RISK MANAGEMENT
Module #18 of the CLIA Lab Director Certification Course
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Educational Objectives
Upon completion of this module, the learner should be able to:

1. Define which regulatory agencies monitor laboratory risk management.
2. List the components that OSHA Guidelines for Safety require in the laboratory.
3. Discuss regulations for training employees about safe practices in the laboratory environment.
4. Define what risk management documentation must be maintained within the laboratory and in the employee’s files.
5. Identify the common warning signs and labels posted in laboratory.
6. Define the term "bloodborne pathogens" and list the common organisms of most concern.
7. Differentiate between direct contact and indirect contact with bloodborne pathogens.
8. Define universal precautions.
9. List barriers that are commonly worn to protect from biohazards.
10. List which infectious materials are included in universal precautions.
11. Discuss safe practices that must be followed to comply with universal precautions.
12. Outline laundry procedures that comply with universal precautions.
13. Develop a procedure for cleaning the work area that will keep employees from contracting diseases from exposure to bloodborne pathogens.
14. Discuss personal protection via HBV vaccination.
15. Discuss safety precautions employees must take when a patient is believed to have tuberculosis.
16. Outline a waste management program that complies with OSHA regulations.
17. Describe the requirements of the OSHA Hazardous Chemical, Electrical, and other disasters guidelines.
18. Define the purposes of Material Safety Data Sheets and why a laboratory must maintain a complete chemical inventory.
19. Describe the NFPA sign and the information obtained in each section of the diamond.
20. Discuss rules that employees must follow to help provide a safe working environment.
21. List the general guidelines for storage of chemicals
22. Define the purpose of spill kits.
23. List what equipment is considered to be "personal protective equipment" and discuss the purpose of each.
24. Discuss the principles of a fire and electrical safety program.
25. Define what the RACE acronym stands for in fire or hazardous situations.
26. Discuss the importance of helping employees avoid repetitive stress injuries.
27. Describe the correct way to lift objects.

Situation:
It was the middle of the "flu season" and the physician's office seemed unusually busy that day. Pat, the laboratory technician, could hardly get the lab tests completed before another patient was waiting to have their blood drawn. At one point there were five patients standing in line waiting to be drawn. In his rush to draw the third patient, Pat accidentally stuck himself with the needle as he was taking the cap off. It was then that he realized that in his rush, he had not changed his gloves nor washed his hands between patients. He just didn't have time! In his rush to get to the sink to wash the puncture, he discarded his gloves, bumped into the cart that was holding his blood drawing supplies, and reached for the faucet. As he was washing his hands, he heard something fall to the floor. On the floor he found a broken tube with a patient's sample splashed all over.

Does this situation seem unlikely? What are the mistakes Pat made? When each employee in a facility takes the responsibility of keeping the entire office, including the laboratory, a safe place
to work, and every person is trained to follow safe practices as second nature, these incidences can be kept to a minimum. Until then, a situation such as the one above can occur.

This module is designed to remind everyone of the risks associated with working in the clinical laboratory, the precautions to be taken in infection control, and other risk management concepts. Many sets of rules, standards and guidelines dealing with risk management have been developed by federal, state, and local agencies and professional organizations. This module contains links to resources that cover all working laboratories. However, each individual must consult with their employer for any specific rules that govern their facility.

The field of health and safety continues to grow in complexity as we learn more about the hazards in our workplace. Today's highly technical clinical laboratory contains many biological fluids, chemicals, electronic instruments, and other sources of potential hazards. Each worker in the laboratory has the responsibility of keeping the laboratory a safe working place in compliance with the guidelines and safety practices outlined by OSHA and the management.

**Regulatory Agencies:**
OSHA, the Occupational Safety and Health Administration, was created in 1970 to help prevent employee work hazards. Subsequently, it then mandated two programs to assure the safety of clinical laboratory personnel. The first deals with the occupational exposure to chemical hazards and became law in 1991. The second deals with occupational exposure to bloodborne pathogens and became law in 1992. In addition, the Joint Commission on Accreditation of Healthcare Organizations and the College of American Pathologists continually revise their guidelines to provide more consideration for the health and safety of the laboratory employee.

