

Safety and First Aid

A. Safety in Healthcare Facilities and Laboratories

1. Goal is to recognize and eliminate hazards by providing safety education, equipment, and training so employees can have a healthy, safe environment.
2. OSHA Act of 1991 mandates the provision of a safe working environment.
3. Safety in specimen handling is critical to avoid acquisition of infection.

B. Personal hygiene in the healthcare and laboratory work environment

1. Put nothing in your mouth.
2. Wash hands frequently.
3. Never apply cosmetics.
4. No eating or drinking.
5. Tie back long hair.
6. Button lab coat.
7. No food in the lab fridge.
8. No loose, dangling clothing or jewelry.
9. Open toed shoes and sandals prohibited.

C. Laboratory Safety

1. Correct handling of specimens
 - a. Specimens should be covered at all times.
 - b. Centrifuge specimens using appropriate precautions.
 - c. Dispose of samples in appropriate biohazard containers.
 - d. Cover needles by properly utilizing the safety equipment which requires a one-handed method of permanently covering a used needle.
2. Correctly dispose of biohazardous waste.
 - a. Double bag as required by facility policy
 - b. Sharps container for needles, lancets and broken glass.

- c. When disposing of specimens in the sink, turn water on *gently*.
 - d. Urine specimens are poured down the drain.
 - e. Blood can be poured down the drain if local ordinance permits, most facilities put in biohazard trash due to the high number of samples.
- 3. Decontaminate the work area daily and as needed.
 - a. Can use a 1:10 dilution of bleach, must be prepared daily.
 - b. Decontamination of reusable equipment
 - 1) Decontaminate with bleach solution or other suitable disinfectant
 - 2) This includes tables, tourniquets, chairs, floors, or anything with visible blood or body fluids.
 - c. Decontamination of blood or body fluid spills must be handled carefully.
 - 1) Place paper towels over the spill.
 - 2) Flood with bleach solution or disinfectant.
 - 3) Allow the solution to soak into the contaminated material.
 - 4) Glass or sharp objects are not to be removed by hand; if present, they must be removed by mechanical means (brush and dustpan).
 - 5) Wipe up material with paper towels or absorbent pads and place in a biohazard container.
 - 6) Spray the area again with bleach or disinfectant and allow it to air dry.
 - 7) Special encapsulating powders are available which gel liquids.
- 4. Colored biohazard labels must be placed on all containers used to store, transport or ship blood or body fluids.
- 5. For accidental blood or body fluid exposure:
 - a. Use appropriate safety equipment, i.e., if in eyes go to the eye wash station.
 - b. If it is a puncture wound **immediately** apply first aid, then report.
 - c. If an employee, report to your supervisor immediately. If a student, follow the exposure plan you will receive during clinical orientation. Take the packet to clinical EVERY DAY.

- d. Health care workers (HCW) and patients (if known) should be evaluated for HIV, HCV, and HBV.
- e. HCW should receive HBV vaccine and initial dose of antiretroviral within 1 to 2 hours of exposure.
- f. HCW should be counseled and evaluated for HIV infection at periodic intervals.

D. Fire Safety

1. Phlebotomist responsibilities

- a. All employees are responsible for safety.
- b. Know the location of fire extinguishers and learn how to use them correctly.
- c. Know the procedure for reporting a fire.
- d. Know the location of the fire blanket .
- e. It is mandatory to attend periodic safety programs to review fire safety.

2. Components of a fire

- a. Fuel
- b. Oxygen
- c. Heat
- d. Necessary chain reaction – to start and maintain a fire

3. Classification of fires

- a. **Class A** (think Ashes) fire occurs with ordinary combustible material such as wood, rubbish, paper, cloth, and many plastics.
- b. **Class B** (think Barrels) fire occurs in a vapor-air mixture over flammable solvents such as gasoline, oil, paint, lacquers, grease, and flammable gasses.
- c. **Class C** (think Current) fire occurs in or near electrical equipment.
- d. **Class D** (think Dangerous) fire occurs with combustible metals such as magnesium, sodium, and lithium.

