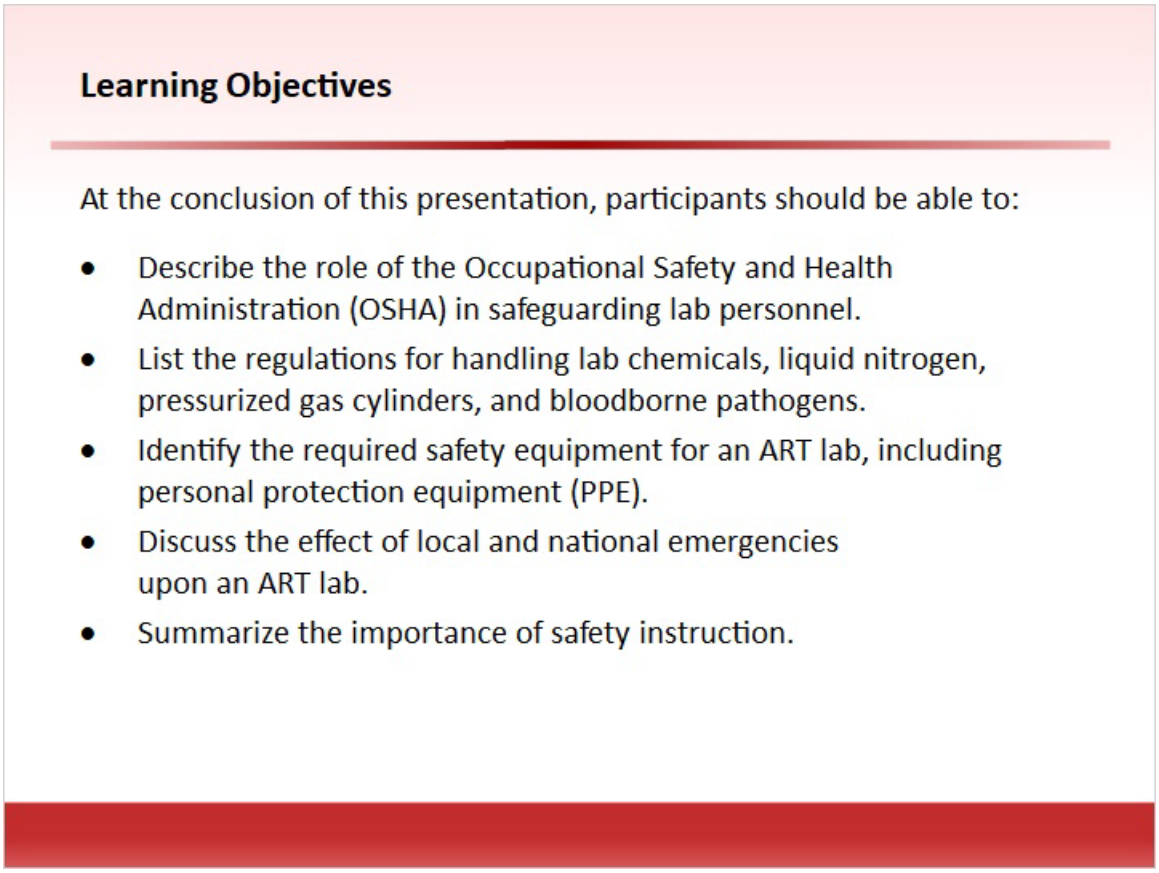
LABCC100 Lesson 35

1.1 Laboratory

Notes:

Welcome to the American Society for Reproductive Medicine's eLearning modules. The subject of this presentation is Laboratory Safety.

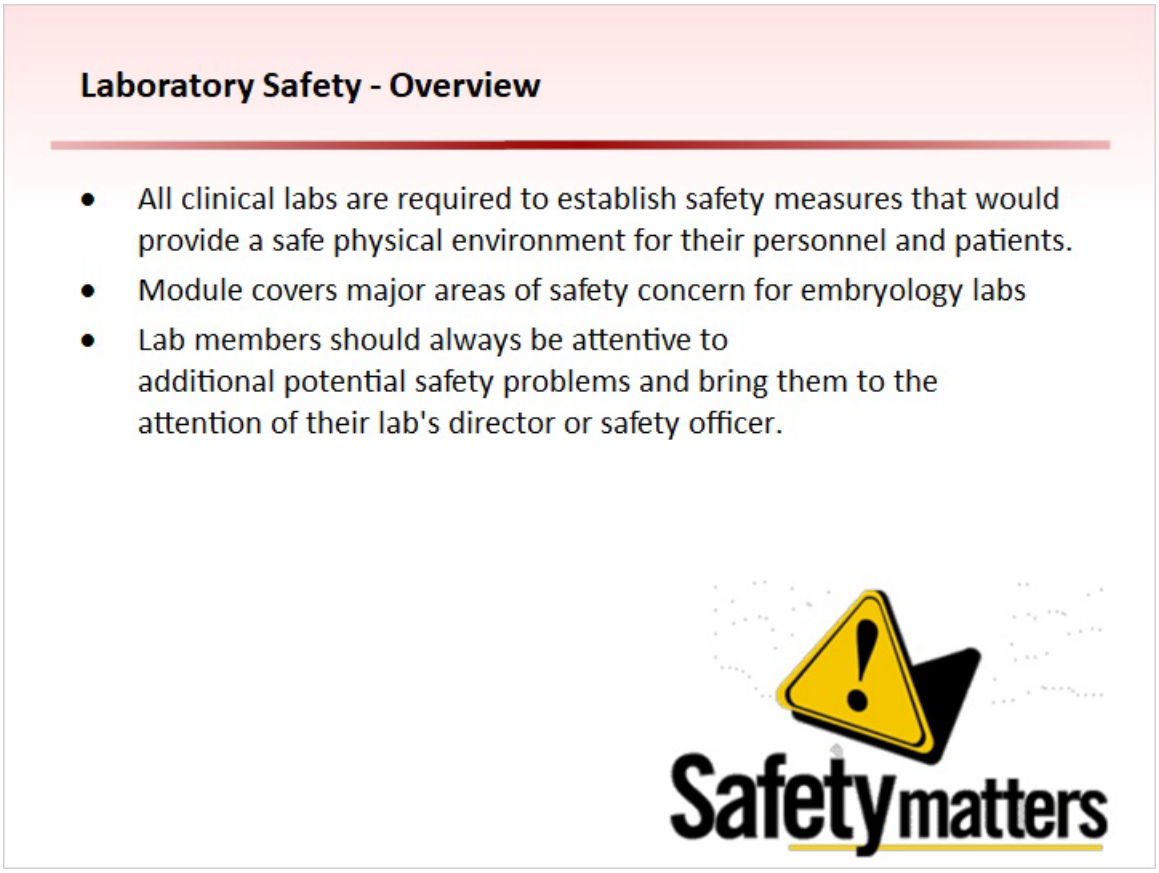
1.2 Learning Objectives



Notes:

At the conclusion of this presentation, participants should be able to:
Describe the role of the Occupational Safety and Health Administration (OSHA) in safeguarding lab personnel.
List the regulations for handling lab chemicals, liquid nitrogen, pressurized gas cylinders, and bloodborne pathogens.
Identify the required safety equipment for an ART lab, including personal protection equipment (PPE).
Discuss the effect of local and national emergencies
upon an ART lab.
Summarize the importance of safety instruction.

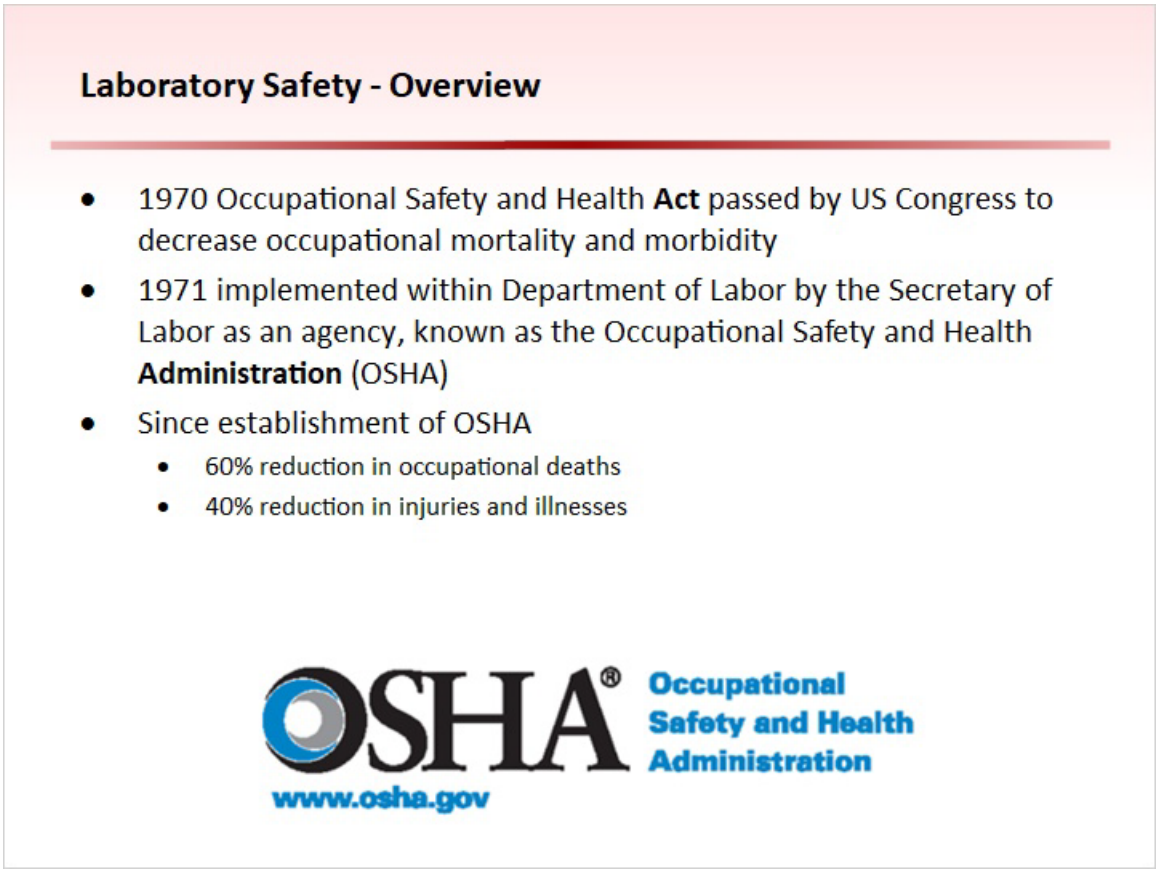
1.3 Laboratory Safety – Overview



Notes:

All clinical labs are required to establish safety measures that would provide a safe physical environment for their personnel. This module will cover the major areas of safety concern for both andrology and embryology labs. As it is not feasible to review all possible areas of lab safety, all lab members should be attentive to additional potential safety problems and bring them to the attention of their lab's safety officer.

1.4 Laboratory Safety – Overview



Notes:

In 1970, the US Congress passed the Occupational Safety and Health Act in an effort to decrease occupational mortality and morbidity.
In 1971, the Occupational Safety and Health Act was implemented within the Department of Labor as an agency, known as the Occupational Safety and Health Administration (OSHA).
Since the establishment of OSHA there has been a 60% reduction in occupational deaths and a 40% reduction in injuries and illnesses.

1.5 Laboratory Safety – Overview

Laboratory Safety - Overview

- OSHA safety regulations published as Occupational Safety Standards
- Each state encouraged to develop own supplemental set of safety standards to best meets needs of the state
  - State OSHA regulations must meet or exceed the federal OSHA standards
  - 22 states have written OSHA standards that supplement Federal OSHA regulations
- Lab personnel should be familiar with federal and/or state OSHA standards that affect their lab.

Notes:

OSHA safety regulations are published as documents known as Occupational Safety Standards. OSHA has encouraged each state to develop its own supplemental set of safety standards that best meets the needs of that state. These state OSHA regulations must meet or exceed the federal OSHA standards. Currently, 22 states have written OSHA standards that supplement the federal OSHA regulations. Lab personnel should be familiar with the federal and/or state OSHA standards that affect their lab.

1.6 Laboratory Safety – Overview

Laboratory Safety - Overview

- 39 federal OSHA standards
  - Available, free for incorporation into lab manuals as PDF files at www.freeOSHAinfo.com
- Inspection agencies (e.g., CAP & FDA) have incorporated applicable OSHA safety standards into their guidelines
- 8 topics of OSHA Safety Standards that have direct application to ART lab safety reviewed in this module

CAP = College of American Pathologists
FDA = US Food and Drug Administration

Notes:

There are 39 federal OSHA standards. These documents are available, free for incorporation into lab manuals as PDF files, at the www.freeOSHAinfo.com website. It should be noted that inspection agencies including the College of American Pathologists and US Food and Drug Administration have incorporated applicable OSHA safety standards into their guidelines. This module will review eight topics of the OSHA Safety Standards that have direct application to ART lab safety.

1.7 Laboratory Safety – Overview

Notes:

Most countries outside of the United States have a national agency, similar to OSHA, that regulates employee safety. In most instances, the safety regulations that have been formulated by OSHA are also incorporated into the guidelines established by other national safety agencies.

