CHAPTER 3 Safety

Like any workplace, a hospital or other healthcare facility contains certain hazards that must be treated with caution and respect to prevent injury. These hazards include biological, physical, chemical, radioactive, electrical, and fire factors, as well as the most significant hazard involved in phlebotomy—sharps in the form of needles, lancets, and glass. **Latex sensitivity** is also a growing concern in the workplace. Here, we discuss the variety of potential hazards you may encounter and outline the proper precautions to take to prevent accidents or injuries. The **Occupational Safety and Health Administration (OSHA)** is the governmental agency responsible for workplace safety.

OUTLINE

OBJECTIVES

1. Explain the role of the Occupational Safety and Health Administration (OSHA) in workplace safety.
2. List eight types of safety hazards.
3. Describe six precautions that can reduce the risk of injury.
4. Explain steps to be taken to lessen the risk of physical or sharps hazards.
5. List the items that must be included on a chemical label according to the Globally Harmonized System.
6. List two other kinds of labels used to identify hazardous materials.
7. Explain the purpose of the safety data sheet (SDS).
8. Describe the components of a chemical hygiene plan.
9. Discuss safety precautions to be used when handling hazardous chemicals.
10. Identify the radioactive hazard symbol.
11. Describe precautions to be taken to reduce the risk of electrical hazards.
12. Describe the four classes of fire, and identify the type or types of fire extinguisher used to combat each.
13. Explain what to do in case of the following:
    a. bleeding wound
    b. no sign of breathing
    c. shock
    d. latex sensitivity

KEY TERMS

allergic contact dermatitis
anaphylaxis
cardiopulmonary resuscitation (CPR)
chemical hygiene plan
Department of Transportation (DOT) label
Globally Harmonized System (GHS) of Classification and Labeling of Chemicals
irritant contact dermatitis
latex sensitivity
National Fire Protection Association (NFPA) label
Occupational Safety and Health Administration (OSHA)
radioactive hazard symbol
safety data sheet (SDS)
sharps

ABBREVIATIONS

AED Automated external defibrillator
CHP chemical hygiene plan
CPR cardiopulmonary resuscitation
DOT Department of Transportation
FDA Food and Drug Administration
GHS Globally Harmonized System
HBV hepatitis B virus
HCl hydrochloric acid
HCV hepatitis C virus
HIV human immunodeficiency virus
MRI magnetic resonance imaging
NFPA National Fire Protection Association
OSHA Occupational Safety and Health Administration
PPE personal protective equipment
SDS safety data sheet

WHAT WOULD YOU DO?

It's 9 a.m., and you are heading to your first draw on the chronic care wing of Mercy Hospital. As you pass the nurse's station, a nurse offers you one of the doughnuts from the box on the desk. You have a tight schedule and cannot stop to eat one now, so the nurse suggests you take it along with you. "It should fit right there in your tray next to your tubes. I'll wrap it up good and tight for you," she offers. Is it appropriate to take the snack for later?

FLASH FORWARD

You will learn about infection control and the special precautions needed to collect and handle biological specimens in Chapter 4.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

Workplace safety is regulated by OSHA. The regulations are designed both to inform workers about hazards in the workplace (e.g., by requiring that workers know the health effects of the chemicals they use) and to protect workers from harm (e.g., by requiring an emergency shower nearby in case of chemical spills). Your employer is required by OSHA to maintain a safe workplace, provide a comprehensive safety training program, and report accidents that occur on the job. OSHA regulations are revised as needed to increase workplace safety in light of new information or new hazards. Therefore you should keep up to date on all relevant information as it changes throughout your career.

TYPES OF SAFETY HAZARDS

Despite their goal of promoting health, healthcare facilities can be dangerous places for people who are not aware of the potential risks. Types of hazards include the following:

- *Biological:* infectious agents, including airborne or bloodborne organisms, such as bacteria and viruses
- *Physical:* wet floors, heavy lifting (e.g., boxes and patient transfers)
- *Sharps:* needles, lancets, and broken glass
- *Chemical:* preservatives and reagents (laboratory-grade chemicals)
- *Radioactive reagents*
- *X-ray equipment*
- *Electrical:* dangerous high-voltage equipment
- *Fire or explosive:* open flames, oxygen, and chemicals (e.g., nitrous oxide)
- *Gases under pressure*
- *Latex sensitivity:* allergic reaction to latex in gloves or other equipment