4. Fire extinguishers
 - a. **Class A** contains dry chemicals, or water.
 - b. **Class B** contains foam, dry chemicals or CO₂ used on fires composed of vapor, air mixtures or solvents.
 - c. **Class C** contains non-conducting extinguishing agents such as dry chemicals, CO₂, or halon used on fires which occur in or near electrical equipment.
 - d. **Class D** used on fires ignited by combustible metals like magnesium, lithium, and sodium. Very rarely encountered in the clinical laboratory.
 - e. **ABC** multipurpose extinguisher is very popular and frequently used. It reduces confusion about what type of extinguisher to use.
5. Proper use of fire extinguisher = **PASS**
 - a. **P**ull Pin
 - b. **A**im Nozzle at the base of the fire
 - c. **S**queeze Handle
 - d. **S**weep Nozzle side to side
6. Most healthcare facilities use acronym **RACE** as the response to a fire
 - a. **RESCUE** Rescue/Remove person(s) from immediate vicinity of the fire
 - b. **ALERT** Immediately pull alarm and call designated number
 - c. **CONFINE** Close all doors and windows.
 - d. **EXTINGUISH** If fire is small with fire extinguisher or **EXIT** area
 - e. If evacuation is necessary, use stairs, not the elevator
 - f. **Stop, drop, and roll** if clothing is on fire.
 - g. If caught in a fire, crawl to exit, get a wet towel if possible to cover mouth and nose.
 - h. Do not block entrance or try to reenter the building.
 - i. Do not panic or run.

E. Electrical Safety

1. Potential major hazard is the possibility of electric current passing through a person.
2. Know the location of circuit breakers to assure fast response during electrical fire or shock.
3. Preventive maintenance on equipment.
 - a. Periodically inspect cords for fraying.
 - b. Control switches and thermostats should be in good working order.
 - c. Unplug equipment when cleaning up spills in equipment or performing preventive maintenance.
 - d. Use a 3-prong plug.
 - e. Do not touch electrical equipment while drawing blood from a patient.
 - f. The use of extension cords is not allowed in the clinical laboratory.
4. Procedure to follow when a coworker has contact with electrical current.
 - a. Do not touch the victim.
 - b. If possible, carefully unplug equipment first or turn off power.
 - c. To remove electrical contact, use electrical-insulating gloves, which cannot conduct electricity or place a hand in a glass beaker to push power supply away from the victim.
 - d. Call for medical assistance and start CPR immediately if needed.
 - e. Do not move the victim.
 - f. Place a fire blanket or other warm clothing over the victim.

F. Radiation safety

1. Three principles to protect yourself
 - a. **Time** – exposure to radiation is cumulative (the more time you are exposed, the more dangerous it is to you); keep exposure to a minimum
 - b. **Shielding** – lead apron or behind lead shield.
 - c. **Distance** – to reduce the amount of radiation exposure.

2. Know the radiation sign and use appropriate precautions – colors may be different, but the symbol will be the same.



- a. Areas where radioactive materials or reagents are stored must be labeled with a radiation hazard sign.
 - b. Exposure for phlebotomists may be during collection of specimens in the nuclear medicine or x-ray department or taking specimens to the RIA department in the lab.
 - c. In clinic settings, phlebotomists may be asked to assist with proper placement of patients for an x-ray, shielding must be provided.
 - d. Unacceptable exposure may lead to diseases such as cancer.
 - e. If routine exposure is expected, it may be a requirement to wear a dosimeter badge to monitor the amount of exposure received.
3. Be knowledgeable about your institution's policy pertaining to radiation safety, especially if pregnant.

G. Mechanical Safety

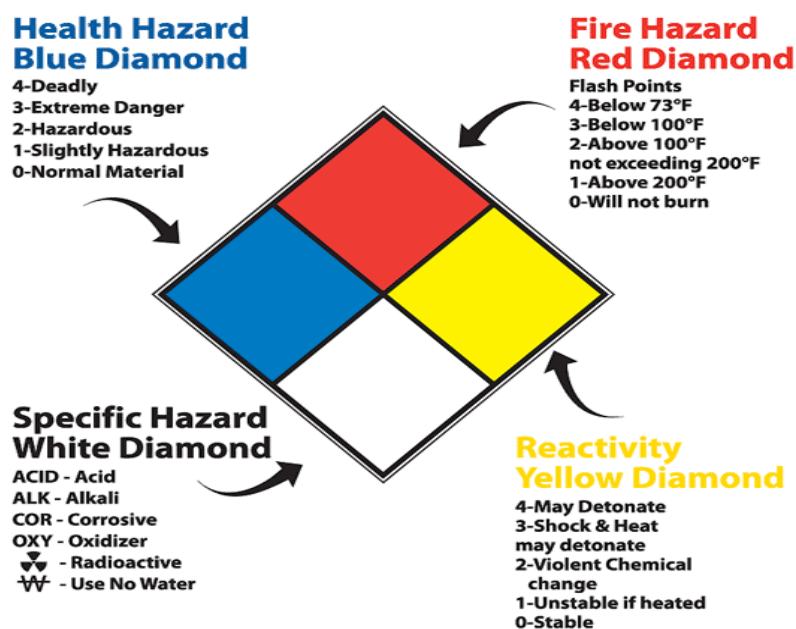
1. Correct use of equipment is critical.
2. Centrifuge is the most common piece of equipment used by phlebotomists.
 - a. Centrifuge must be properly balanced.
 - b. Unbalanced load can lead to dangerous problems.
3. Routine cleaning and preventive maintenance must be done on a regular basis
4. If a tube of blood breaks in a centrifuge
 - a. Unplug the centrifuge before cleaning.
 - b. Clean with an appropriate disinfectant.