Today all physician offices and laboratories must have written policies and procedures that are customized for each facility. OSHA states that these policies and procedures must include rules for:

- General Safety
- Bloodborne Pathogens
• Universal Precautions
• Tuberculosis Prevention
• Communication of Hazards
• Chemical Hygiene
• Personal Protective Equipment
• Fire and Electrical Safety
• Ergonomics Precautions

**General Safety Guidelines**

OSHA and other regulatory agencies mandate that employers provide a safe working environment for their employees, and develop work practice controls where warranted. However, a clinical laboratory risk management program depends on every employee's participation and cooperation. Noncompliance with safety precautions not only endangers the individual, but often compromises the health and safety of fellow workers and the surrounding community. It may also result in loss of experimental integrity and property damage. The overall safety program must include, but is not limited to, all of the following aspects. Several of these will be expanded in other sections of this unit.

**Hazard warning signs and labels**

Prominent signs and labels must be posted in all laboratory areas. These signs generally fall into four categories:

- **NOTICE:** states a policy related to safety of personnel or protections of property.
- **CAUTION:** indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided.
- **WARNING:** indicates a potentially hazardous situation that could result in serious injury or death if not avoided.
- **DANGER:** indicates a potentially hazardous situation that will result in serious injury or death if not avoided.

In addition, the [National Fire Protection Agency (NFPA)](https://www.nfpa.org) requires the posting of the hazardous materials classification charts within the laboratory area. All hazards such as biohazards,
radiation hazards, laser light, chemical hazards, explosive or flammable liquids, cryogenic hazards, compressed gas storage, noise hazards, and UV light must be posted with guidelines for handling these hazards available in a procedural manual on site. All employees must be educated on the meanings of these signs and labels.

**Safe work practices**
The safe work practices policies must include, but are not limited to, guidelines for all of the following topics.

**Hygiene:** covers the safe use of chemicals and the use of universal precautions when the employee has the potential of being exposed to blood.

**Dress Code:** covers the use of personal protective equipment including laboratory clothing, gloves, eye and face protection, and respiratory protection.

**Incident Reports:** All exposure incidents require that an incident report be filed on employees within 24 hours of an accident and must be kept in the employee's permanent file.

**Infection Control:** policies must be in place for the protection of all employees including transfer personnel or couriers and those processing the samples. Work surfaces that come in contact with any hazards or have the potential to become contaminated must be cleaned on a daily basis with a disinfectant such as dilute bleach (0.5% sodium hypochlorite). Should accidents occur, all work surfaces must be decontaminated first with a spill kit using the manufacturer's instructions and then with a disinfectant such as the one mentioned above.

**Hazard containment/Waste management:** Each employer must develop a protocol for the processing of regulated waste material. Separate containers must be used for "dry" and "wet" materials and sharps (needles, scalpel blades). Some institutions require that waste materials be autoclaved before disposal; others dispose of their waste by incineration.

**Control of air flow**
The air flow within a laboratory environment should be controlled to contain any hazardous materials. Disruption of the airflow may result in the production of aerosols and the transmission of airborne materials into unwanted areas of the facility. If any of the air flow systems is
disrupted for any length of time, employees must stop working with any hazardous materials, contain the hazards, and leave the laboratory area.

**Training and Record-keeping**

It is the responsibility of the employer to provide training for all new employees on bloodborne pathogens and chemical hygiene regulations. Many health care agencies also require training in fire safety. This education may be in the form of videos, discussions, or demonstrations and should be provided for employees annually. Employees may be expected to take and pass quizzes covering the material, which can then be kept in the employee’s permanent file.

**Bloodborne Pathogens**

While working in the laboratory, safety precautions must be taken in regard to bloodborne pathogens. Bloodborne pathogens are defined as any pathogenic microorganisms present in the blood of humans which are able to cause human diseases.

The organisms that most commonly come to mind when referring to bloodborne pathogens are the Hepatitis B virus (HBV) and the Human Immunodeficiency Virus (HIV). It should be remembered that body fluids and body secretions are also potentially hazardous specimens and the laboratory worker must exercise great caution and good laboratory practices when working with these specimens as well.

Exposure to blood, body fluids, and body secretions can occur by **direct contact** as well as **indirect contact**.

**Direct contact occurs through:**

- Needle puncture (parenteral) or by spilling blood, body fluids or secretions over unprotected skin openings or mucus membranes (eyes, nose, mouth, etc.)
- aerosols produced by opening of the specimen or by specimen centrifugation
- specimen splashed into eyes during handling and processing
Indirect contact can occur when the outside of containers and specimen vouchers are contaminated with blood, serum, body fluids, etc.

Since the potential for infectivity of patient's blood and body fluids is not routinely known, it is essential that all laboratory workers conform to blood and body fluid precautions on all patients. These "universal precautions" should be followed regardless of any lack of evidence of the patient's infectious status.