In addition to specific safety precautions for phlebotomy procedures, a number of general precautions can reduce your risk of injury:

- Practice hand hygiene, as discussed in Chapter 4.
- Always wear the appropriate personal protective equipment (PPE) when handling specimens.
- Avoid touching your face, nose, or mouth in the work area. Do not rub your eyes, handle contact lenses, or apply cosmetics, especially when wearing gloves.
- Never store food or beverages in the laboratory refrigerator with reagents or specimens.
- Do not let anything hang loose that might get contaminated or caught in equipment. Tie back shoulder-length hair, and never wear long chains, large or dangling earrings, or loose bracelets.
- Protect your feet from spills, slips, and falling objects. Never wear open-toe or open-back shoes. Shoes should be sturdy, made of nonabsorbent material, and have nonskid soles.

Fig. 3.1 Safety cones; note English and Spanish warnings.

- Avoid putting anything in your mouth in the work area. This means no eating, drinking, smoking, or chewing gum, while in the laboratory area. Never put pens or pencils in your mouth.

Physical Hazards

Avoiding physical hazards in the workplace is mostly a matter of common sense, plus learning some important habits:

- Avoid running. This is not only a safety rule but also a consideration for patients, who may become concerned or agitated.
- Watch for wet floors. Your facility should use cones or other types of signs to warn when a floor is wet and should have cleanup equipment for spills (Fig. 3.1).
- Bend your knees when lifting heavy objects or transferring a patient (Fig. 3.2).
- Maintain a clean, organized work area.

Sharps Hazards

Sharps, especially needles and lancets, are the most common hazards you will encounter as a phlebotomist. Sharps are dangerous both because of the physical injury they may cause and because they may carry bloodborne pathogens, such as human immunodeficiency virus (HIV), hepatitis B virus (HBV), or hepatitis C virus (HCV). The risk of contracting a bloodborne pathogen from a needlestick depends on several factors, including the pathogen involved, the amount of blood you are exposed to, and the level of virus in the patient's blood.

To prevent contact, always use the safety engineering features as specified for the device you are using. Safety engineering features for sharps include shielded or self-blunting needles for both vacuum tube systems and butterflies, as well cylindrical sheaths for syringe needles, used when transferring blood into vacuum tubes.

FLASH FORWARD
Bloodborne pathogens are discussed in Chapter 4.

The safety feature must be activated as soon as the needle is removed from the vein, unless it is an in-vein safety activation device. Never detach the needle from the plastic tube holder, because this will expose the rubber-covered needle that punctures the tube. The needle-vacutainer unit is disposed of in its entirety in a sharps container. A used needle should never be removed from a syringe by hand, and you should never bend or break a needle. Dispose of

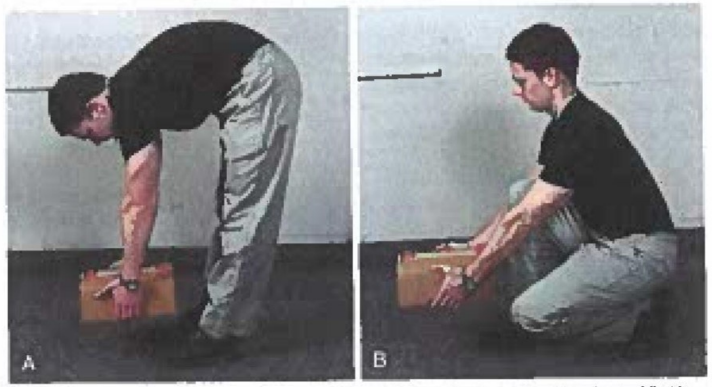


Fig. 3.2 (A) Improper lifting technique (B) Proper lifting technique. The knees should be bent while lifting; this allows the legs to bear the weight, instead of the back.

Fig. 3.3 Sharps containers.

sharps in a puncture-resistant container immediately after activating the safety feature (Fig. 3.3). It is best to keep the needle disposal device within arm's reach during the procedure.

The Needle Stick Safety and Prevention Act of 2001 required all employers to switch to safety needle devices to minimize the risk of accidental sticks and solicited employee input in choosing safer devices. Failure to comply with the 2001 regulation can result in high fines for the institution and the individual who violates the act.