In addition to national safety agencies, several international safety and health organizations have been established, including:

Department of Occupational Safety & Health of the International Labor Organization (ILO)
International Commission on Occupational Health (ICOH)
Pan American Health Organization (PAHO)
World Health Organization (WHO)

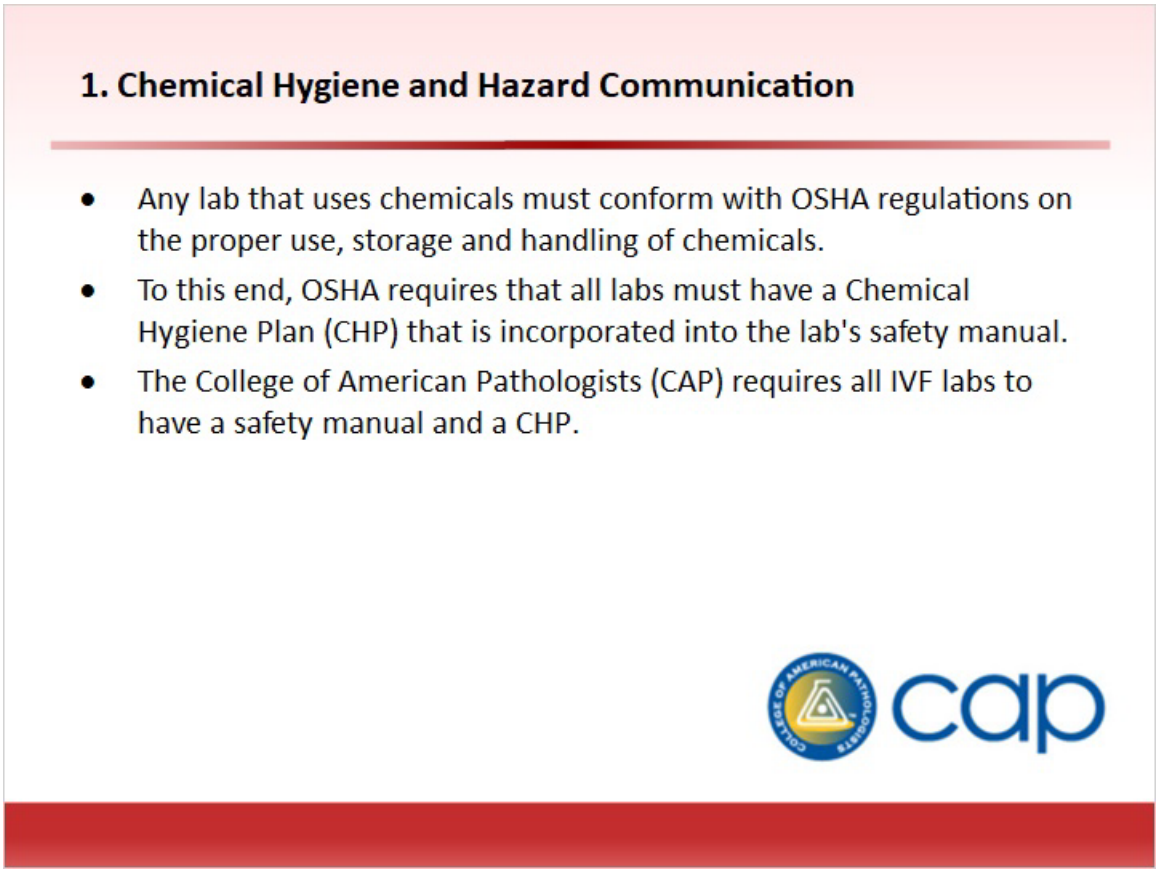
1.8 Major areas of Safety Concern for Labs

Notes:

The 8 major areas of safety concern that will be covered in this module are:

1)Chemical hygiene and hazardous materials
2)Liquid nitrogen handling
3)Safety courses
4)Accidents and emergencies
5)Bloodborne pathogen training
6)Safety equipment
7)Waste management
8)Fire prevention

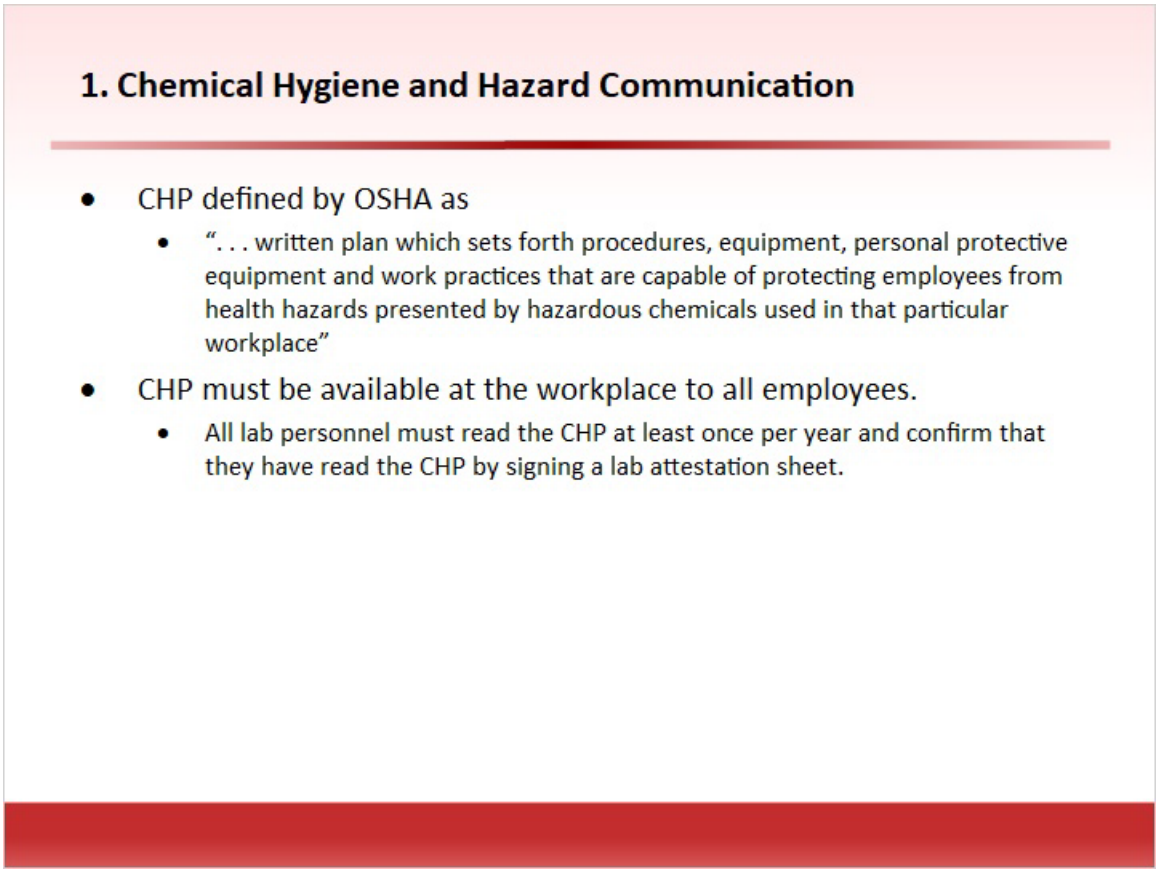
1.9 1. Chemical Hygiene and Hazard Communication



Notes:

Any lab that uses chemicals must conform with the OSHA regulations on the proper use, storage and handling of chemicals. To this end, OSHA requires that all labs must have a Chemical Hygiene Plan (CHP) that is incorporated into the lab's safety manual. The College of American Pathologists (CAP) requires all IVF labs to have a safety manual and a CHP.

1.10 1. Chemical Hygiene and Hazard Communication



Notes:

OSHA defines CHP as a "written plan which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from health hazards presented by hazardous chemicals used in that particular workplace." The CHP must be available at the workplace to all employees. All lab personnel must read the CHP at least once per year and confirm that they have read the CHP by signing a lab attestation sheet.

1.11 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Major components of the CHP

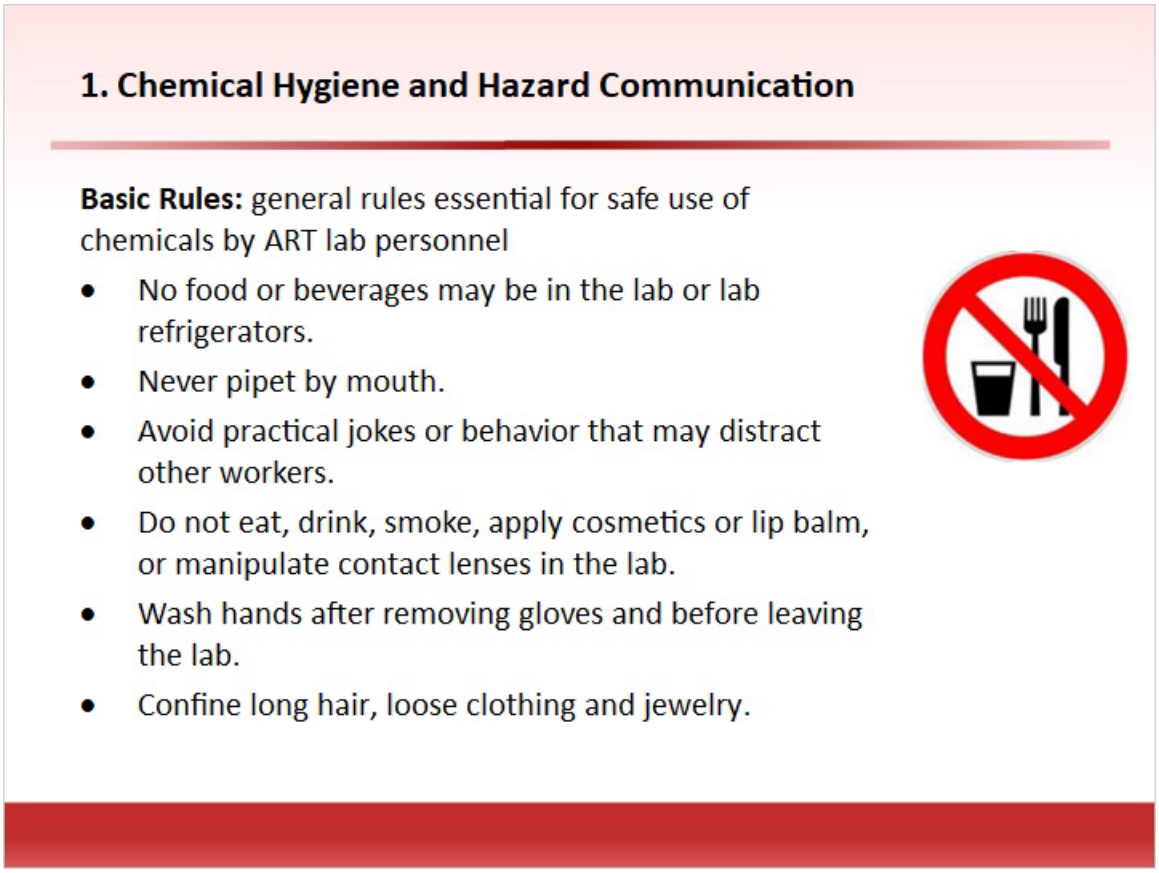
- Basic Rules
- Chemical procurement, distribution and storage
- Housekeeping
- Personal protective equipment (PPE)
- Records
- Signs and labels
- Waste disposal
- Training and information

Notes:

The major components of the CHP are:

Basic rules
Chemical procurement, distribution and storage
Housekeeping
Personal protective equipment (PPE)
Records
Signs and labels
Waste disposal
Training and information

1.12 1. Chemical Hygiene and Hazard Communication



Notes:

Basic rules are general rules that are essential for the safe use of chemicals by ART lab personnel. These include:

No food or beverages may be in the lab or lab refrigerators
Never pipet by mouth
Avoid practical jokes or behavior that may distract
other workers
Do not eat, drink, smoke, apply cosmetics or lip balm,
or manipulate contact lenses in the lab
Wash hands after removing gloves and before leaving the lab
Confine long hair, loose clothing and jewelry

1.13 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

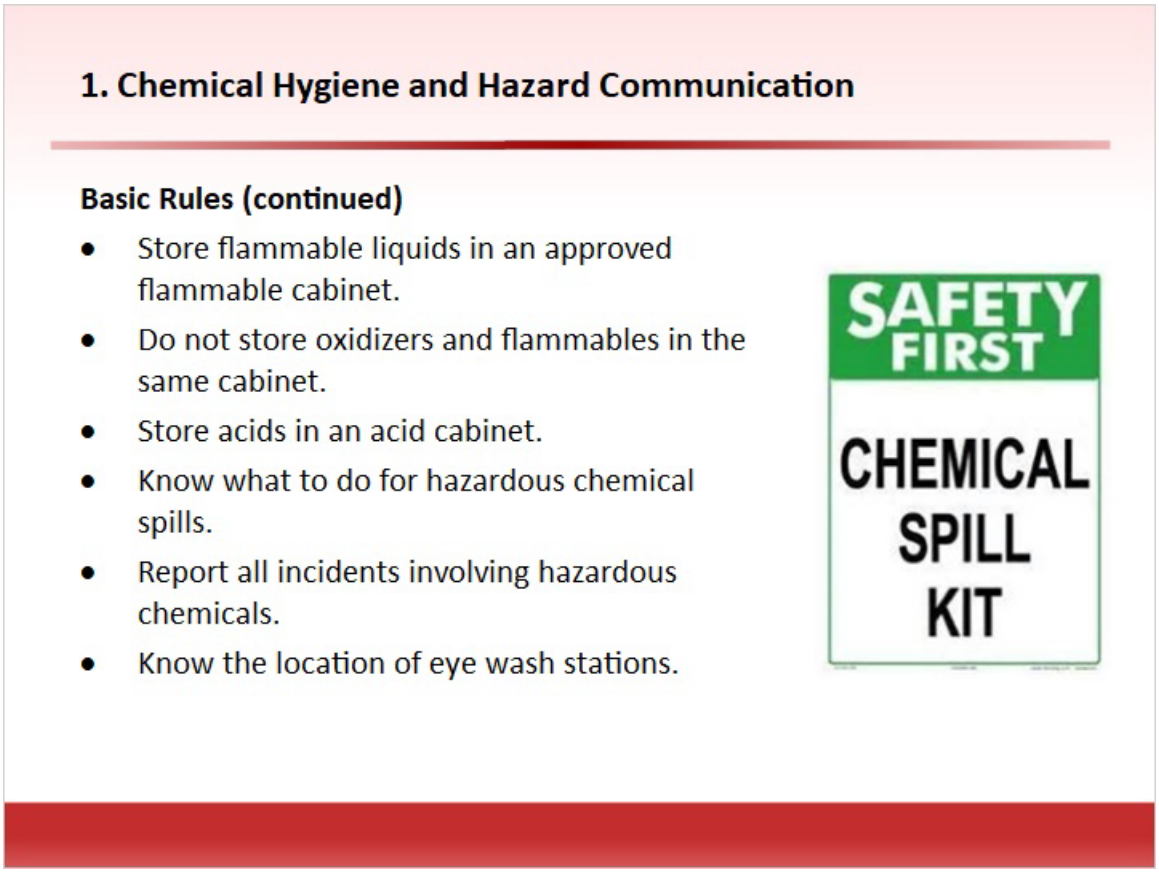
Basic Rules (continued)

- Wear shoes at all times. Open-toed or canvas shoes should not be permitted.
- Wear appropriate eye protection when necessary.
- Wear appropriate gloves if corrosive, toxic materials or bloodborne pathogens are being handled.
- Read container labels before starting a procedure.
- Wear a lab coat or scrubs in the laboratory. Replace them when they become soiled, worn, or contaminated. Wear a clean white lab coat when seeing patients.