H. Chemical Safety

1. Injury in the laboratory can occur due to exposure to poisonous, volatile, caustic, or corrosive agents such as strong acids or bases.
2. Different chemicals and reagents can present different types of hazards.
 - a. Inhalation of fumes can damage lungs Example: sulfuric acid.
 - b. Some are corrosive (can chemically damage or destroy body tissue) Example: phenol.
 - c. Some are caustic (can chemically burn body tissue) Example: acetic acid.
 - d. Some are volatile (can vaporize or change into a gas under normal conditions) Example: some solvents.
 - e. Some present a combination of hazards.
3. All chemicals and reagents should be stored in the original container, tightly closed and in an appropriate, well ventilated storage area, such as a flammable cabinet.
4. **Hazard communication manual**, mandated by OSHA in 1986 and known as the “**Right to Know Act**,” requires that employers maintain documentation related to all hazardous substances and must include the following:
 - a. Written communication program.
 - b. Documented training of employees.
 - c. Sophisticated tracking and documentation of hazardous substances and **Safety Data Sheets (SDS)**.
5. **Occupational Safety and Health Administration** (OSHA) hazard communication standard (Right to Know) is designed to ensure that laboratory workers are fully aware of hazards associated with chemicals in the workplace.
 - a. Each site must have a comprehensive chemical hygiene plan to implement the practice of safety measures throughout the lab.
 - b. A **chemical hygiene plan** for each lab must include:
 - 1) Outline the specific work practices and procedures necessary to protect workers from any health hazards associated with hazardous chemicals.
 - 2) Provide information and training regarding hazardous chemicals to all lab workers.

- c. All hazardous chemical labels must contain the following:
 - 1) Appropriate warning, i.e., corrosive.
 - 2) Explain the nature of hazard, i.e., flammable.
 - 3) Special precautions to eliminate risks.
 - 4) Explain first-aid treatment for exposure.
- 6. Information about signs and symptoms associated with exposure to hazardous chemicals used in the lab must be communicated to all.
 - a. Reference materials for this information are included in the Safety Data Sheets (SDS) provided by all chemical manufacturers and suppliers.
 - b. This information concerns hazards, safe handling, storage, and disposal of hazardous chemicals used in the lab.
- 7. Safety Data Sheets (SDS)
 - a. Previously called Material Safety Data Sheets (MSDS), modified to SDS to be in line with **Global Harmonization System (GHS)**.
 - b. **GHS** developed for consistent hazardous material classification and transportation regulations in all countries and standardized the order and format of the SDS.
 - c. Information is provided by chemical manufacturers about each chemical every time the chemical is purchased.
 - d. Each lab must have on file all SDSs for the hazardous chemicals used in the lab.
 - e. Use of SDSs is a common way that potential product hazard information is made available to employees and OSHA requires this provision by all chemical manufacturers.
 - f. The healthcare facility is required to provide this information to its workers. The SDS's must be in an area accessible to all employees.
 - g. Each SDS contains basic information about the specific chemical or product including:
 - 1) Trade name, chemical name, and synonyms
 - 2) Chemical family

- 3) Manufacturer's name, address and phone number for further information
 - 4) Hazardous ingredients
 - 5) Physical data, fire and explosion data.
 - 6) Health hazard and protection information
- h. The SDS **DOES NOT** include instructions on how to use the chemical, as this may vary with each lab's use of the chemical.
8. Hazard Warning
- a. The NFPA 704 marking system is a hazard identification system developed by the National Fire Protection Association that is frequently used in health care facilities.
 - b. This system provides, at a glance, in words, symbols, and pictures, information on the presence of potential hazards and the level of hazard.
 - 1) Health – blue
 - 2) Flammability – red
 - 3) Reactivity or instability – yellow
 - 4) Special hazards information – white