If you are stuck by a used needle or other sharp object that has been in contact with blood, or if you get blood in your eyes, nose, mouth, or broken skin, you should perform the following steps:

1. *Immediately* flood the exposed area with water for 10 to 15 minutes and clean any wound with soap and water or a skin disinfectant.
2. Report this immediately to your employer. Your employer is required to keep a log of such incidents. Follow your facility's exposure control plan for reporting and medical treatment for an accidental needle exposure.
3. Seek immediate medical attention, including counseling for exposure to HIV, HBV, and HCV.

FLASH FORWARD
You will learn more about exposure control plans in Chapter 4.

Some phlebotomists may be tempted to cut some safety corners, especially as they gain more confidence in their handling of needles and other sharps. However, there is never a good enough reason to take such risks. The risk of infection is always present, and there can be months of psychologic trauma while waiting to learn the results of serologic testing after an accidental needle stick. In many institutions, not following safety procedures is grounds for dismissal.

Chemical Hazards

You will encounter many different chemicals in your work as a phlebotomist, including several that can be quite harmful if handled improperly. For example, hydrochloric acid (HCl), which burns mucosal tissue and skin, is used as a preservative for urine. Bleach, which causes irritation of mucosal tissue and skin, is used as a disinfectant in the laboratory.

Identification of Chemicals and Your Right to Know

The safe handling of chemicals begins with proper labeling. All chemicals should have labels that identify the chemical by name, and you should read the label carefully before using any chemical. Do not use a chemical that is not labeled.

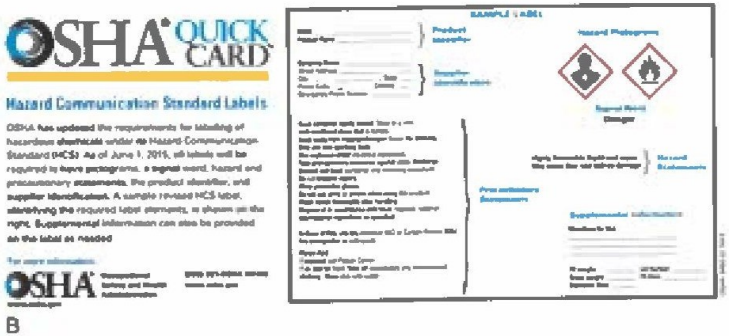
OSHA mandates using the **Globally Harmonized System (GHS) of Classification and Labeling of Chemicals**. The GHS label contains information on the identity of the chemical, the chemical manufacturer or other responsible party, appropriate hazard warnings communicated through the visual symbols called *pictograms*, explanations of the hazards involved in exposure to the chemical, and first-aid measures to take in the event of exposure (Fig. 3.4).

OSHA also requires that each chemical come with a **safety data sheet (SDS)**; also called a *materials safety data sheet*), which provides information about the chemical, its hazards, and the procedures for cleanup and first aid. The SDS has 16 sections, with each section providing specific information on

TABLE 3.1 Safety Data Sheet (SDS) Sections

1	Identification
2	Hazard identification
3	Composition/information on ingredients
4	First-aid measures
5	Fire-fighting measures
6	Accidental release measures
7	Handling and storage
8	Exposure controls/personal protection
9	Physical and chemical properties
10	Stability and reactivity
11	Toxicologic information
12	Ecologic information
13	Disposal considerations
14	Transport information
15	Regulatory information
16	Other information

A



B

Fig. 3.4 Examples of OSHA-mandated labeling. A. Pictograms and Hazards. B. Globally Harmonized System Label. (From OSHA: *Hazard Communication*, 2013. Retrieved from www.osha.gov/dsg/hazcom/index.html.)

that chemical (Table 3.1). These data sheets must be kept on file in the workplace, and you have a right to review them. It may also be possible to access these sheets through your facility's intranet.

CLINICAL TIP

The Chemical Hazardous Communication Standard (Haz Com Standard) or "Right-to-know" law allows an employee to review all information on chemical hazards in the workplace.