Notes:

Basic Rules also include the following:
Wear shoes at all times. Open-toed or canvas shoes should not be permitted.
Wear appropriate eye protection when necessary.
Wear appropriate gloves if corrosive, toxic materials or bloodborne pathogens are being handled.
Read container labels before starting a procedure.
Wear a lab coat or scrubs in the laboratory.
Replace them when they become soiled, worn, or contaminated. Wear a clean white lab coat when seeing patients.

1.14 1. Chemical Hygiene and Hazard Communication



Notes:

Basic rules (continued)

Store flammable liquids in an approved flammable cabinet.
Do not store oxidizers and flammables in the same cabinet.
Store acids in an acid cabinet.
Know what to do for hazardous chemical spills.
Report all incidents involving hazardous chemicals.
Know the location of eye wash stations.

1.15 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Chemical procurement, distribution and storage

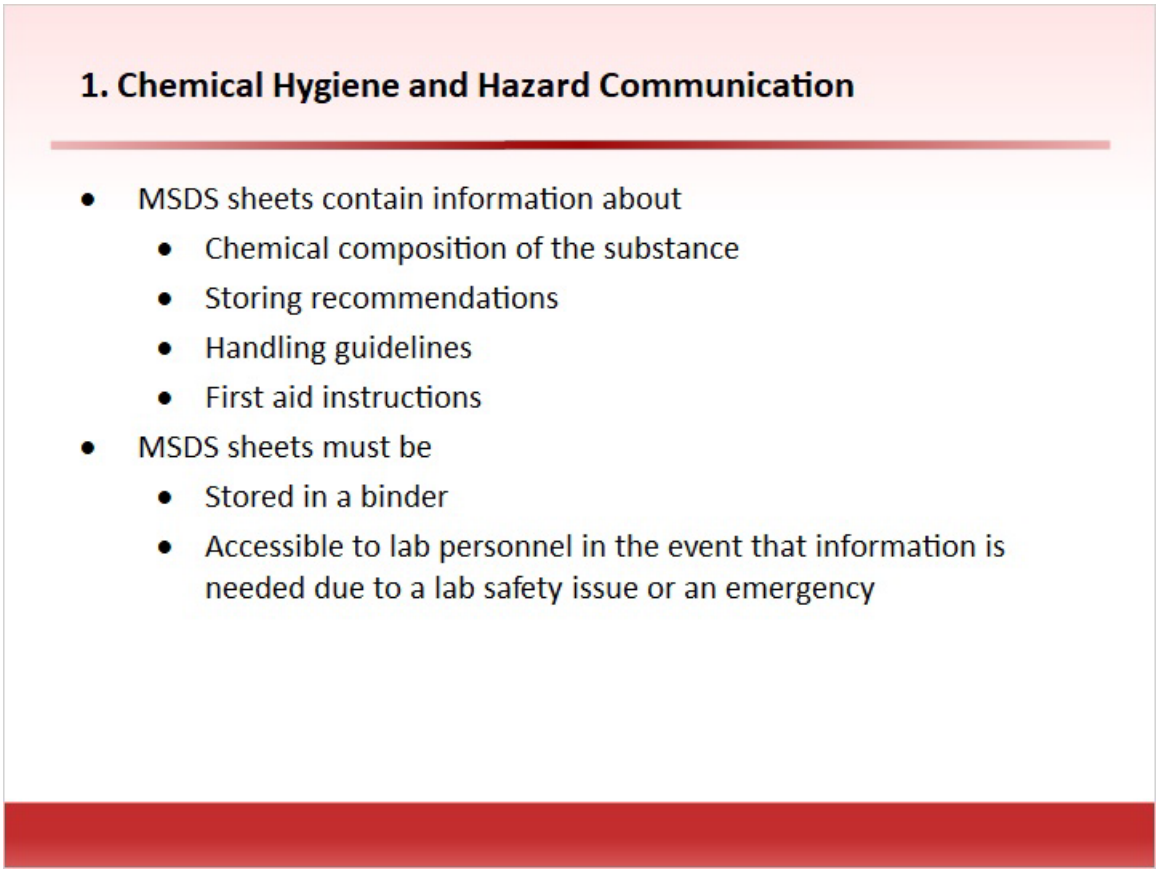
- Before a substance is received, information on proper handling, storage, and disposal should be reviewed.
- Material safety data sheet (MSDS) for each chemical used
- No container should be accepted into the lab without an adequate identifying label.
- Chemicals must be stored in an appropriate area.
- Stored chemicals should be examined periodically (at least annually) for replacement.

Notes:

The second item in the CHP is chemical procurement, distribution and storage.

- Before a substance is received, information on proper handling, storage, and disposal should be reviewed.
- A material safety data sheet (MSDS) must be obtained for each chemical used in the lab.
- No container should be accepted into the lab without an adequate identifying label.
- Chemicals must be stored in an appropriate area.
- Stored chemicals should be examined periodically (at least annually) for replacement.

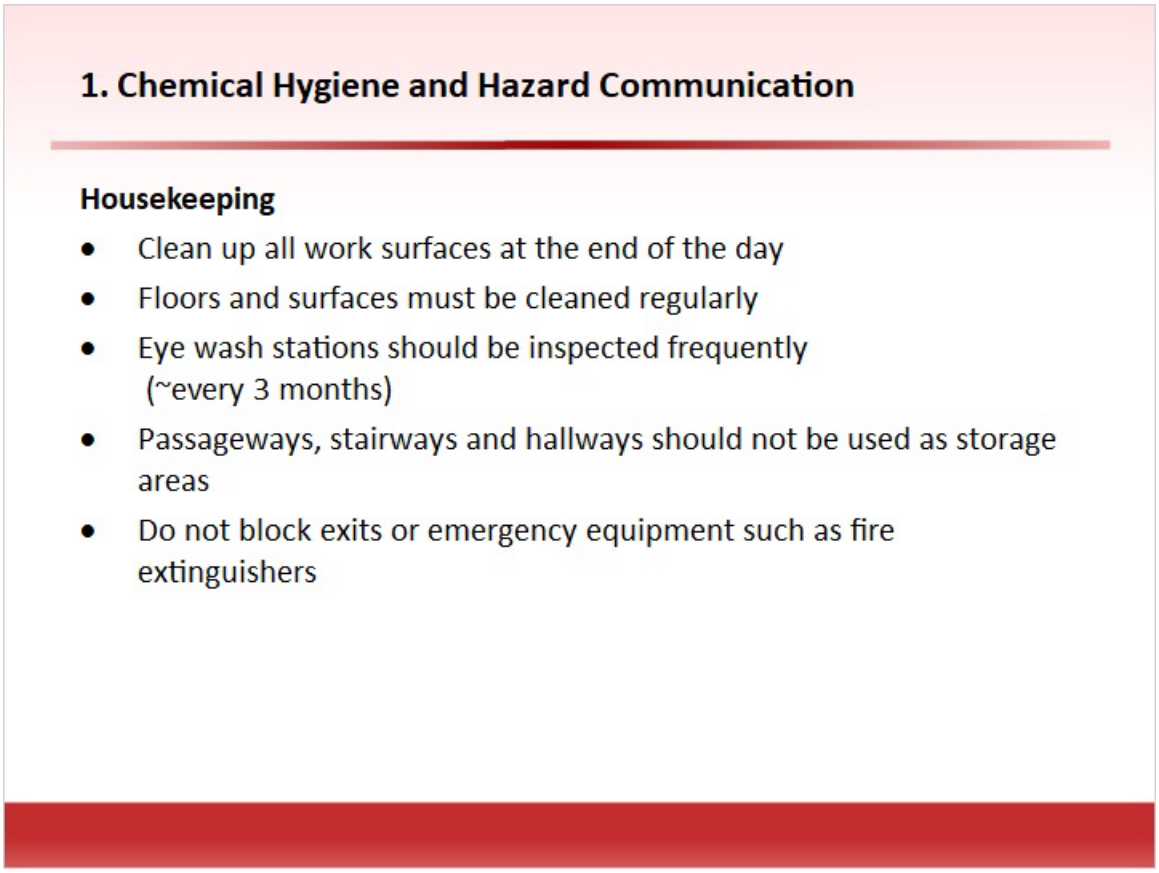
1.16 1. Chemical Hygiene and Hazard Communication



Notes:

Material safety data sheets contain information about the chemical composition of the substance, storing recommendations, handling guidelines, and first aid instructions. MSDS sheets must be stored in a binder and accessible to lab personnel in the event that information is needed due to a lab safety issue or an emergency.

1.17 1. Chemical Hygiene and Hazard Communication

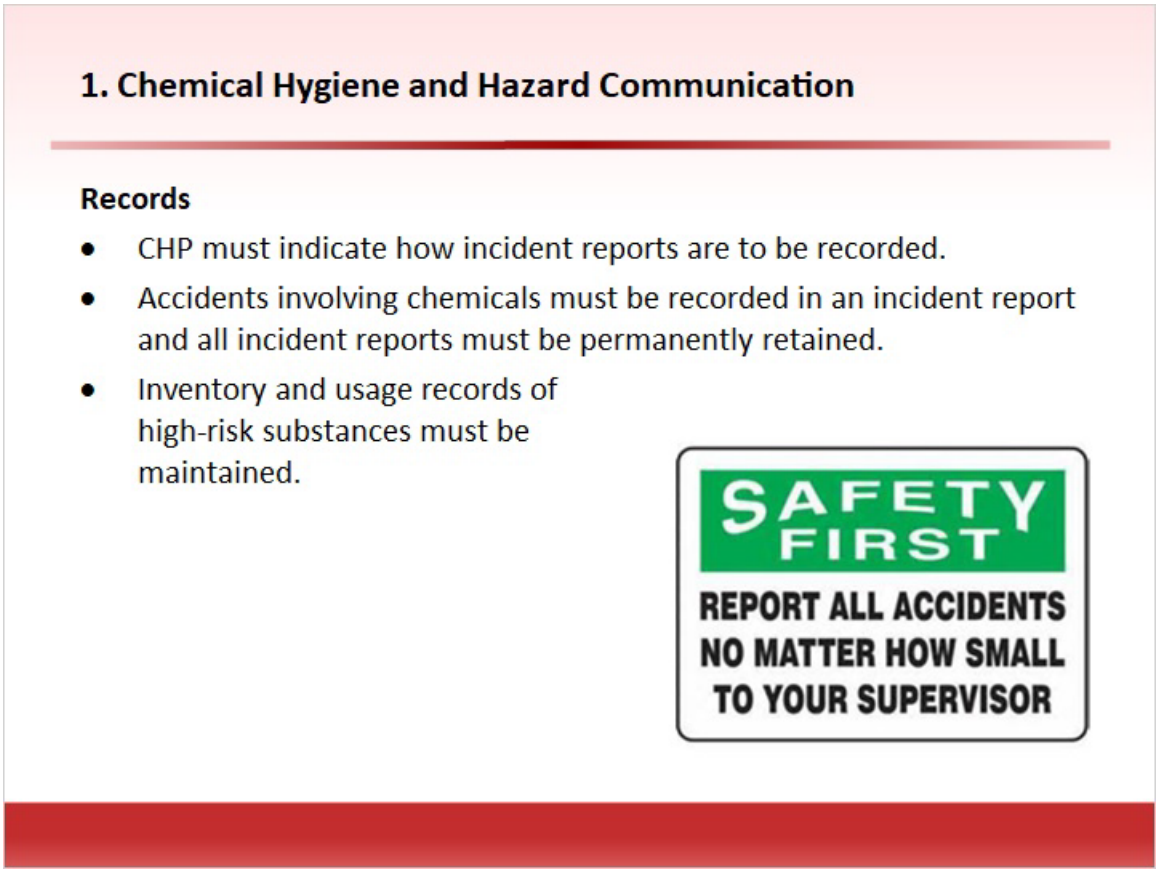


Notes:

Housekeeping involves maintaining a clean environment in the lab.

Clean up all work surfaces at the end of the day.
Floors and surfaces must be cleaned regularly.
Eye wash stations should be inspected frequently, approximately every 3 months.
Passageways, stairways and hallways, should not be used as storage areas.
Do not block exits or emergency equipment such as fire extinguishers.

1.18 1. Chemical Hygiene and Hazard Communication



Notes:

The CHP must indicate how incident reports are to be recorded. Accidents involving chemicals must be recorded in an incident report and all incident reports must be permanently retained. Inventory and usage records of high-risk substances must be maintained.

1.19 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Signs and labels

- Prominent signs and labels of the following types must be posted:
  - Emergency telephone numbers of emergency personnel, supervisors, and lab personnel
  - Signs on refrigerators prohibiting food storage
  - Signs identifying lab hazards, including compressed gas cylinders and liquid nitrogen containers
  - Labels identifying hazardous waste containers, receptacles for biological waste and needles

Notes:

Prominent signs and labels of the following types must be posted:
Emergency telephone numbers of emergency personnel, supervisors, and lab personnel
Signs on refrigerators prohibiting food storage
Signs identifying lab hazards, including compressed gas cylinders and liquid nitrogen containers
Labels identifying hazardous waste containers, including receptacles for biological waste and needles.

1.20 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Signs and labels

- All hazardous chemicals must be appropriately labeled with hazardous chemical labels and/or hazardous diamond labels.

Notes:

All hazardous chemicals must be appropriately labeled with hazardous chemical labels and/or hazardous diamond labels.

1.21 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Signs and labels

- Fire Diamond
  - Most commonly used hazardous chemical label
  - Established by the National Fire Protection Association (NFPA)
  - Developed to help emergency personnel quickly and easily identify the risks posed by hazardous materials.
  - Determines what special equipment should be used, procedures
    followed, or precautions taken during the initial stages of an emergency response

Notes:

The fire diamond is the most commonly used hazardous chemical label. It was established by the National Fire Protection Association (NFPA) and was developed to help emergency personnel quickly and easily identify the risks posed by hazardous materials. The fire diamond determines what special equipment should be used, procedures followed, or precautions taken during the initial stages of an emergency response.