**Universal Precautions**

"Universal precaution" is defined as an approach to infection control where all human blood and body fluids are treated as if known to be infectious for bloodborne pathogens. Specimens that entail "universal precautions" are all excretions, secretions, blood, body fluid, and any drainage. Laboratory personnel should protect themselves from contact with these specimens by using the appropriate barrier precautions to prevent cross-transmission and exposure of their skin and mucous membranes, especially the eyes, nose, and mouth.

**Barriers**

- Gloves must be worn when handling any biologic specimen and when touching blood, body fluids, mucous membranes or non-intact skin of all patients. Disposable, nonsterile latex or vinyl gloves provide adequate barrier protection. Gloves should be worn during routine laboratory procedures as well as phlebotomy. Phlebotomists should always change gloves and properly dispose of them between patients. Hands should be washed for 15 seconds whenever gloves are changed.
- Protective clothing, such as laboratory coats, cloth gowns, aprons, etc., should be worn when there is a chance for spraying or splashing of blood and body fluids. If the protective clothing becomes visibly contaminated with blood or body fluids it should be changed immediately to prevent contamination of personal clothing or skin. Protective
Clothing should not be taken home for laundering. Protective clothing should also be removed whenever leaving the laboratory.

- Protective eyewear such as goggles, safety glasses with side protection, and facial shields MUST be worn if there is significant potential for the splattering of blood and body fluids to the eyes, nose or mouth. In most situations splash shields will suffice.

**Other safe practice rules**

Other "Universal Precautions" that should be followed in the proper operation of a clinical laboratory or physician's office laboratory are:

1. Never pipet by mouth and never blow out pipets that contain infectious material or other liquids.
2. Avoid using syringes whenever possible and dispose of needles without recapping, bending, or cutting, in rigid puncture-resistant containers clearly marked as biohazard.
3. Disinfect and decontaminate all work surfaces and devices where biologic materials are handled at completion of work. Sodium hypochlorite (0.5%) or some other proper disinfectant can be used. All spills should be immediately disinfected with 0.5% sodium hypochlorite. Contact should occur for at least 15 minutes.
4. No warning labels are to be used on patient specimens.
5. Properly dispose of contaminated laboratory supplies (biohazardous waste). All contaminated supplies may be incinerated or autoclaved prior to being discarded.

6. Obtain immediate treatment for accidental and inappropriate contact with biohazards, such as a needle stick. The incident should be reported to the supervisor so that appropriate prophylactic measures can be taken.

7. Strongly encourage frequent hand washing for 20 seconds in the laboratory. Employees must wash hands before leaving the laboratory.

8. All tubes should be inspected for cracks before centrifuging.

9. Employers must provide HBV vaccinations for all employees at no cost to the employee.
Tuberculosis is a contagious and potentially life threatening disease caused by a bacterium known as *Mycobacterium tuberculosis*. Employees in the field of health care have a risk of developing tuberculosis as a result of their occupational exposure to tuberculosis. The annual tuberculin conversion rate is estimated to approach 4% of physicians training in a medical center. Tuberculosis is transmitted by inhaling contaminated air containing *M. tuberculosis*. This organism is passed from person to person by infectious aerosols or droplet nuclei produced by coughing, sneezing, talking, etc. The major symptoms of tuberculosis are a chronic productive cough lasting three weeks or more, fever, chest pain, night sweats, loss of weight, fatigue, anorexia, and hemoptysis (blood in the sputum).

In 95% of patients with tuberculosis, the cell-mediated immune system is able to contain the disease at the initial site of infection in the lungs and this local infection heals without consequence. Therefore, infection has occurred but the disease remains "latent." The patient is not infectious, that is, not able to spread the disease to others. In 5% of TB cases, the disease is "active." These people usually have some or all of the symptoms mentioned above and often have an abnormal chest x-ray as well. Patients with "active" disease are infectious and must be isolated until the disease is controlled.

Most of the time the physician does not know on preliminary examination that his patient may have active tuberculosis until x-rays and PPD skin tests are performed. It is prudent to screen all patients for cough or determine if they have been exposed to relatives or other individuals with tuberculosis. However, if the physician is suspicious that his patient may have active tuberculosis (presents many of the symptoms previously described) or poses a higher index of suspicion, such as an immigrant from SE Asia, an IV drug abuser, a homeless individual or an immunocompromised patient (e.g., AIDS patient), then the patient should wear a surgical mask and be placed in a TB isolation room with the door closed to reduce the chances of producing aerosols.