Two other types of secondary labels are still in use to identify hazardous materials. The **Department of Transportation (DOT) label** (Fig. 3.5) displays the type of hazard, the United Nations hazard class number, and an identifying number. The **National Fire Protection Association (NFPA) label** (Fig. 3.6) is a design recognized by firefighters that warns of the location of hazardous materials in the event of a fire. It uses a diamond-shaped symbol whose four quadrants contain numbers indicating the relative danger level in four areas: health, fire, chemical stability, and specific hazard types. Higher numbers indicate higher risk. Primarily designed for fixed installations, this symbol has been widely used to indicate hazards at the entrances to laboratory facilities within buildings. How the DOT and NFPA labels will be used in conjunction with the GHS will be determined as time goes on.

Fig. 3.5 Department of Transportation label displaying the type of hazard, the United Nations hazard class number, and an identifying number.

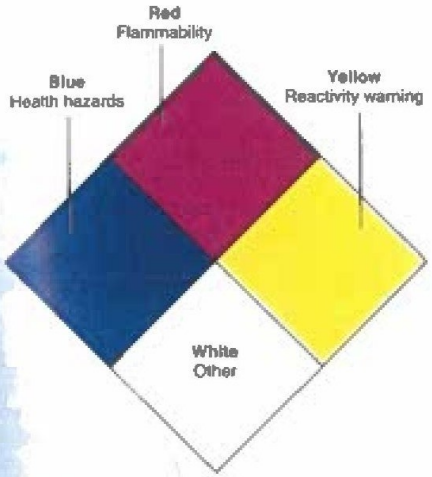


Fig. 3.6 National Fire Protection Association (NFPA) label.

Reducing Risk

OSHA has issued the Chemical Hazardous Communication Standard ("Haz Com Standard") to control the risk of exposure to dangerous chemicals in the workplace. This regulation is also called the *Right-to-Know Law*. It is your responsibility to read the SDS before handling any chemical. OSHA further requires that every workplace develop and train its employees in a **chemical hygiene plan (CHP)**. The plan describes all safety procedures, special precautions, and emergency procedures used when working with chemicals. Each employee must receive training in the details of the plan.

Although some chemicals are more dangerous than others, you should treat every chemical as if it were hazardous. This means that you should always use PPE when working with chemicals, including eye protection, a laboratory coat, and gloves.

Follow protocols and instructions carefully. For instance, if a protocol says to add an acid to water, do not add the water to the acid instead. Combining acid and water releases heat. By adding acid to water, you allow the large amount of water to heat up slowly. By adding water to concentrated acid, the small amount of water may boil on contact (Fig. 3.7). This can cause the acid to splash out of the container onto the skin or mucous membranes, causing burns.

CLINICAL TIP

- Never add water to acid. Always add acid to water.
- Follow the written chemical hygiene plan of your facility.
- Always review the SDS before handling any chemical.
- Never mix chemicals together unless you are following an approved protocol.
- Never store chemicals above eye level.
- Always store a chemical in its original container.
- Always use the appropriate PPE and engineering controls before handling any chemical.

Know the Location of Safety Showers and Eyewash Stations in the Laboratory When Accidents Happen

Despite precautions, chemical accidents occasionally occur. In such cases, you must be prepared to act quickly to prevent or minimize a serious injury.

If a chemical spills on you, proceed immediately to the safety shower or eyewash station. Flush the affected area with water for a minimum of

Fig. 3.7 Adding water to concentrated acid is very dangerous.

15 minutes. Report your accident to the appropriate supervisor in your department, and then proceed to the emergency room to be evaluated for further treatment.

If a chemical spills on the floor or a work surface, alert nearby personnel of the danger, and then follow laboratory protocol for cleanup. Cleanup kits should be available, with different types of equipment and neutralizing chemicals used for different types of spills. You must take the time to learn how to use the cleanup kit in your facility.

Radioactive Hazards

Radioactive materials are used in healthcare facilities to perform diagnostic tests and deliver treatment. In areas in which radioactivity is used, the **radioactive hazard symbol** is displayed (Fig. 3.8). Although the duties of a phlebotomist do not involve direct handling of radioactive materials, you may be exposed to small amounts of such materials when drawing blood from a patient in the radiology department, for instance, or when drawing blood from a patient receiving radioactive treatments or undergoing imagery with a radioactive substance. X-rays are used for diagnosis. Precautions taken by the staff of the radiology department should prevent you from ever being exposed to x-rays. You should not be drawing blood while a patient is receiving an x-ray.