1.22 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Signs and labels

- Fire Diamond divided into four colored, smaller diamonds that represent a chemical substances:
  - Flammability (top red diamond)
  - Health risks (left blue diamond)
  - Chemical reactivity (right yellow diamond)
  - Special hazard comment (bottom white diamond)

Notes:

The fire diamond is divided into four colored, smaller diamonds that represent a chemical substance. These are: flammability (top red diamond), health risks (left blue diamond), chemical reactivity (right yellow diamond), and a special hazard comment (bottom white diamond).

1.23 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Signs and labels

- Numeric code in each Fire Diamond
- Rates degree of potential hazard of the chemical substance
- Scale of 0 (no hazard) to 4 (severe hazard)

Notes:

Within each fire diamond is a numeric code that rates the degree of the potential hazard of the chemical substance. The numeric code goes from a scale of 0 (no hazard) to 4 (severe hazard).

1.24 1. Chemical Hygiene and Hazard Communication

1. Chemical Hygiene and Hazard Communication

Training and information

- All lab personnel must receive training on chemical hygiene and hazard communication policies
- Written material, lectures, videos, or computer-based learning
  - CHP
  - Specific physical and health hazards of the ART lab
  - Protective measures available in the lab for the handling of chemicals
    - PPE
    - Laminar flow hood usage
    - Appropriate work practices

Notes:

All lab personnel must receive training on chemical hygiene and hazard communication policies. The training can be in the form of written material, lectures, videos or computer-based learning. Training should include information about the CHP, specific physical and health hazards of the ART lab, and protective measures available in the lab for the handling of chemicals including information about PPE, laminar flow hood usage, and appropriate work practices.

1.25 2. Liquid Nitrogen Handling and Safety

2. Liquid Nitrogen Handling and Safety

Liquid nitrogen (LN_2)

- Utilized in ART labs for the cryopreservation and storage of gametes and embryos
- At atmospheric temperature, LN_2 boils at -196°C
  - Can cause rapid tissue freezing when in contact with skin
  - A potentially hazardous material requiring special handling
- Careless handling of LN_2 can cause serious cold burns.

Notes:

Liquid nitrogen (LN_2) is utilized in ART labs for the cryopreservation and storage of gametes and embryos. At atmospheric temperature, LN_2 boils at -196°C and can cause rapid tissue freezing when in contact with skin. As such, LN_2 is a potentially hazardous material requiring special handling. Careless handling of LN_2 can cause serious cold burns.

1.26 2. Liquid Nitrogen Handling and Safety

2. Liquid Nitrogen Handling and Safety

- Lab personnel must protect themselves from direct skin contact with LN_2
  - Wear face protection: clear plastic face shield or goggles
  - Use low thermal cryoprotective gloves
  - Wear a full-length smock or cryo apron over pants and shoes
- Sandals, canvas sneakers, and shorts should never be worn when handling LN_2

Notes:

Whenever LN_2 is being handled, lab personnel must protect themselves from direct skin contact with LN_2 and should wear face protection in the form of a clear plastic face shield or goggles, use low thermal cryoprotective gloves, and wear a full-length smock or cryo apron over pants and shoes. Sandals, canvas sneakers, and shorts should never be worn when handling LN_2.

1.27 2. Liquid Nitrogen Handling and Safety

2. Liquid Nitrogen Handling and Safety

- As LN_2 vaporizes, it displaces oxygen → should be housed only in a well-ventilated room
- Since LN_2 is odorless, vaporized LN_2 could lead to asphyxiation without any warning.
- Oxygen sensors should be installed in poorly ventilated rooms housing LN_2.

Notes:

As LN_2 vaporizes, it displaces oxygen and therefore should be housed only in a well-ventilated room. LN_2 is also odorless and vaporized LN_2 could lead to asphyxiation without any warning. Oxygen sensors should be installed in poorly ventilated rooms housing LN_2.

1.28 2. Liquid Nitrogen Handling and Safety

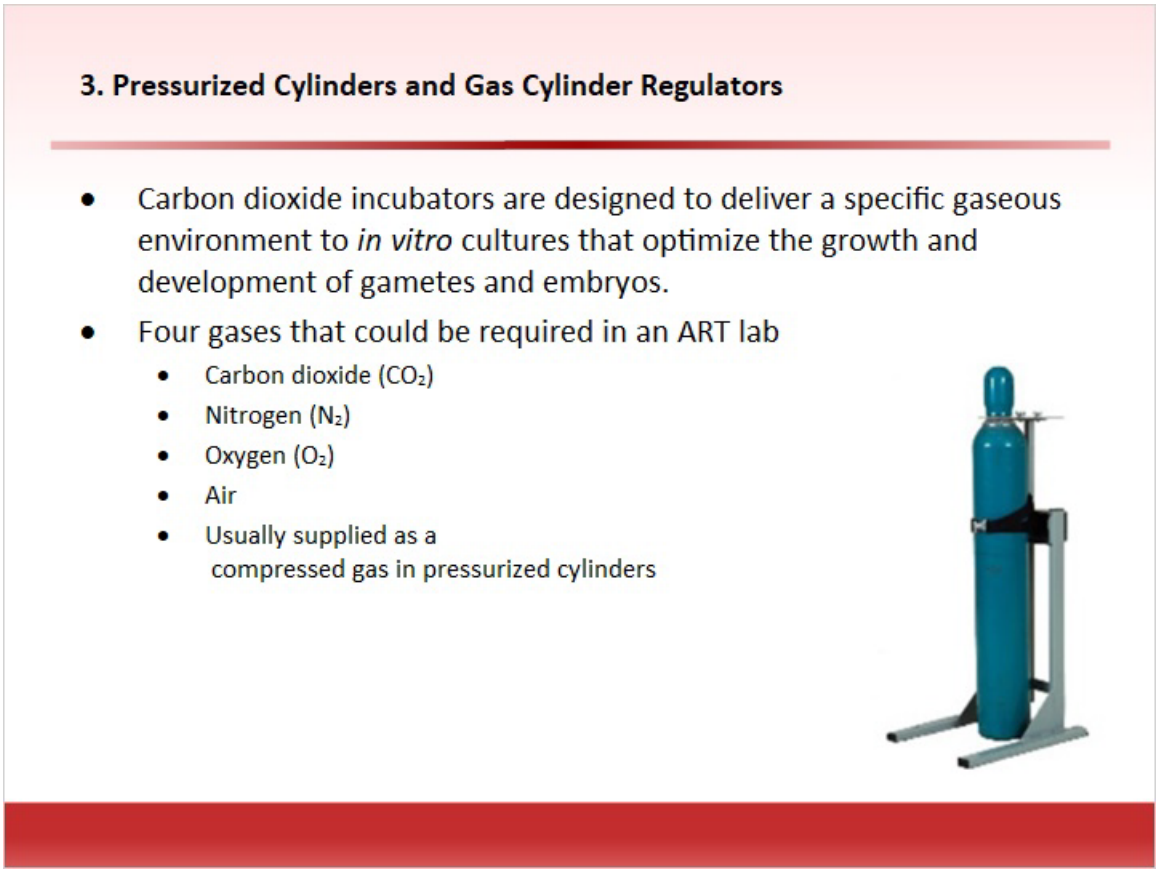
2. Liquid Nitrogen Handling and Safety

- Liquid-to-gas expansion ratio of nitrogen from vaporization = 1:694 at room temperature
- LN_2 very explosive if allowed to vaporize in a sealed container
- All LN_2 storage containers must have top-off values or gas escape mechanisms.

Notes:

The liquid-to-gas expansion ratio of nitrogen from vaporization is an amazing 1:694 at room temperature.
This would make LN_2 very explosive if it was allowed to vaporize in a sealed container.
Thus all LN_2 storage containers must have top-off values or gas escape mechanisms.

1.29 3. Pressurized Cylinders and Gas Cylinder Regulators



Notes:

At the heart of an ART program are CO_2 incubators. These incubators are designed to deliver a specific gaseous environment to in vitro cultures that optimize the growth and development of gametes and embryos. Depending upon the type of incubator used, the four gases that could be required in an ART lab are carbon dioxide (CO_2), nitrogen (N_2), oxygen (O_2), and air. These gases are usually supplied as a compressed gas in pressurized cylinders.

1.30 3. Pressurized Cylinders and Gas Cylinder Regulators

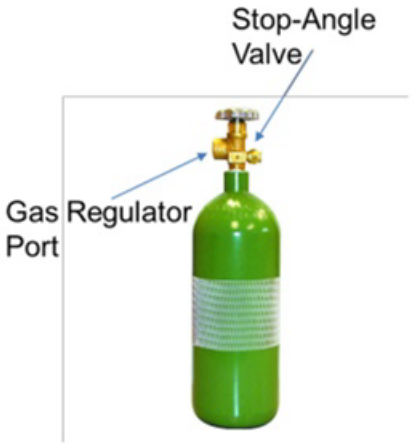
3. Pressurized Cylinders and Gas Cylinder Regulators

Pressurized gas cylinders

- Most commonly long thin cylinders with flat bottoms and a stop-angle valve (shut-off) at top

Stop-angle valves

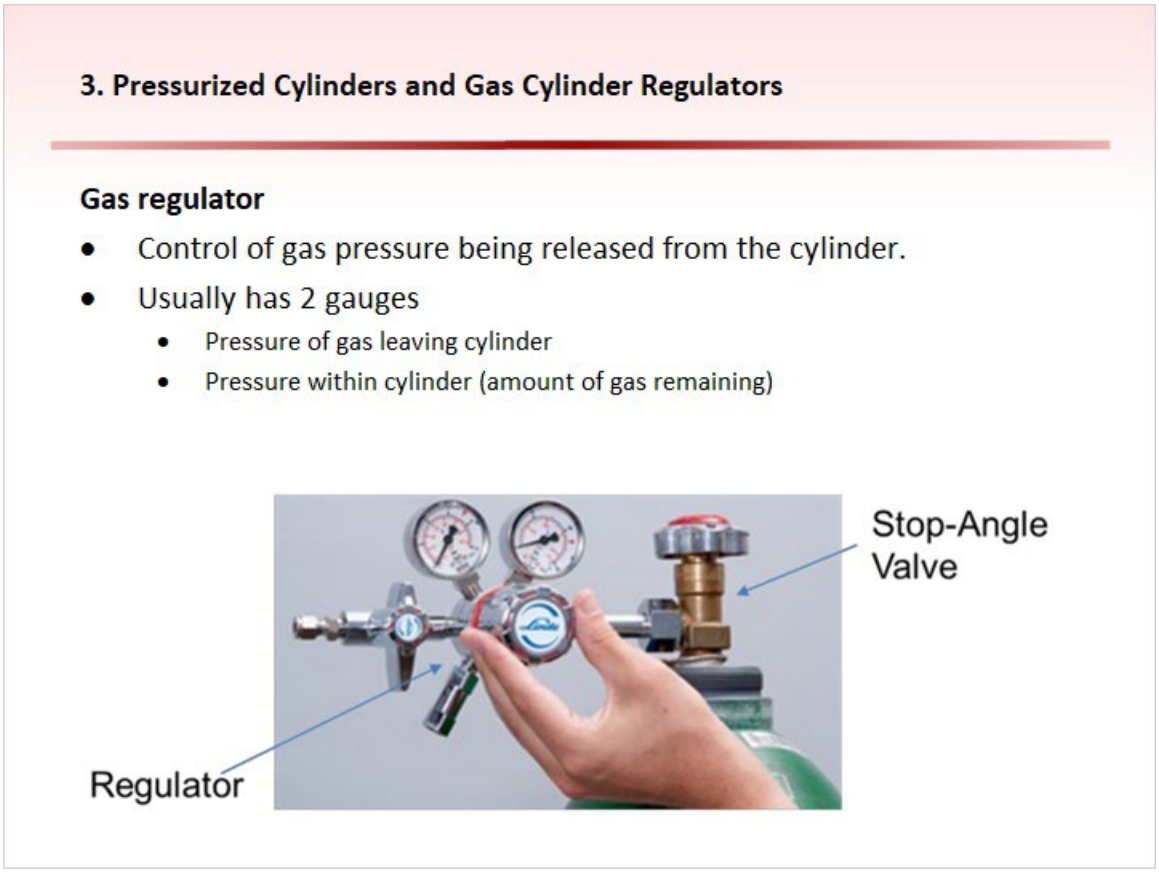
- Usually protected by a screw-on metal cap
- Threaded port at 90° angle from the cylinder that will accept a gas regulator



Notes:

Pressurized gas cylinders are most commonly long, thin cylinders with flat bottoms and a stop angle valve at its top. The stop angle valve for large gas cylinders are usually protected by a screw-on metal cap. Positioned at a 90° angle from the cylinder, the stop-angle valve has a threaded port that will accept a gas regulator.