Ideally, the TB isolation rooms should have a negative air pressure to direct airflow away from adjoining rooms or hallways. Contaminated air should be exhausted to the outside of the building.
Early morning sputum is the best specimen for culture. The ideal situation is to collect three to five consecutive early morning sputum specimens (at least 10 mL each) by the "deep cough" technique so as to collect drainage from deep down in the lung. Sometimes patients cannot cough up sputum and the inhalation of hot saline vapor is necessary for inducing sputum production. During coughing and cough inducing procedures, the patient should be kept isolated until coughing subsides. Staff exposed to patients during coughing and specimen collection should wear respiratory protective devices, such as N95 or High-Efficiency Particulate Air (HEPA) respirators.

Once the expectorated or induced sputum is obtained it is placed in a regular sterile sputum cup and sent immediately to the clinical laboratory for processing, cultivation, isolation and identification of mycobacteria utilizing the proper OSHA TB safety regulations.

TB isolation rooms should be kept empty until properly ventilated (1 hour) and then cleaned by routine office procedures.

**Introduction**

The [Hazard Communications Law](#), sometimes referred to as the Lab Right to Know Standard, was passed in 1983. This requires workplaces to develop a chemical hygiene plan (CHP) which mandates that laboratories have a complete chemical inventory updated annually and a complete file of Material Safety Data Sheets (MSDS) or the Safety Data Sheets (SDS), which is the new term revised in 2012 for all hazardous and toxic chemicals or substances in their facility. The SDS outline the proper storage, disposal, hazards, toxic levels and other properties of every chemical used in the facility and must be available to the employee 24 hours per day and seven days a week. The local Environmental Protection Agency (EPA) personnel will provide guidelines on the disposal of all chemicals. Consult your local fire department for the standards set by the National Fire Protection Association (NFPA) in relationship to the storage of flammable agents used in the laboratory. Also, as part of the CHP, all employees must be trained on the proper use and disposal of hazardous chemicals and potential carcinogens.
SDS Chemical Labeling

OSHA mandated that laboratories must have a chemical hygiene plan developed and in place as of January 31, 1991. This plan provides for the protection and education of all employees in the facility and must include:

1. Glossary of safety terms
2. Standard operating procedures for use of chemicals
3. Safety Data Sheets (SDSs) for all chemicals
4. An inventory of chemicals updated annually
5. Appropriate chemical storage information
6. Chemical labeling requirements
7. A description of environmental monitoring
8. Maintenance of safety devices
9. Availability of required personal protective equipment (PPE) for all employees
10. Waste removal and disposal procedures
11. Housekeeping protocol for working with hazardous chemicals
12. Requirements for employee physicals and consultations
13. Education/training requirements of employees
14. Recordkeeping requirements
15. Appointment of a Safety Officer and Committee
16. Any other information deemed necessary to assure a safe working environment.
Standard operating procedures
Each facility must develop procedures for handling accidents and chemical spills. In general, if chemicals have come in contact with the eyes or skin, the areas must be flushed with copious amounts of water first and then followed with medical attention. The eye washing procedure requires a minimum of 15 minutes of washing. Some skin contact with chemicals may require neutralization as part of the washing process. For example, acid burns may be neutralized by the application of a paste of sodium bicarbonate (baking soda) to the affected area. Thus, sodium bicarbonate should be available as part of the laboratory first-aid kit.

To help assure protection employees, each employer must develop rules for avoiding unnecessary chemical exposure. These rules might include, but not be limited to the following:

In the laboratory work area:
1. Smoking, eating, and drinking are prohibited.
2. Do not store any food or drinks in any laboratory refrigerators, especially those that store chemicals or biological hazards.
3. Do not apply cosmetics, even lip balm.
4. Pull back and secure long hair.
5. Wear only approved clothing.
6. Wear shoes that cover the entire foot and are not made of canvas.
7. Always wear safety glasses when handling chemicals. Do not wear contact lenses. Never manipulate contact lenses.
8. Pipetting by mouth is absolutely prohibited.
9. Keep hands away from hair, mouth, eyes, nose, and face while working in the laboratory.
10. Wash hands thoroughly after handling any chemicals.
11. Wash hands thoroughly before handling non-laboratory equipment and before leaving the laboratory.
12. Dispose of all chipped or cracked glassware because they could break easily and spill chemicals.
13. Rinse all used glassware thoroughly before putting with other glassware to soak.
14. Clean work area thoroughly when the testing is completed.
Some guidelines for the storage of chemicals include:

- Store a minimal amount (less than a liter) of chemicals in the working laboratory area.
- Clearly mark all refrigerators that store chemicals.
- Solvents with a low flash-point (like hydrogen peroxide) must be stored in an explosion proof refrigerator.
- Toxic or carcinogenic chemicals must be stored in unbreakable, chemically resistant, secondary containers.
- Toxic chemicals must be labeled: HIGH CHRONIC TOXICITY.
- Carcinogenic chemicals must be labeled: CANCER SUSPECT AGENT.
- Volatile solvents must be stored in fire safety cabinets with venting to the outside of the building where possible.
- The amount of volatile solvents at the bench must be limited to 100 mL or less. (Some local fire departments limit this amount further.)

OSHA guidelines require that chemicals remain in the original containers with the original labels kept intact. When portions of the chemical are removed from the original container, the label on the new container must include the origin of the chemical and all hazards that the chemical might pose. OSHA has adopted new hazardous chemical labeling requirements as a part of its recent
revision of the Hazard Communication Standard, 29 CFR 1910.1200 (HCS), bringing it into alignment with the United Nations’ Globally Harmonized System of Classification and Labelling of Chemicals (GHS). These changes will help ensure improved quality and consistency in the classification and labeling of all chemicals, and will also enhance worker comprehension. As a result, workers will have better information available on the safe handling and use of hazardous chemicals, thereby allowing them to avoid injuries and illnesses related to exposures to hazardous chemicals.

GHS Label Components

1. **Signal word.** The signal word indicates hazard level. There are only two words used as signal words, “Danger” and “Warning.” Within a specific hazard class, “Danger” is used for the more severe hazards, and “Warning” is used for the less severe hazards.

2. **Hazard Pictogram.** These are used to identify hazardous products and are commonly grouped by chemical/physical risk, health risk and environmental risk.

3. **Manufacturer Information.** This identifies the manufacturer’s company name, address, and telephone number.

4. **Precautionary Statements/First Aid.** Describe recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to the hazardous chemical or improper storage or handling. There are four types of precautionary statements: prevention (to minimize exposure); response (in case of accidental spillage or exposure emergency response, and first-aid); storage; and disposal.

5. **Hazard Statements.** Describe the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard. For example: “Causes damage to kidneys through prolonged or repeated exposure when absorbed through the skin.” All of the applicable hazard statements must appear on the label.

6. **Product Name or Identifiers.** How the hazardous chemical is identified.

Physician office laboratories that handle cytotoxic drugs are required to have special procedures on handling these agents. Biosafety hoods must be provided, and employees trained and monitored in their use of the hoods. In addition, the hoods themselves must be monitored.
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annually to assure that they are operating correctly and that the minimum air flow across the face of the hood is met.

Formaldehyde and gluteraldehyde, chemicals that are often found in medical facilities, are also covered under this standard. Baseline monitoring is usually recommended for documenting potential employee exposure to these chemicals. Radioactive chemicals, which are now used rarely in the clinical laboratory, also require special monitoring and disposal procedures.

In addition to chemicals, the Hazard Communication Standard covers gas tanks such as oxygen, CO2, and others. Tanks, both full and empty, must be stored upright on a stand and/or chained to a wall or stationary object, preferably in an area away from the laboratory. Generally, these tanks are color coded and marked by the globally harmonized system of classification and labeling of chemicals (GHS).

An employee's knowledge of the properties of the chemicals in use in the laboratory and of the proper handling techniques greatly reduces the potential of dangerous situations. All chemicals should be handled carefully, and, when in heavy containers, placed on a cart for transport from one area to another. Glass containers should be placed in protective plastic carriers for safer transport. In the event of a chemical accident, the spill must be contained and an appropriate spill kit used to clean up the area. Many of these kits are available commercially, and each comes with directions for its appropriate use.

Remember to keep all reagent/chemical bottles and containers clearly labeled. When moving a chemical to a different container, it is best to first label the new container appropriately, thus avoiding the possibility of having an unlabeled chemical in the laboratory.

The U.S. Environmental Protection Agency (EPA) controls the disposal of all non-radioactive chemicals. However, many local fire departments and/or municipal governments have their own regulations for proper disposal. Each laboratory safety officer should consult these local regulations when developing the policies for their laboratory.
According to OSHA regulations, when information such as new toxicity data, new disposal methods, cleanup methods or other information becomes available and a company sends you an updated SDS, all employees must be informed of the changes. The education of employees on the proper storage and use of chemicals is necessary to help them avoid dangers such as burns, explosions, fires, and exposure to toxic fumes.