The effects of radiation exposure increase with the length of exposure, the distance to the radiation source, the dose of radiation, and the shielding in place. Appropriate shielding devices are required to protect employees from unnecessary exposure to radiation. Pregnant women need to be especially careful to minimize their exposure because of the risk to the fetus. There are several important guidelines to follow to minimize your risk:

- Recognize the radioactive hazard symbol.
- Exercise extra caution in areas where radioactive materials are in use.
- Learn your institution's procedures for minimizing exposure and responding to accidents.

Pregnant women in the first trimester should not enter a patient's room or a laboratory facility if there is a radiation alert posted at the door; this precaution can prevent a possible adverse effect on the fetus.

Fig. 3.8 Radioactive hazard symbol.

Electrical Hazards

Electrical hazards in the laboratory may result in shock or fire. General rules of electrical safety apply in healthcare institutions as well, including the following:

- Know the location of the circuit breaker box for the equipment you are using.
- Avoid using extension cords, since long-term use of extension cords violates OSHA regulations.
- Avoid buildup of static/sparks by standing on antistatic mats when operating electrical equipment.
- Report and avoid using loose electrical switches or outlets, frayed cords, overloaded circuits, and ungrounded equipment.
- Unplug a piece of equipment before servicing it.
- If a piece of equipment is marked as defective with an electrical caution warning, do not attempt to use it or open it, even for inspection. It may contain batteries or electrical capacitors that store electricity even when unplugged.
- Avoid contact with any electrical equipment while drawing blood. Electricity may pass through you and the needle and shock the patient.

Emergency Response to Electric Shock

When someone receives an electric shock in the workplace, turn off the equipment, either by unplugging it or by switching off the circuit breaker. In the event you cannot turn off the electricity, break the electrical contact between the source and the victim using a nonconductive material, such as a wooden broom handle. Do not touch the victim directly until the risk of further shock is removed.

Call for medical assistance (call 911 or your facility's emergency service), then check the victim's respiration and circulation by taking their pulse and counting breaths per minute. Start **cardiopulmonary resuscitation (CPR)** if indicated (CPR is discussed later in this chapter). Electrical shock can cause physiologic shock resulting in insufficient blood supply to the heart and organs. Keep the victim warm with a blanket or coat, and elevate the victim's legs so the torso is higher than the head.

Someone who receives an electrical shock, even one that doesn't cause an immediate problem, is at higher risk for heart irregularities for several hours afterward. A victim of an electrical shock should therefore monitor their own condition, preferably under medical supervision, until the danger is over.

Emergency Response to Electric Burns

Electrical shock can also cause tissue burns. Tissue burns caused by electricity can be extensive, with extremities being the most vulnerable. Victims should receive immediate care even when no visible damage is apparent.

Fire and Explosive Hazards

Fires or explosions in the laboratory may occur as a result of chemical or electrical accidents or carelessness with flames or other fire sources. In addition to preventive measures, the most important steps to take to minimize the risk of injury are summarized in the acronym *RACE* (Box 3.1):

*R*escue. Remove any patients from the immediate area where fire risk is present (Fig. 3.9).

*A*larm. Call 911 or the appropriate number for fire emergency in your facility.

*C*onfine. Close all windows and doors.

*E*xtinguish. If the fire is small and contained, use a fire extinguisher (Fig. 3.10) or fire blanket to put it out.

Know how to use a fire extinguisher. The proper technique is summarized in the acronym *PASS* (Box 3.2):

*P*ull the pin.
*A*im at the base of fire.
*S*queeze the handle.
*S*weep.

Also know the location of all fire extinguishers and emergency exits in your facility. Exit signs should be plainly marked with written escape routes posted around the office or facility.

BOX-3.1 RACE Procedure

In the event of fire, RACE:
*R*escue patients
*A*larm: call 911
*C*onfine: close doors and windows
*E*xtinguish the fire

BOX-3.2 Use of a Fire Extinguisher

To use a fire extinguisher:
*P*ull the pin.
*A*im at the base of fire.
*S*queeze the handle.
*S*weep.

Fig. 3.9 Fire pull and RACE card.

Fig. 3.10 Fire extinguisher with evacuation plan and fire alarm.