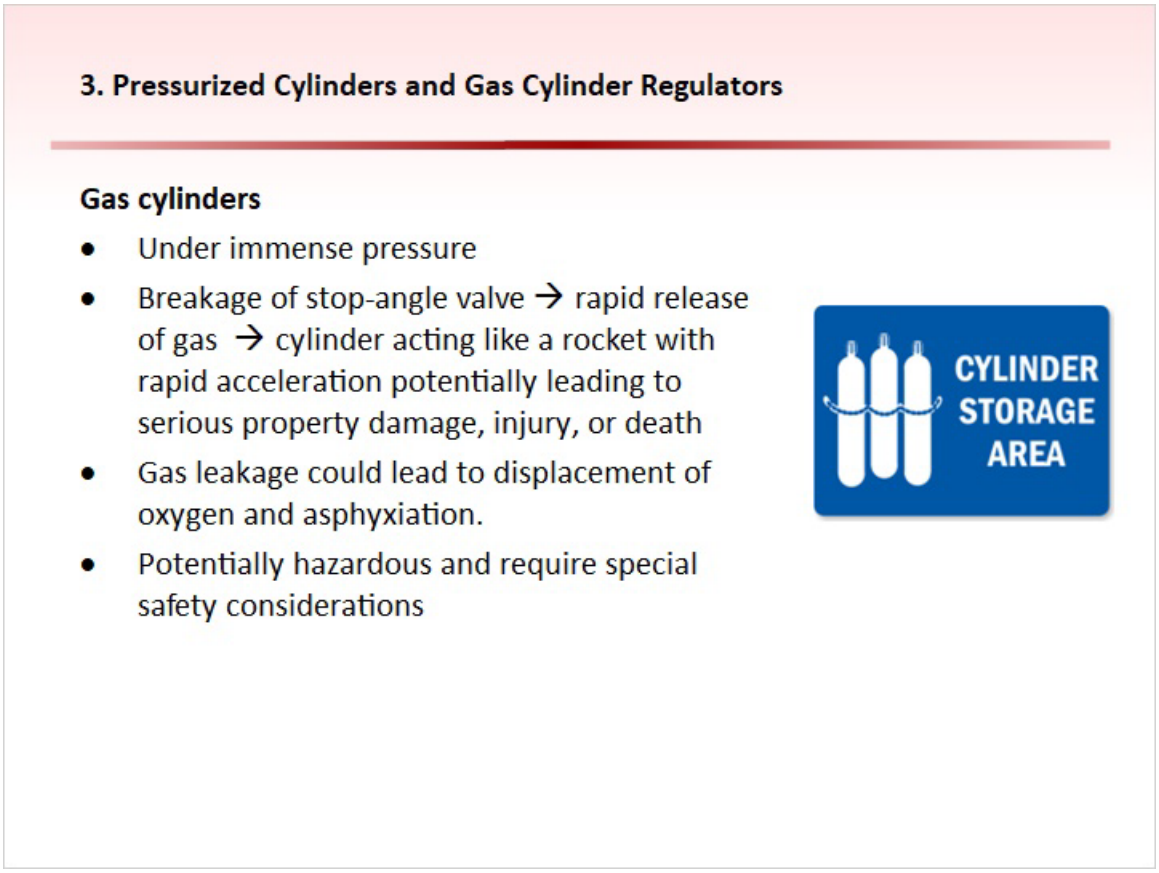
1.31 3. Pressurized Cylinders and Gas Cylinder Regulators



Notes:

The gas regulator allows the operator to control the pressure of the gas being released from the cylinder. The regulator usually has two gauges, one showing the pressure of the gas leaving the cylinder and another showing the pressure within the cylinder and thus the amount of gas remaining.

1.32 3. Pressurized Cylinders and Gas Cylinder Regulators



Notes:

The gas within a cylinder is under immense pressure. If the stop-angle valve were to be broken off of a full cylinder, the rapid release of gas would lead to the cylinder acting like a rocket with rapid acceleration through the walls of a room, potentially leading to serious property damage, injury, or death. Additionally, leakage of gas from a cylinder could lead to displacement of oxygen and asphyxiation. Gas cylinders are, therefore, potentially hazardous and require special safety considerations.

1.33 3. Pressurized Cylinders and Gas Cylinder Regulators

3. Pressurized Cylinders and Gas Cylinder Regulators

- **Required safety measures for handling pressurized gas cylinders**
  - Transported only by trained personnel using transport carts designed for pressurized gas cylinders
  - Regulator must be removed and the stop-angle valve covered by its protective metal cap

Gas Cylinder Transport Cart

Notes:

The following safety measures must be undertaken when handling pressurized gas cylinders: cylinders should be transported only by trained personnel using transport carts designed for pressurized gas cylinders; when cylinders are transported or moved, the regulator must be removed and the stop-angle valve covered by its protective metal cap.

1.34 3. Pressurized Cylinders and Gas Cylinder Regulators

3. Pressurized Cylinders and Gas Cylinder Regulators

- **Gas cylinder safety measures** (continued)
  - Stored cylinders or cylinders in use must be securely fixed with straps or chains to the wall of a room or, when transported, to the surface of the cylinder carrier.
  - Regulators attached to cylinders must be checked for leaks, especially if an oxygen cylinder is being used
  - Gas cylinders not in use should have their protective metal cap over the stop-angle valve.

Notes:

Stored cylinders or cylinders in use must be securely fixed with straps or chains to the wall of a room or, when transported, to the surface of the cylinder carrier. When regulators are attached to cylinders, they must be checked for leaks, especially if an oxygen cylinder is being used since oxygen leakage could lead to an explosive environment. Gas cylinders that are not in use should have their protective metal cap over the stop-angle valve.

1.35 3. Pressurized Cylinders and Gas Cylinder Regulators

3. Pressurized Cylinders and Gas Cylinder Regulators

- **Gas cylinder safety measures (continued)**
  - Well ventilated room
  - If door to storage room: lower portion should have venting in compliance with local fire regulations
  - Signage should be present in rooms containing pressurized cylinders to indicate their hazardous potential
  - All gas cylinders should be properly labeled as to contents

Notes:

The room housing gas cylinders must be well ventilated. If stored in a room with a door, the lower portion of the door should have venting in compliance with local fire regulations. Signage should be present in rooms containing pressurized cylinders to indicate their hazardous potential. All gas cylinders should be properly labeled as to their contents

1.36 3. Pressurized Cylinders and Gas Cylinder Regulators

3. Pressurized Cylinders and Gas Cylinder Regulators

- **Gas cylinder safety measures (continued)**
  - Stored upright and not exposed to temperatures above 125°F
  - Not be located next to a direct heat source or a source of ignition
  - If the building housing gas cylinders were to catch fire, the fire department must be warned about the presence and type of gas cylinders within the building.

Notes:

Gas cylinders should be stored upright and should not be exposed to temperatures above 125° F. They should not be located next to a direct heat source or a source of ignition. If the building housing gas cylinders were to catch fire, the fire department must be warned about the presence and type of gas cylinders within the building.

1.37 4. Bloodborne Pathogen Training

4. Bloodborne Pathogen Training

Bloodborne pathogens

- Infectious microorganisms found in human blood that can cause serious illness or death
- Include, but are not limited to
  - Hepatitis B virus (HBV)
  - Hepatitis C virus (HCV)
  - Syphilis
  - Human immunodeficiency virus (HIV) that causes AIDS

- In an ART lab, bloodborne pathogens could be present in blood, follicular fluid, semen, and testicular biopsy samples

Notes:

Bloodborne pathogens are infectious microorganisms found in human blood that can cause serious illness or death.
These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), syphilis, and the human immunodeficiency virus (HIV) that causes AIDS. In an ART lab, bloodborne pathogens could be present in blood, follicular fluid, semen, and testicular biopsy samples.

1.38 4. Bloodborne Pathogen Training

4. Bloodborne Pathogen Training

- Exposure to bloodborne pathogens by:
  - Splashes of biological samples to mucous membranes (eyes, nose, or mouth) or to open wounds
  - Inadvertent contact from biological samples to mucous membranes or to open wounds due to careless hygiene
  - Accidental skin puncture by contaminated needles or sharps
  - Punctures or lacerations by contaminated instruments

Notes:

In an embryology lab, personnel could be exposed to bloodborne pathogens by any of the following: splashes of biological samples to mucous membranes (eyes, nose, or mouth) or to open wounds; inadvertent contact from biological samples to mucous membranes or to open wounds due to careless hygiene; accidental skin puncture by contaminated needles or sharps; or punctures or lacerations by contaminated instruments.

1.39 4. Bloodborne Pathogen Training

4. Bloodborne Pathogen Training

- Accidental inoculation of bloodborne pathogens in a lab may lead to life-threatening illnesses.
- Special precautions to ensure that lab personnel do not come in contact with bloodborne pathogens
- OSHA requires that all biological labs protect personnel from blood or from other potentially infectious materials (OPIM)

Photo courtesy of Michael W. Vernon, PhD, HCLD

Notes:

Accidental inoculation of bloodborne pathogens in a lab may lead to life-threatening illnesses. Because of this, special precautions must be taken in reproductive labs to ensure that lab personnel do not come in contact with bloodborne pathogens. OSHA requires that all biological labs protect personnel from blood or from other potentially infectious materials (OPIM).

1.40 4. Bloodborne Pathogen Training

4. Bloodborne Pathogen Training

OSHA bloodborne pathogen standard requires:

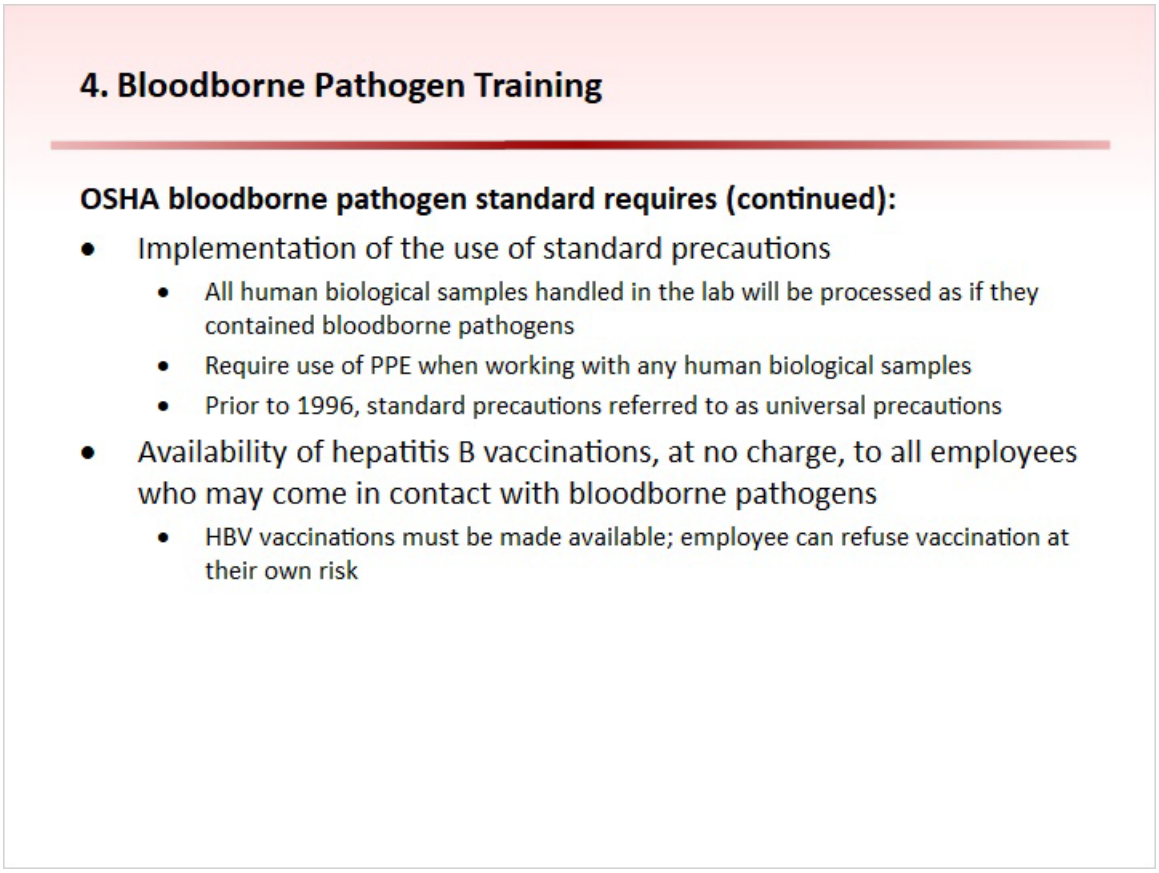
- Establishing written exposure control plan
  - Job positions that will be exposed to blood pathogens
  - Tasks and procedures performed by lab personnel that may result in pathogen exposure
  - Plan must be updated annually
- PPE including
  - Gloves, gowns, eye protection, and masks

Photo courtesy of Michael W. Vernon, PhD, HCLD

Notes:

The OSHA bloodborne pathogen standard requires establishing a written exposure control plan to eliminate or minimize occupational exposure to blood pathogens. The plan must list which job positions will be exposed to blood pathogens along with a list of tasks and procedures performed by lab personnel that may result in pathogen exposure. The exposure plan must be updated annually.
The OSHA standard also requires PPE that includes providing gloves, gowns, eye protection and masks.

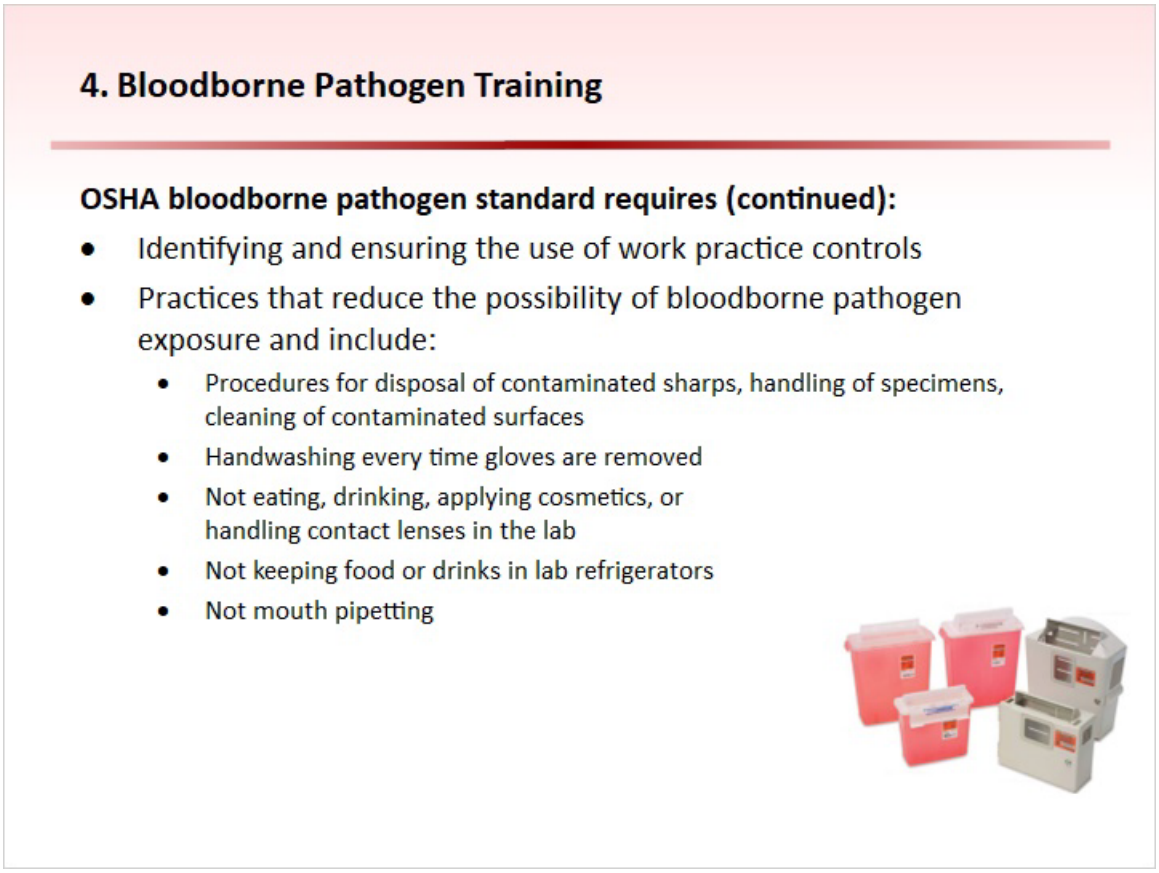
1.41 4. Bloodborne Pathogen Training



Notes:

In implementation of the use of standard precautions, all human biological samples handled in the lab will be processed as if they contained bloodborne pathogens. Standard precautions require the use of PPE when working with any human biological samples. Prior to 1996, standard precautions were referred to as universal precautions. Another requirement is the availability of hepatitis B vaccinations, at no charge, to all employees who may come in contact with bloodborne pathogens. Although HBV vaccinations must be made available, an employee can refuse the opportunity for vaccination at their own risk

1.42 4. Bloodborne Pathogen Training



Notes:

Another standard requires identifying and ensuring the use of work practice controls. These are practices that reduce the possibility of bloodborne pathogen exposure and include:
Procedures for the disposal of contaminated sharps, handling of specimens, cleaning of contaminated surfaces
Hand washing every time gloves are removed
Not eating, drinking, applying cosmetics or handling contact lenses in the lab
Not keeping food or drinks in lab refrigerators
Not mouth pipetting

1.43 4. Bloodborne Pathogen Training

4. Bloodborne Pathogen Training

OSHA bloodborne pathogen standard requires (continued):

- The use of post-exposure incident reports
  - Record exposure incident
  - Evaluate outcome of incident; appropriate testing for infection at no cost to the worker
- Maintaining a sharps injury log by the employer
- Using appropriate signage of potential presence of bloodborne pathogens
- Providing information and training to lab personnel about bloodborne pathogens

Notes:

Also required is the use of post-exposure incident reports. These reports record the exposure incident and evaluate the outcome of the incident, which includes appropriate testing for infection at no cost to the worker.
Other requirements are:
Maintaining a sharps injury log by the employer.
Using appropriate signage of the potential presence of bloodborne pathogens.
Providing information and training to lab personnel about bloodborne pathogens.

1.44 5. Safety Equipment

5. Safety Equipment

- Employers must purchase safety equipment to protect their employees from occupational injury or death
- Safety equipment used in an embryology lab aimed at protecting lab personnel from accidental exposure to
  - Chemicals
  - Bloodborne pathogens
  - Fire

Notes:

OSHA requires that employers purchase safety equipment that would protect their employees from occupational injury or death. The safety equipment used in an embryology lab are primarily aimed at protecting lab personnel from accidental exposure to the hazards of chemicals, bloodborne pathogens, and fire.

1.45 5. Safety Equipment

5. Safety Equipment

Personal protection equipment (PPE)

- Front line of defense against chemical and bloodborne
- Refers to garments or equipment designed to protect the wearer's body from hazards
- Equipment associated with ART lab:
  - Surgical cap
  - Surgical mask
  - Goggles or face shield
  - Surgical gloves
  - Surgical scrubs
  - Surgical booties

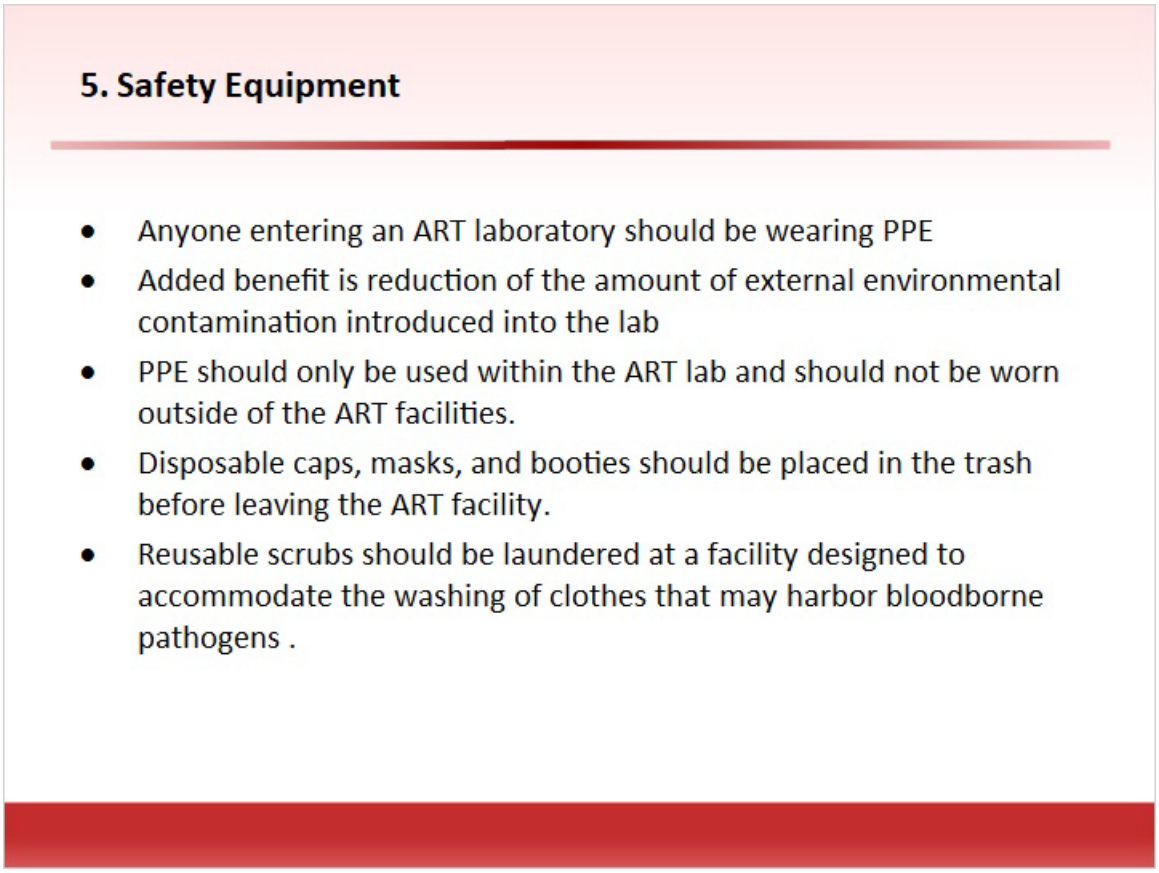
Photo courtesy of Michael W. Vernon, PhD, HCLD

ART = assisted reproductive technology

Notes:

The front line of defense against chemical and bloodborne pathogens is PPE: garments or equipment designed to protect the wearer's body from hazards.
The PPE equipment associated with an assisted reproductive technology (ART) lab would be:
Surgical cap
Surgical mask
Goggles or face shield
Surgical gloves
Surgical scrubs
Surgical booties

1.46 5. Safety Equipment



Notes:

Anyone entering an ART laboratory should be wearing PPE. This provides the added benefit of reducing the amount of external environmental contamination introduced into the lab. PPE should only be used within the ART lab and should not be worn outside of the ART facilities. Disposable caps, masks, and booties should be placed in the trash before leaving the ART facility. Reusable scrubs should be laundered at a facility designed to accommodate the washing of clothes that may harbor bloodborne pathogens.

1.47 5. Safety Equipment

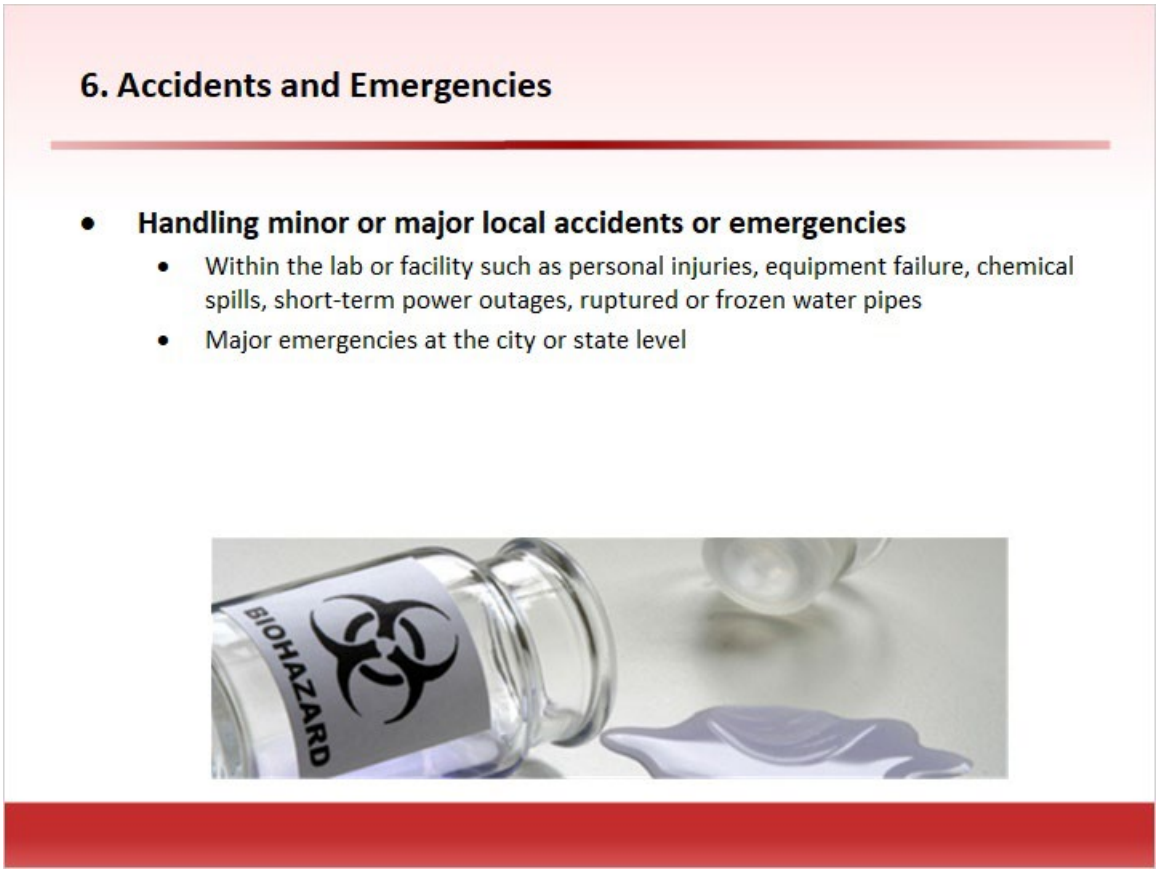
5. Safety Equipment

- ART labs should have eye wash fountains available to lab personnel
- If caustic acids are used, the lab should also have an easily accessible drench-type shower.
- Finally, as described in the section on fire prevention, labs should also have fire extinguishers available for use on small fires

Notes:

In addition to PPE, ART labs should have eye wash fountains available to lab personnel. If caustic acids are used, the lab should also have an easily accessible drench-type shower. Finally, as described in the section on fire prevention, labs should also have fire extinguishers available for use on small fires.

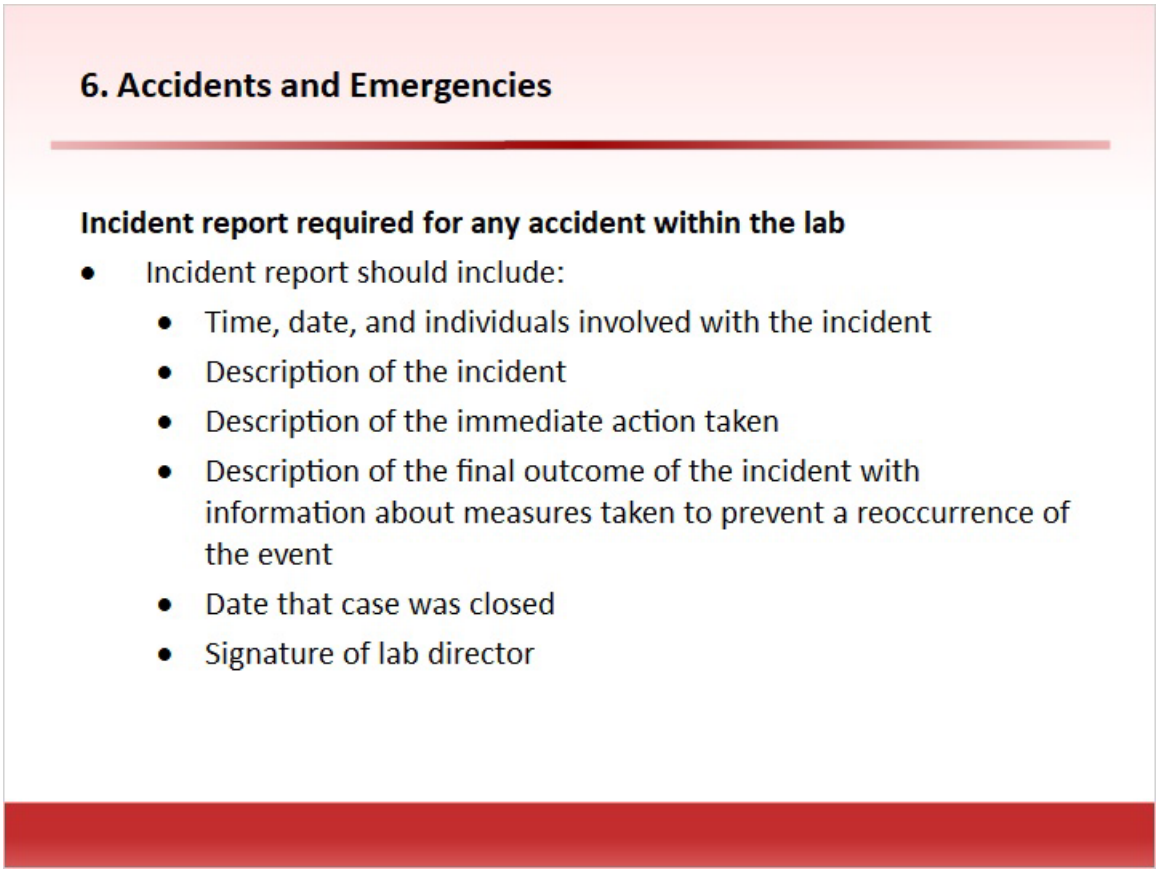
1.48 6. Accidents and Emergencies



Notes:

The embryology lab must be prepared to handle minor or major local accidents or emergencies that may happen within the lab or facility, as well as major emergencies at the city or state level that may affect the ability of the lab to function. Local accidents and emergencies would include personal injuries, equipment failure, chemical spills, short-term power outages, ruptured or frozen water pipes, or any other adverse event that disrupts lab activities.

