection and guidelines.

EXERCISE 7 Ordering – Blood Collection in an Isolation Room (Procedure 2-4)

Directions: Number these steps in the correct order of the procedure.

_____ Wash your hands with soap and water after entering the anteroom.

_____ Discard needles and contaminated equipment in the sharps container.

_____ Dress according to Procedure 2-3 with mask, gown, cap, shoe covers, and gloves.

_____ Collect the blood sample.

_____ Label the tubes.

_____ Remove all rings and watches or bracelets.

_____ Check the isolation card to know what type of isolation you need to follow.

_____ Remove isolation attire.

_____ Check the patient's armband.

REVIEW QUESTIONS

Multiple Choice

Choose the one best answer.

1. The single most important way to prevent the spread of infection in a hospital or other facility is
   a. gowning and gloving.
   b. handwashing.
   c. always wearing masks.
   d. avoiding breathing on patients.
2. All of the following are components in the chain of infection *except*
   a. source.
   b. mode of transportation.
   c. poor isolation technique.
   d. susceptible host.
3. When a patient develops an infection 48 hours after hospitalization that was not present upon admission, the infection is classified as
   a. hospital acquired (nosocomial).
   b. communicable.
   c. infectious.
   d. unavoidable.
4. The primary purpose of infection control is to
   a. determine the source of communicable disease.
   b. isolate patients from other patients and visitors.
   c. protect the patient from outside contamination.
   d. prevent the spread of infection within hospitals and other health care facilities.
5. A potential source of infectious material from a patient in protective isolation includes
   a. feces.
   b. none (the phlebotomist is considered a potential source of infection to the patient).
   c. urine.
   d. blood.
6. Aerosols can be produced by
   a. centrifuging open serum tubes.
   b. popping open blood containers.
   c. pouring off a serum sample.
   d. all of the above
7. When coming into contact with patients under airborne precautions, it is necessary to wear
   a. a mask.
   b. gloves.
   c. a gown.
   d. *a* and *b*.
8. Standard precautions policy states that if there is a possibility of coming into contact with a patient's blood or any other body fluid, you must wear
   a. a gown.
   b. goggles.
   c. gloves.
   d. nothing, but wash hands immediately.
9. According to standard precautions, blood and body fluids from which group are considered biohazardous?
   a. IV drug users
   b. homosexuals
   c. patients who are HIV positive
   d. all blood and body fluids
10. Under standard precautions, all used needles are to be disposed of in the following manner:
    a. recapped.
    b. discarded intact.
    c. bent.
    d. broken or cut off.

CRITICAL THINKING

1. You walk into a patient's room to draw blood and notice a fire in the patient's wastebasket. What would you do?
2. After drawing blood from a patient, you puncture yourself in the left thumb. What actions should you immediately take?
3. Observe someone performing a venipuncture. What personal protective equipment did he or she use in the procedure? Was there any equipment that he or she should have used and did not?
4. You are ready to draw a patient's blood, and he says that he is highly allergic to latex. How should you respond to this statement?