TABLE 3.2 Classes of Fire

Class	Fuel	Extinguisher
A	Wood, paper, and cloth	A, ABC
B	Grease, oil, and flammable liquids	ABC, BC, and halogenated agents
C	Energized electrical equipment	C
D	Flammable metals	D, special equipment
K	Cooking oils and grease	K, special equipment

Classes of Fire

There are five classes of fire, as identified by the NFPA, based on the fire's fuel source (see Fig. 3.8). These dictate the type of extinguisher that should be used to combat the fire, as shown in Table 3.2. Every extinguisher will include the class or classes of fire it is designed to fight. Some extinguishers are only rated for one type, whereas others, such as an ABC extinguisher, can be used on multiple types. Type A fires can be extinguished with water, carbon dioxide, dry chemical, or a chlorofluorocarbon. Any extinguisher marked with an A (e.g., A, ABC) can be used. Class B fires can be extinguished with carbon dioxide, dry chemical, or a chlorofluorocarbon. Any extinguisher marked with a B can be used. Class C fires can be extinguished with carbon dioxide or dry chemical. Any extinguisher marked with a C can be used. Class D and type K fires contain specialized chemicals and require extinguishers specifically marked with the appropriate letter for each.

Magnetic Resonance Imaging Hazards

A magnetic resonance imaging (MRI) machine uses an extremely powerful magnet to create images of the body. The strength of the magnet poses significant safety risks when proper precautions are not taken. The magnet is strong enough to pull metal objects toward it from across the room at great speed. Warning signs are posted outside the MRI examination room. Anyone entering the MRI examination room must remove all metallic objects, including jewelry, belt buckles, and even zippers. People with implanted metallic devices may be barred from entering. The instructions of the MRI staff must be followed to prevent serious injury or death.

EMERGENCY FIRST-AID PROCEDURES

A full review of first-aid techniques is beyond the scope of this chapter. Here we review the most common types of emergencies and the major steps that should be taken to deal with them. Healthcare workers should be trained in the techniques of CPR and should refresh their skills biannually.

Cardiopulmonary Resuscitation

A victim of cardiac arrest will be unresponsive and will not be breathing normally. Quick intervention may save the person's life. Chest compressions restore circulation, and are the most important intervention. Guidelines issued by the American Heart Association (AHA) emphasize that continual chest compressions should be the initial CPR action for all victims, regardless of their age, and that breathing aid is less important than continual compression, especially in adults. If you are not trained in rescue breathing or cannot provide rescue breathing, you should perform compression only ("hands-only CPR") after determining the victim is not responsive and not breathing normally. For a trained professional, it is appropriate to deliver rescue breathing with compressions. The AHA uses the mnemonic CAB to help remember CPR steps. C is for compression, A is for airway, and B is for breathing.

1. Determine whether the victim is conscious by asking loudly, "Are you okay?" If there is no response, alert emergency medical personnel (either within the hospital or by calling 911).
2. Determine whether the victim is breathing normally. If the victim is unresponsive and is not breathing or is only gasping, begin chest compressions immediately. (If there is an automated external defibrillator [AED] device nearby, use that instead.)
3. To perform chest compressions, place the victim flat on their back and kneel next to the victim's neck and shoulder. Place your hands, one on top of the other in the middle of the victim's chest. Push down on the chest, right between the nipples, compressing the chest between 1½ and 2 inches. Use your body weight to help you compress the chest to the appropriate depth. Compressions should be at the rate of 100 per minute, so each compression should take less than 1 second. Continue compressions until professional help arrives.
4. If you are trained in CPR, clear the victim's airway. Begin by tilting the head back, by placing your palm on victim's forehead and lifting the chin. Clear the airway as you have been instructed in your CPR training.
5. Perform rescue breathing to restore oxygen to the circulation. Once the head is tilted back and the airway is clear, pinch the nostrils and cover the victim's mouth with yours to form a seal. Give two rescue breaths. Each breath lasts one second. The victim's chest should rise. If it does not, retilt the head and repeat the rescue breath. Each cycle of CPR is two breaths followed by 30 compressions.
6. When an AED is available, use it according to the directions on the machine. Administer one shock, then resume CPR cycles, starting with compressions for two minutes.
7. Continue until emergency medical personnel arrives.

CPR for Children and Infants

Cardiac arrest in children and infants is usually caused by respiratory failure. Since oxygen is quickly depleted, administering rescue breathing is essential.

Bleeding Aid

Severe bleeding is a life-threatening medical emergency. Don't remove large or deeply embedded objects. Remove any clothing or debris on the wound. Don't probe the wound or attempt to clean it. Wear disposable protective gloves if available. Follow OSHA standard precautions. The ABCs of treating a bleed are:

A—Alert—call 911.