**Standards adopted by OSHA** in 1994 and 1996 require that all employers provide personal protective equipment (PPE) for their employees and that all employees be trained on the use of PPE. If they do not use the equipment correctly, the employees must be retrained until they use the equipment properly. The equipment that is considered to be PPE includes, but is not limited to:

1. **Lab coats must be:**
   - impervious to liquids.
   - worn while working in the laboratory and removed when leaving the laboratory.
   - left in the laboratory when leaving the room.
   - laundered by the employer.

2. **Gloves must:**
   - provide protection against biohazards, specific chemical agents, extreme temperatures, and traumatic injury.
   - be discarded in a biohazardous waste container after handling chemical and biological hazards. Hands must be washed each time gloves are removed.
   - be removed before touching non-contaminated laboratory surfaces such as the telephone or a computer terminal.
   - be decontaminated after each use and stored in a clean area if not disposable.
   - be provided for all purposes and for individuals with unique needs.

3. **Dress code:**
   - **Clothing under laboratory coats** should cover the extremities (for example, slacks or longer skirts for legs) to protect them from splashes and spills.
• Shoes should be comfortable, with non-slippery soles and cover the entire foot. They should not be made of canvas.

4. Safety goggles or glasses, masks, or full face shields must be provided for the employees. They should be worn while working in the laboratory. Several models can be worn over prescription glasses.

5. Vaccinations against the hepatitis B virus must be provided for all employees.

6. Splash guards or shatterproof safety shields must be provided and used whenever the employee might encounter aerosols or other splashes. For example, employees should always open tubes of blood with a splash guard between their face and the tube of blood.

7. First aid kits must be available for the treatment of minor skin abrasions in the work area. The employer must also consider whether his employees need formal training in first aid and CPR.

8. Spill kits must be available for the containment and clean up of any laboratory spills. There are many spill kits available commercially and each comes with directions for their appropriate use.

9. Eyewash or facewash stations must be located within the laboratory, and the employees trained on how to use them. These should be checked weekly for correct operation. When a splash to the eyes has occurred, the eye should be washed for at least 15 minutes, which means that many portable eyewash facilities would not be adequate.

10. Safety showers must be mounted within the laboratory area. They should have a large ring on a chain that can be easily found even when employees have their eyes closed. In addition, showers should be mounted high enough that employees can stand under them when needed. Showers must be checked annually for correct operation.
11. **Chemical fume hoods or biological safety cabinets** must be provided whenever the employee works with hazardous or volatile chemicals or with pathogens.

12. **Surgical masks** should be worn by patients suspected of having "active" tuberculosis when outside their room or until they are outside the building away from other people, at which point they can remove their masks. Staff must wear PPE, N95 during sample collection. Staff exposed to patients during coughing and specimen collection should wear **Respiratory Protective Devices**, such as N95 or **High-Efficiency Particulate Air (HEPA)** respirators.

The NFPA and OSHA have published standards with guidelines for protecting employees from the hazard of fires and electricity. In addition, many local and state agencies have adopted codes that also regulate the work place. Explosions and fires can be encountered anywhere in the health care setting. The most common causes of fires are carelessness, lack of appropriate training, smoking, faulty electrical wiring, and unattended equipment. To prevent fires all facilities should have a mandatory fire safety training program that includes training in safe work practices, fire fighting, and fire drills and evacuation. Employees must take precautions with electrical circuits, wires, and connections so that they do not receive shocks and so that fires do not occur.

**RACE**

In the event of a fire or other hazardous situation (major chemical spills and electrical problems), all employees must remember the RACE acronym for appropriate action:

- **Rescue**: Move all people in the vicinity of the hazard beyond a fire door.
- **Alert**: Notify the fire department through either a phone call or by pulling the appropriate alarm. When phoning, be prepared to give your name and the location and extent of the hazard. Also alert other personnel in the area and tell them what they should do to help you.
- **Confine**: Try to keep the hazard in one location by closing all doors and windows. Turn off all gas supplies, remove all flammables, and assure that all smoke doors are closed. Disconnect all electrical equipment where appropriate.
- **Extinguish**: A fire with an approved fire extinguisher only from a point of safety. Never turn your back on the fire; move the extinguisher back and forth at the base of the fire.
Other fire safety precautions that employees must know include:

- the proper evacuation plan and what the exit routes are for the area. Be certain that the exit route remains unobstructed.
- location of the fire alarms and fire extinguishers.
- the telephone number for calling the fire department.
- the use of the fire extinguisher and the fire blanket.
- the limit of the amount of chemicals at the working bench (no more than that which is used in 24 hours).
- storing incompatible chemicals separately.
- keeping flammable liquids away from sources of ignition such as Bunsen burners, motors, and switches.
- using safety can to store flammable liquids. Keep flammable liquids in an approved fire safety cabinet. Keep doors of the cabinet closed.
- never using extension cords. Use only UL approved equipment.