- c. The hazard identification system consists of four small, diamond-shaped symbols grouped into a larger diamond. **MEMORIZE!**
 - 1) Top diamond is *red* and indicates a *flammability* hazard.
 - 2) Diamond on right is *yellow* and indicates a reactivity-instability hazard; these materials are capable of explosion or violent chemical reactions.
 - 3) Diamond on the left is blue and indicates a possible health hazard.
 - 4) Diamond on the bottom is white and indicates special hazard information such as radioactivity, special biohazard, and other dangerous elements.
 - 5) The system indicates the severity of the hazard using numerical designations from 0 to 4, with 0 being no hazard and 4 being extremely hazardous.
- 9. Routine safety precautions when handling chemicals.
 - a. Read labels for potential hazards prior to use.
 - b. Use appropriate PPE when handling.
 - c. Use special carriers for transport of large bottles of chemicals.
 - d. Rooms or cabinets used for storage must be labeled with caution signs at entrance specifying chemicals present.
 - e. Never store chemicals above eye level.
 - f. Explosives and flammables should be stored in separate, specially designed safety cabinets.
 - g. If a chemical is transferred from the original container, **the new container must be labeled with chemical name and hazard identification diamond.**
- 10. Chemical spill or exposure
 - a. Know the location and proper use of the eye wash station and safety shower.
 - b. If clothing is involved, go to a safety shower, remove clothing, and rinse for 15 minutes.
 - c. If eyes are splashed, go to the eye wash station, remove contact lenses, and rinse for 15 minutes.

- d. For spills on surfaces, obtain a chemical clean up kit from the clinical chemistry department.
 - 1) Special supplies which absorb or neutralize acid, alkali, mercury, and other chemicals.
 - 2) Type used will depend on the type of chemical involved.
 - 3) Has an indicator system that changes color when spill has been neutralized and can be cleaned up.
- 11. Disposal of chemicals
 - a. Acids and alkalis that are soluble in water can be flushed down the sink with lots of cold water.
 - b. Pour alkalis into a large amount of water first.
 - c. ALWAYS add acid to water, NEVER add water to acid. Pouring water into **acid** may result in an explosion.

I. Equipment and Safety in Patient Rooms

- 1. Properly dispose of all specimen collection supplies.
- 2. Leave bed rails in the position they were in when you entered.
- 3. Report unusual odors.
- 4. Check and report spills on the floor.
- 5. During blood collection, do not touch electrical instruments, patients and you may become grounded and receive a shock.
- 6. If a patient has an IV, report to the nurse if the site is red and swollen, blood is backing up, the IV container is empty or the IV alarm is sounding.
- 7. If the patient is in unusual pain, or is unresponsive, notify the nursing station immediately.
- 8. Be aware of signs and symptoms of latex allergies in patients which may include skin rash, hives, respiratory problems, or shock.

J. Safety Outside of Patient Rooms

- 1. Travel with care as trays, carts, or other equipment may be in unusual places.
- 2. Pick up items on the floor to prevent individuals from slipping.

3. Avoid running, as others may become alarmed and run also, or you may run into someone.

K. Disaster emergency plan

1. Most institutions have developed procedures to follow in case of tornado, hurricane, flooding, earthquake, bomb threat and local major disasters.
2. Must become knowledgeable about your role in disaster plan procedures.
3. Many places have annual or semi-annual area-wide disaster drills involving all emergency service departments and appropriate health care facilities.

L. Emergency Procedures

1. Detach yourself from the situation to the degree necessary to perform well and deliver best possible care.
 - a. Be prepared to act if an accident or unexpected event occurs in your presence.
 - b. Prevent severe bleeding, maintain airway, prevent shock, and further injury.
 - c. Get assistance immediately, but do not leave the patient.
2. Bleeding aid
 - a. Place a clean cloth over the site and apply pressure. Call for help.
 - b. If a cloth or gauze is not available, use your gloved hand.
 - c. Elevate the wounded limb to decrease blood flow, raise it above the heart.
 - d. Do not use a tourniquet to control bleeding unless there is an extreme situation, such as a limb is mangled, crushed, or amputated to the extent that there is profuse bleeding.
3. Breathing aid
 - a. Lips, tongue and fingernails become blue when breathing stops.
 - b. This is an indication for immediate mouth to mouth resuscitation using a mouth-to-mouth barrier device.
 - c. Delay in artificial respiration may result in brain damage or death.
4. Circulation aid can be achieved by proper Cardiopulmonary Resuscitation.

- a. Most large health care institutions offer CPR classes and refresher courses periodically.
 - b. TAKE a CPR class. Do not perform CPR unless you are certified.
5. Preventing shock
- a. May be the result of excessive bleeding, extensive burns, lack of oxygen or other traumatic events.
 - b. Signs include pale, cold, clammy skin; weakness; rapid pulse; increased shallow breathing and frequently nausea and vomiting.
 - c. Main objectives are to improve circulation, get sufficient oxygen to the brain and maintain body temperature.