B—Bleeding—find the source of the bleed.

C—Compression—apply direct pressure to the wound. Cover the wound with a clean cloth and apply pressure by pushing directly on it with both hands. A tourniquet applied proximal (closer to the body's center) to the wound can reduce bleeding as well.

Elevate the limb unless you suspect a fracture. This will lessen the blood flow to the area of the wound, and therefore limit the amount of blood loss. Maintain compression on the wound until medical assistance is available.

First Aid for Physiologic Shock

Shock is a life-threatening medical condition of low blood flow to the tissues, resulting in cellular injury and inadequate tissue function. It is important to recognize the early signs of shock: pale, cold, or clammy skin; rapid pulse; dizziness or fainting; shallow breathing; weakness; and possible nausea or vomiting. Anything that affects the flow of blood through the body can cause shock. Some common causes of shock are:

1. significant blood loss
2. dehydration
3. allergic reaction
4. reduced blood pressure
5. heart failure
6. nerve damage
7. blood infections

In the event of possible shock, perform the following actions:

- Call for professional assistance.
- Keep the victim lying down.
- Elevate the victim's legs, unless you suspect a fracture.
- In case of vomiting, keep the victim's airway open by turning the victim's head to the side and sweeping out his or her mouth with your finger.
- Keep the victim warm.

DISASTER EMERGENCY PLAN

Most institutions have disaster emergency plans that describe procedures in the event of a large-scale disaster, such as a flood, hurricane, fire, or earthquake. Learn your institution's procedures so that you are prepared to respond in an emergency. Pay special attention to your responsibilities. These may range from reporting to a specific place or person outside your facility in case of a fire in your building to helping remove patients from danger. If you are assigned to multiple institutions, be sure to check procedures and your responsibilities at each one.

You may also have responsibilities as a responder in the event of a health-related emergency, for instance, when a surge of injured patients arrives at your hospital, as they might in the event of a multicar accident or building collapse. In such an event, you may be called on to take on responsibilities outside of your normal duties, whether in processing patients as they arrive, taking samples in the emergency room, or working longer shifts. Again, know your institution's plan and your responsibilities, and be prepared to respond quickly.

SENSITIVITY TO LATEX AND OTHER MATERIALS

Latex sensitivity is a serious issue in the healthcare field. Today, many healthcare facilities have stopped using latex gloves, replacing them with stretch nitrile or vinyl. However, there are sources of latex present in healthcare facilities, including disposable gloves, dental dams, airway and intravenous tubing, syringes, stethoscopes, catheters, dressings and bandages. The reaction to latex products can take a variety of forms.

Irritant contact dermatitis occurs as a result of direct skin contact with materials left on the latex surface during manufacturing, such as processing chemicals. Redness, swelling, and itching

may occur within minutes to hours of exposure. Removing the glove and washing the exposed area are enough to reduce the reaction within several hours. The skin may become highly sensitized with repeat exposure.

Allergic contact dermatitis is a true allergic response in which the body's immune system reacts to the proteins or other components of the latex that are absorbed through the skin. Perspiration increases absorption. Absorption may also occur through inhalation of glove powder. Symptoms may not be localized to the exposed area.

Anaphylaxis is a rapid, severe immune reaction that can be life threatening if not treated. During anaphylaxis, the airway may swell shut, the heart rate may increase, and the blood pressure drops. Epinephrine injection and emergency room management are needed for anaphylaxis.

Those at highest risk for developing a latex allergy include people who are often exposed to natural rubber latex, including rubber industry workers and those who frequently wear latex gloves (such as healthcare workers), and people who have had multiple surgeries.

Regulations by the Food and Drug Administration (FDA) require the labeling of medical gloves that contain natural rubber latex or powder. Glove boxes are required to bear caution statements whose wording depends on the actual content of the gloves.

Nitrile and vinyl are much less allergenic but may nonetheless cause a reaction in some individuals. In addition, they may react with chemicals in some hand lotions, causing irritant or allergic dermatitis. Only approved lotions or hand creams should be used to prevent these reactions.

FLASH FORWARD
You will learn about latex tourniquets in Chapter 8.