All health care employees need to attend fire safety training provided by a local fire or safety agency. This training is best when it provides hands-on practice of the use of fire extinguishers.

Fire extinguishers

Fire extinguishers are labeled with letters that indicate what kind of fire they can be used on:

- **A** Class A Extinguishers can be used on ordinary combustibles such as wood, cloth, and paper.
- **B** Class B extinguishers can be used on flammable liquids and gases.
- **C** Class C extinguishers are used on fires that involve an electrical supply.

In addition there are many multipurpose or combination extinguishers available. Consult your local fire department for the appropriate extinguisher to have in your particular work areas.
**Electrical Safety Precautions**

Employees must use precautionary measures when working with electrical equipment. Some equipment requires special precautions that are often suggested in the manual accompanying the instrument. OSHA requires that all grounded circuitry meet the regulations of the National Electrical Code published by the NFPA. The electrical safety precautions that employees must consider include:

1. Never overload circuits.
2. Power strips with their own fuses or circuit breakers may be used where multiple outlets are needed.
3. Never use extension cords. If one is needed on a temporary basis, the cord must be less than 12 feet in length, UL approved, and have only one outlet at the end.
4. Be sure all equipment is grounded by using three prong plugs only. Check the ground on all outlets annually.
5. Keep hands dry when working with electrical equipment. If liquids spill on electrical equipment, unplug immediately if it can be done safely and dry the equipment with a hair dryer.
6. Never use electrical equipment when any "problem conditions" occur such as:
   - frayed power cords.
   - sparking noises or overheating smells.
   - damaged plugs.
   - any feeling of small shocks or tingling.
7. Never use Class A or ABC extinguishers on an electrical fire.

**Ergonomics**

Ergonomics is the science of designing equipment and devices that fit employees' body movements and cognitive abilities. Effective and successful fits assure high productivity, avoidance of illness and injury risks, and increased satisfaction among employees.

**Repetitive Stress Injuries**

Repetitive stress injuries (RSIs) are costing American employers more than 20 billion dollars each year. RSIs can occur whenever workers must repeat the same motion throughout their
workday. Examples of common repetitive motions are the use of a computer mouse or keyboarding at a computer terminal for long periods of time. Ergonomics is the science of helping employees avoid RSIs by fitting their job to them. Often, simple and inexpensive changes in the employee's work environment (such as replacing a mouse with a track ball or educating the employee on proper posture at a keyboard) may prevent RSIs.

Lifting
All employees should be given instructions on the proper way to lift heavy objects even though this may not be a routine part of their job. These instructions might include:

- Stand as close to the object to be lifted as possible with feet apart for balance, toes straight ahead toward the object.
- Keep the spine straight and the body level facing the object.
- Squat or bend knees, keeping the spine straight.
- Grip the object securely in both hands keeping the object close to the body.
- Using the leg and thigh muscles, slowly and smoothly push up with the object.
- Do not bend your back while lifting.

The Physician Office Laboratory Risk Management Glossary and List of Abbreviations