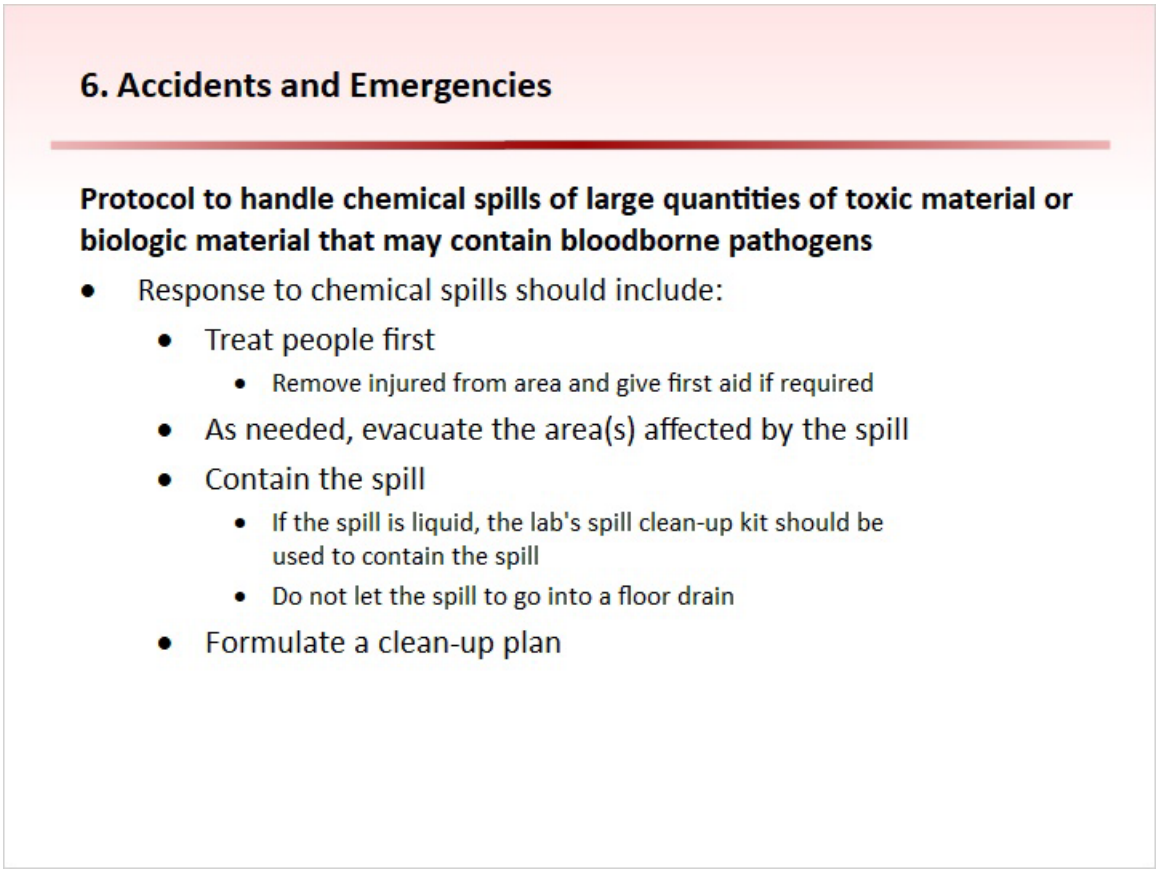
1.49 6. Accidents and Emergencies



Notes:

Any accident that happens within the lab must be reported in an incident report. An incident report should include the time, date and individuals involved with the incident, a description of the incident, a description of the immediate action taken, a description of the final outcome of the incident with information about measures taken to prevent a reoccurrence of the event, the date that the case was closed, and the signature of the lab director.

1.50 6. Accidents and Emergencies



Notes:

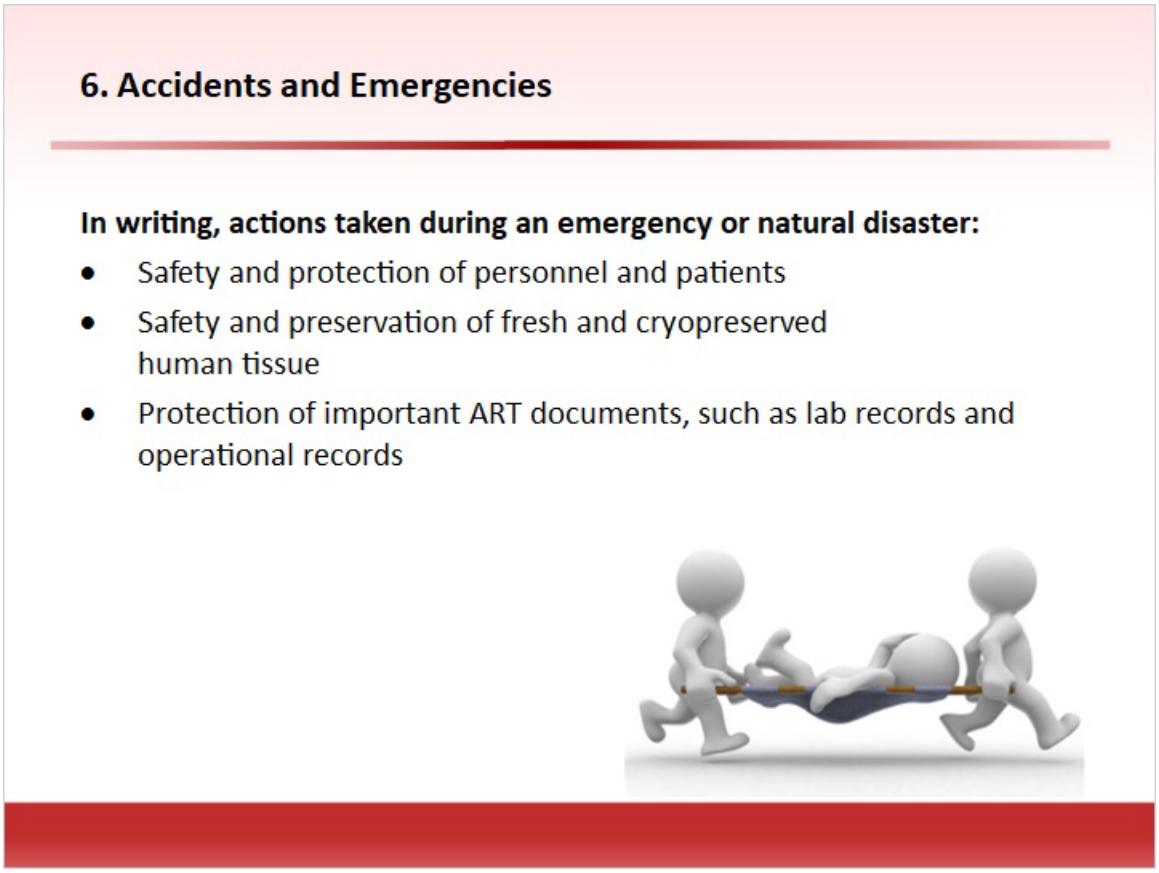
A protocol should be established to handle chemical spills of large quantities of toxic material or biologic material that may contain bloodborne pathogens. The response to chemical spills should include the following: Treat people first; remove the injured from the area and give first aid if required; as needed, evacuate the area(s) affected by the spill. Contain the spill; if the spill is liquid, the lab's spill clean-up kit should be used to contain the spill; taking care to not let the spill to go into a floor drain. Finally, formulate a clean-up plan.

1.51 6. Accidents and Emergencies

Notes:

The lab should also have an individualized emergency preparedness plan (Emergency Plan) to handle catastrophic events that completely disrupt lab function. Catastrophic events would include tornadoes, hurricanes, earthquakes, snowstorms, floods, or any other natural disaster that prevents the lab from functioning

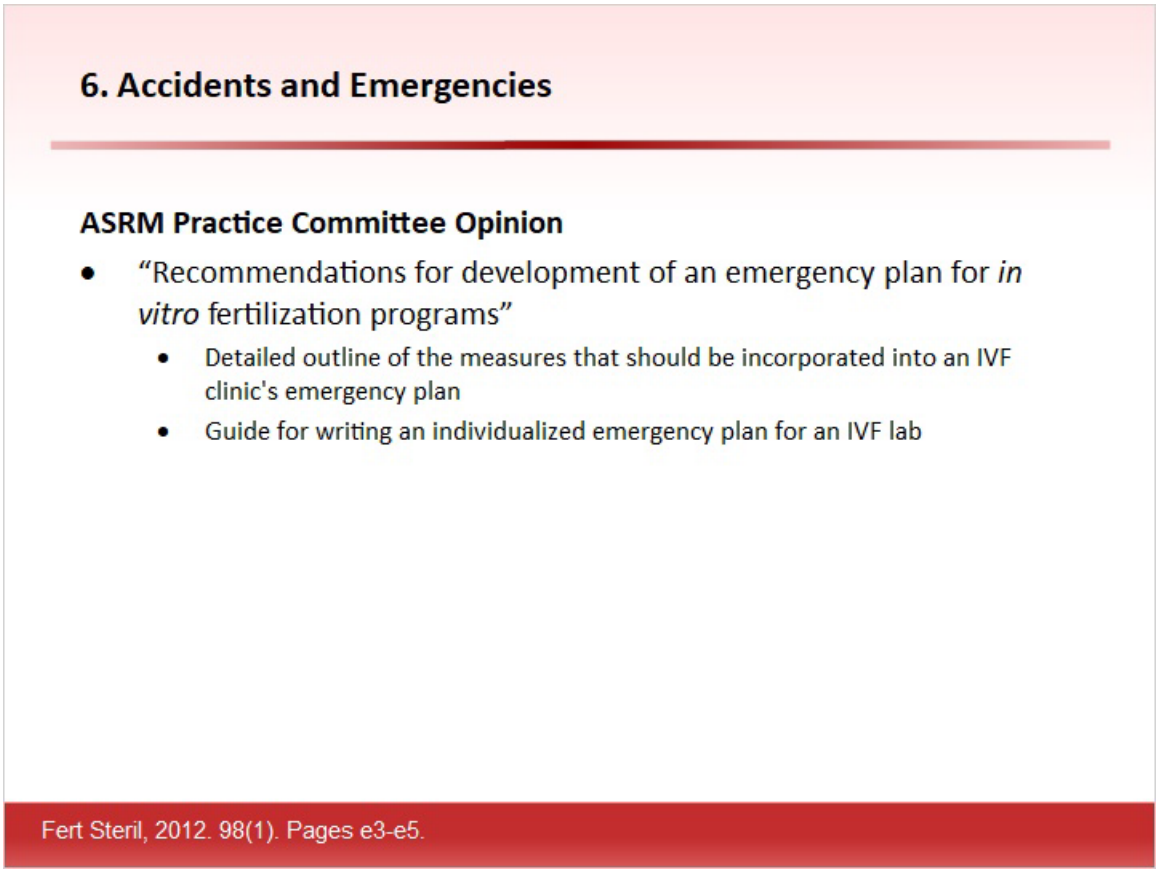
1.52 6. Accidents and Emergencies



Notes:

The emergency plan sets out, in writing, the actions taken during an emergency or natural disaster. These actions should include the safety and protection of personnel and patients; the safety and preservation of fresh and cryopreserved human tissue and the protection of important ART documents, such as lab records and operational records.