Preventing Latex Reactions

Individuals with known sensitivity to latex should wear a medical alert bracelet and carry an epinephrine auto injector (commonly called an *epi-pen*). They should avoid areas where powdered latex gloves or aerosols containing latex products are used. Patients should be asked about allergies or other reactions to previous latex exposure. The substances causing latex allergy are similar to ones found in chestnuts and some tropical fruits, such as kiwi, avocado, and banana. Patients should be asked about allergies or reactions to any of these fruits.

REVIEW FOR CERTIFICATION

Safety is a paramount concern in the healthcare workplace. OSHA is responsible for workplace safety and has created rules and regulations to improve safety. These regulations govern the handling of sharps, chemicals, and other occupational hazards. The phlebotomist must pay close attention to workplace safety and learn the most effective ways to avoid hazards such as biologic, physical, sharps, chemical, radioactive, electrical, and fire dangers. Most important of all is the danger of accidental contamination with blood or other body fluids.

WHAT WOULD YOU DO?

Unfortunately, you must pass on the snack. Food and beverages should never be stored or transported along with specimens because of the risk that one or the other will become contaminated. It is also a violation of OSHA regulations, and your employer could be fined. If you eat contaminated food, you could become ill or even die. If the sample becomes contaminated, the patient may suffer from incorrect results or may need another sample drawn.

STUDY QUESTIONS

See answers in Appendix F.

1. Name six types of safety hazards in the workplace and give an example of each.
2. List five safety precautions that can reduce the risk of injury in the workplace.
3. Because needle sticks are a major concern, what should you never do after performing a venipuncture?
4. List the five identifying features that all hazardous material labels must display.
5. Describe the purpose of an SDS.
6. Explain the purpose of a chemical hygiene plan.
7. In the event a chemical spills on your arm, what steps should be taken?
8. Describe the steps in the emergency response to electric shock.

9. List the five classes of fire and at least one fuel responsible for each class.
10. Describe the protocol for hands-only CPR.
11. Describe three types of reaction associated with latex usage.
12. Name the organization that regulates workplace safety, and define its purpose.
13. Explain the process that should be followed in controlling a bleeding emergency.
14. List the signs of shock and the steps to take to prevent further complications.
15. What is the best way for a phlebotomist to prepare for a disaster that occurs in the community?
16. Choose a local healthcare institution. Research its disaster emergency plan, and find out what responsibilities phlebotomists have in the plan.

CERTIFICATION EXAMINATION PREPARATION

See answers in Appendix F.

1. OSHA stands for
   a. Occupational Standards in Health Associations.
   b. Outline of Safety Hazards and Accidents.
   c. Occupational Safety and Health Administration.
   d. Occupational Standards and Health Administration.
2. When mixing acids and water, you should
   a. add acid to water.
   b. add water to acid.
   c. never mix acids and water together.
   d. add equal amounts in an empty container.
3. Chemicals should be
   a. stored above eye level.
   b. labeled properly.
   c. cleaned up using soap and water.
   d. disposed of in the sink.
4. The first action to take in the event of fire is to
   a. call the fire department.
   b. close the windows and doors.
   c. remove patients from danger.
   d. pull the fire alarm.
5. In the event of electric shock, the first thing you should do is
   a. call 911.
   b. attempt to turn off the electrical equipment.
   c. break contact between the source and the victim.
   d. start CPR.
6. Class C fires involve
   a. wood.
   b. grease or oil.
   c. flammable materials.
   d. electrical equipment.
7. Which of the following does the NFPA symbol not warn about?
   a. Protective equipment
   b. Fire
   c. Chemical stability
   d. Health
8. The first thing to do when giving CPR to a victim is
   a. clear the airway.
   b. place the victim on a firm, flat surface.
   c. begin mouth-to-mouth ventilation.
   d. determine whether the victim is conscious.
9. Safety equipment in the laboratory may include
   a. personal protective equipment.
   b. an emergency shower.
   c. an eyewash station.
   d. all of these.
10. An SDS provides information on
    a. sharps.
    b. patients.
    c. chemicals.
    d. office procedures.
11. Reaction to latex products may include
    a. irritant contact dermatitis.
    b. allergic contact dermatitis.
    c. anaphylaxis.
    d. all of these.
12. The yellow diamond in the NFPA label indicates
    a. health hazards.
    b. flammability.
    c. reactivity warning.
    d. other.