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<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Autoclave</td>
<td>sterilize by use of steam pressure to destroy microbial life</td>
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<tr>
<td>Blood</td>
<td>human blood, human blood components, and products made from human blood</td>
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<tr>
<td>Bloodborne Pathogen</td>
<td>any pathogenic microorganisms that are present in human blood and can cause disease in humans</td>
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<tr>
<td>Clinical Laboratory</td>
<td>a workplace where diagnostic or other screening procedures are performed on blood or other potentially infectious materials</td>
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<tr>
<td>Contaminated</td>
<td>the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface</td>
</tr>
<tr>
<td>Decontamination</td>
<td>the use of physical or chemical means to remove, inactivate, or destroy bloodborne pathogens to the point where they are no longer capable of transmitting infectious particles</td>
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<tr>
<td>Exposure Incident</td>
<td>the contact of specific eye, mouth, other mucous membrane, non-intact skin, or parenteral sites with blood or other potentially infectious materials during the performance of an employee's duties</td>
</tr>
<tr>
<td>GHS</td>
<td>Globally Harmonized System for Hazard Communication</td>
</tr>
<tr>
<td>HBV</td>
<td>hepatitis B virus; one of the micro-organisms considered to be a bloodborne pathogen</td>
</tr>
<tr>
<td>HIV</td>
<td>human immunodeficiency virus; one of the micro-organisms considered to be a bloodborne pathogen</td>
</tr>
<tr>
<td>Incineration</td>
<td>destruction of regulated waste by burning</td>
</tr>
<tr>
<td>Laundry</td>
<td>any clothing or other fabric (e.g., bedding) that is worn in the presence of bloodborne pathogens and has the potential of becoming &quot;contaminated&quot;</td>
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<tr>
<td>MSDS or SDS</td>
<td>material safety data sheet or safety data sheet; provides information about chemicals to comply with the OSHA &quot;Hazard Communication&quot; Rule</td>
</tr>
<tr>
<td>NFPA</td>
<td>National Fire Protection Agency</td>
</tr>
<tr>
<td>Parenteral</td>
<td>piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions</td>
</tr>
<tr>
<td>PPE</td>
<td>personal protective equipment; specialized clothing or equipment worn by an employee for protection against a hazard</td>
</tr>
</tbody>
</table>
| Regulated Waste                          | • liquid or semi-liquid blood or other potentially infectious materials (PIMs)  
|                                        | • contaminated items that might release blood or PIMs  
|                                        | • items caked with dried blood or PIMs  
|                                        | • contaminated sharps  
|                                        | • pathological and microbiological wastes |
| Risk Management                        | the development of rules, regulations, equipment, and training that help provide a safe environment for all employees ("Safety") |
| RSIs                                   | Repetitive Stress Injuries; injuries caused by the repetition of a certain motion (e.g., carpal tunnel syndrome from computer work) |
| Sharps                                 | any object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires; are of most concern when "contaminated" |
| Sterilize                              | the use of physical or chemical means to destroy all microbial life including highly resistant bacterial endospores |
| Universal Precautions                  | an approach to infection control where all human blood and body fluids are treated as if known to be infectious for bloodborne pathogens |
| Work Practice Controls                 | rules that reduce the likelihood of exposure by altering the manner in which a task is performed (e.g., prohibiting the recapping of needles) |
GHS Label

**Carbon Monoxide**

H220: Extremely flammable gas. - H331: Toxic if inhaled. - H360D: May damage the unborn child. - H372: Causes damage to organs through prolonged or repeated exposure

Keep container tightly closed. Avoid breathing vapours. If inhaled: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Call a Poison Center or doctor. Store in a well-ventilated place.
Safety Data Sheets (SDS)
This information is provided as an addendum to help the reader of the Risk Management module understand the material safety data sheets (SDS). There are sixteen sections on the sheets including:

Section 1 – Chemical Identity: This section provides the common and chemical name for any chemical substance. It must be cross-referenced to the name found on the label.

Section 2 – Hazardous Ingredients: Where there are mixtures of chemicals, the hazardous chemical must be identified with the list of other chemicals found in the compound. Carcinogens must be identified if they are present in the mixture at levels of 0.1% or greater.

Section 3 – Composition/information on Ingredients: Includes information on chemical ingredients; trade secret claims.

Section 4 – First-aid Measures: Includes important symptoms/effects, acute, delayed; required treatment.

Section 5 – Fire-fighting Measures: lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6 – Accidental Release Measures: Lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7 – Handling and Storage: Lists precautions for safe handling and storage, including incompatibilities.

Section 8 – Exposure Controls/Personal Protection: Lists OSHA’s Permissible Exposure Limits (PELs); ACGIH Threshold Limit Values (TLVs); and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the SDS where available as well as appropriate engineering controls; personal protective equipment (PPE).

Section 9 – Physical and Chemical Properties: Lists the chemical's characteristics.

Section 10 – Stability and Reactivity: Lists chemical stability and possibility of hazardous reactions.

Section 11 – Toxicological Information: Includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12 – Ecological Information
Section 13 – Disposal Considerations
Section 14 – Transport Information
Section 15 – Regulatory Information
Section 16 – Other Information: Includes the date of preparation or last revision.

References
1. CDC. Guidelines for preventing the transmission of Mycobacterium tuberculosis in healthcare settings, 2005. MMWR. December 30, 2005/54(RR17); 1-1421.