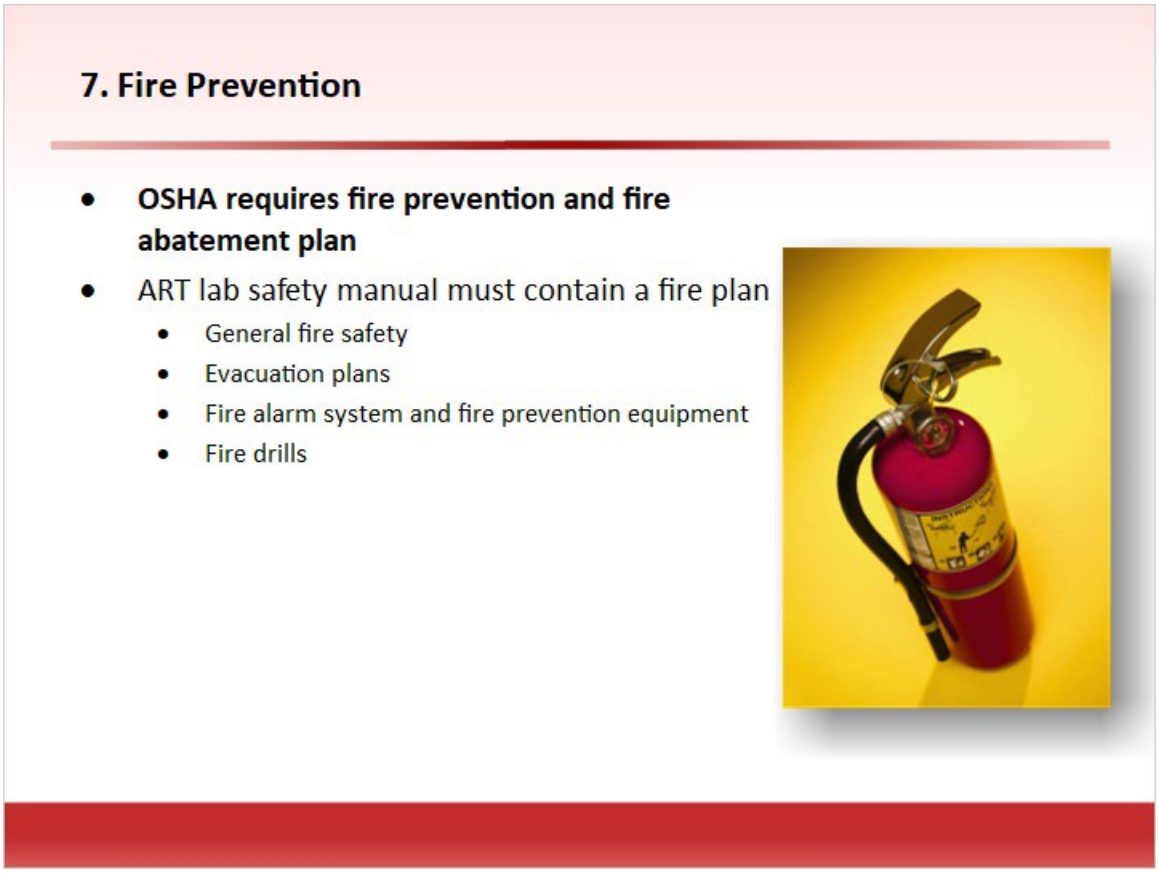
1.53 6. Accidents and Emergencies



Notes:

The ASRM practice committee has written a committee opinion on the "Recommendations for development of an emergency plan for *in vitro* fertilization programs" that gives a detailed outline of the measures that should be incorporated into an IVF clinic's emergency plan. This practice paper should be used as a guide for writing an individualized emergency plan for an IVF lab.

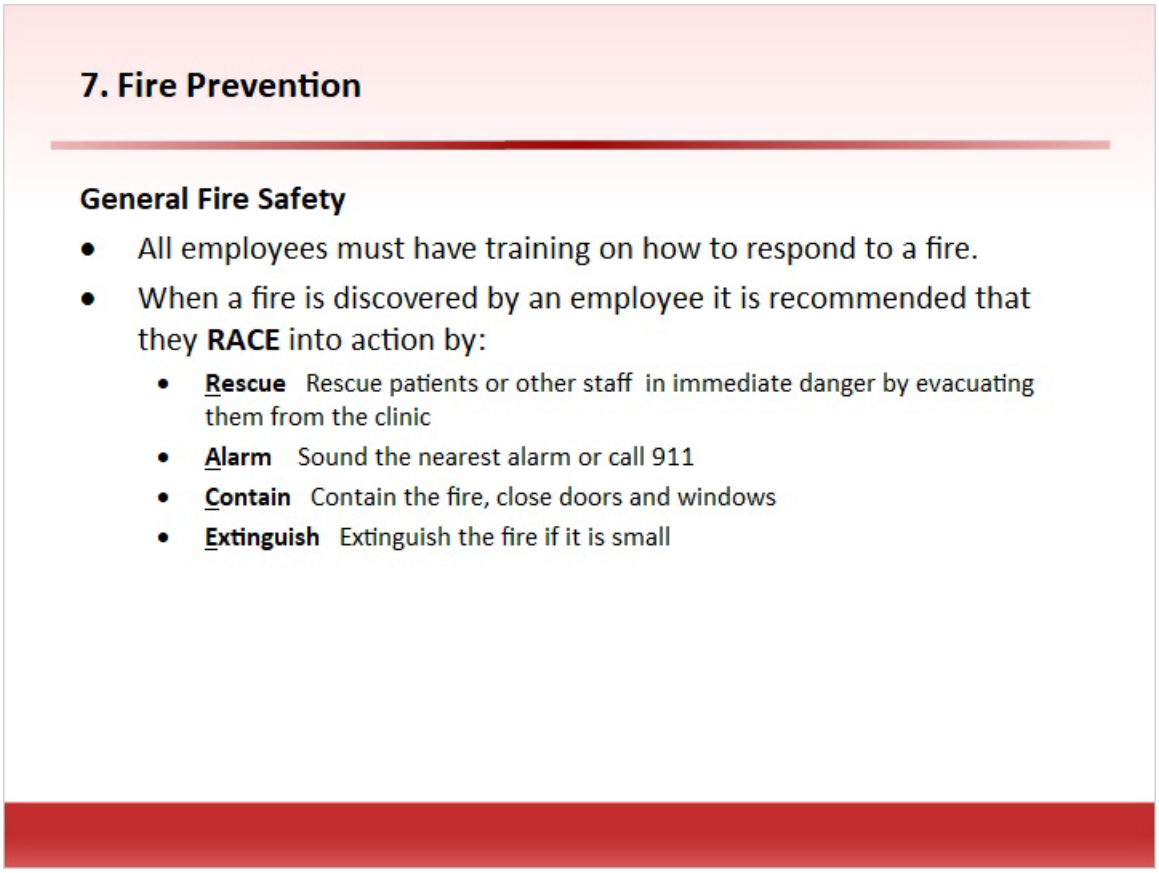
1.54 7. Fire Prevention



Notes:

Fire hazards are ever present in the laboratory environment. OSHA requires that all workplaces have a fire prevention and fire abatement plan. In addition, the safety manual of an ART lab must contain a fire plan that contains, at a minimum, information about: general fire safety, evacuation plans, fire alarm system and fire prevention equipment, and fire drills.

1.55 7. Fire Prevention



Notes:

All employees must have training on how to respond to a fire. When a fire is discovered by an employee it is recommended that they RACE into action using the acronym.
Rescue. Rescue patients or other staff in immediate danger by evacuating them from the clinic
Alarm. Sound the nearest alarm or call 911
Contain. Contain the fire, close doors and windows
Extinguish. Extinguish the fire if it is small

1.56 7. Fire Prevention

7. Fire Prevention

Written Evacuation Plan

- Must be included in the safety manual
  - Describes the routes out of building if a fire is detected or if fire alarm is sounded
  - Diagram of fire evacuation routes must be posted throughout clinic
- Exit signs must be placed on all evacuation doors that lead to outside of building

Notes:

A written evacuation plan describing the routes out of the building if a fire is detected or if the fire alarm is sounded must be included in the safety manual. The plan must include a diagram of the fire evacuation routes and this diagram must be posted throughout the clinic. Exit signs must be placed on all evacuation doors that lead to the outside of the building.

1.57 7. Fire Prevention

7. Fire Prevention

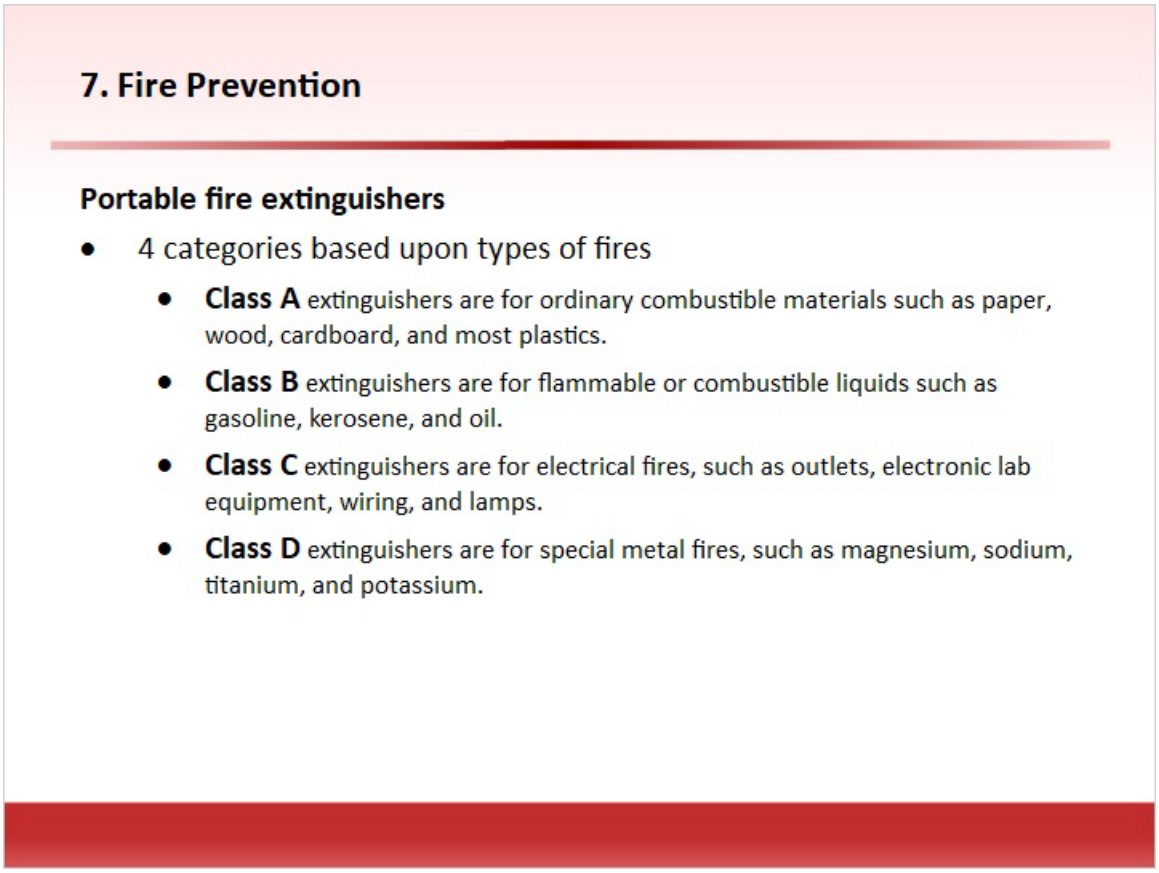
Fire alarm system and fire prevention equipment

- **Smoke or fire detectors** must be located in all areas; tested annually.
- **Automatic fire sprinkler system** that meets local fire codes, permanently installed in ceiling in all areas
- **Portable fire extinguishers** must be located in strategic areas throughout.

Notes:

Smoke or fire detectors must be located in all areas and should be tested annually. An automatic fire sprinkler system that meets local fire codes must be permanently installed in the ceiling in all areas and portable fire extinguishers must be located in strategic areas throughout.

1.58 7. Fire Prevention



Notes:

Fire extinguishers are divided into four categories, based upon the different types of fires that they are meant to extinguish.
Class A extinguishers are for ordinary combustible materials such as paper, wood, cardboard, and most plastics.
Class B extinguishers are for flammable or combustible liquids such as gasoline, kerosene, and oil.
Class C extinguishers are for electrical fires, such as outlets, electronic lab equipment, wiring, and lamps.
Class D extinguishers are for special metal fires, such as magnesium, sodium, titanium, and potassium.

1.59 7. Fire Prevention

7. Fire Prevention

Portable fire extinguishers

- **Water extinguishers** or **APW extinguishers** (air-pressurized water) suitable only for Class A fires
- **Dry chemical extinguishers**
  - Filled with foam or powder, pressurized with nitrogen
  - Suitable for a combination of Class A, B, and/or C fires.
  - Contain caustic chemicals and must be cleaned up immediately after use
- **BC dry chemical extinguishers** contain Na bicarbonate or K bicarbonate
- **ABC dry chemical extinguishers** contain monoammonium phosphate
- **CO_2 extinguishers** are suitable for Class B and C fires.

Notes:

Three common types of fire extinguishers are used in an ART lab.
Water extinguishers or APW extinguishers (air-pressurized water) are suitable only for Class A fires. Dry chemical extinguishers are filled with foam or powder and are pressurized with nitrogen. These are suitable for a combination of Class A, B, and/or C fires. These extinguishers contain caustic chemicals and must be cleaned up immediately after use. BC dry chemical extinguishers contain sodium bicarbonate or potassium bicarbonate. ABC dry chemical extinguishers contain monoammonium phosphate. CO_2 extinguishers are suitable for Class B and C fires.

1.60 7. Fire Prevention

7. Fire Prevention

How to use fire extinguishers

- Train all employees to follow **PASS** procedure
  - **PULL**. Pull the pin between the handles to enable the extinguisher
  - **AIM**. Aim the fire extinguisher's nozzle at the base of the fire
  - **SQUEEZE**. Squeeze the handles to release the contents of the extinguisher
  - **SWEEP**. Sweep the nozzle from side to side until fire is extinguished

Notes:

All employees should be trained in the proper use of a fire extinguisher and follow the steps in the P.A.S.S. procedure.
PULL. Pull the pin between the handles to enable the extinguisher.
AIM. Aim the fire extinguisher's nozzle at the base of the fire.
SQUEEZE. Squeeze the handles to release the contents of the extinguisher.
SWEEP. Sweep the nozzle from side to side until fire is extinguished.

1.61 7. Fire Prevention

7. Fire Prevention

Fire Drills

- Ideally conducted at least once per year, unannounced
- Staff member assigned to monitor and record:
  - That each employee followed RACE protocol
  - The total time required to evacuate building
  - If alarm could be heard in all areas of the clinic and lab
  - If measures were taken by the evacuated staff to confirm that all patients and staff evacuated the building

Notes:

A major component of fire safety is the execution of organized fire drills. Ideally fire drills should be conducted at least once per year and they should be done unannounced. A member of the staff should be assigned the duty of monitoring the fire drill and recording that each employee followed the RACE protocol, the total time required to evacuate the building, if the alarm could be heard in all areas of the clinic and lab, and if measures were taken by the evacuated staff to confirm that all patients and staff evacuated the building.

1.62 8. Safety Courses

Notes:

All personnel must be informed about the lab safety plan and receive formal training specifically about the safety needs of the lab. The training can be in the form of written material, lectures, videos or computer based learning. Safety training received by each lab member must be recorded and must be repeated on an annual basis.

1.63 Major Areas of Safety Concern for Labs

Notes:

This module has covered 8 major topics from the OSHA Safety Standards that have direct application to ART lab safety. Adherence to these recommendations and regulations are important in safeguarding lab personnel as well as the patients cared for in the lab.

1.64 Thank you!

Notes:

Thank you for participating in this educational activity.