

Laboratory Safety

Safety in the laboratory involves the protection of four different groups: the employees who perform laboratory procedures, the patients, the office cleaning staff, and the community (protection of the environment). This LabFacts will give an overview of the standards required for an effective laboratory safety program.

General laboratory safety procedures and policies should be documented in a safety section of the Standard Operating Procedure Manual (SOPM). The safety section of the Standard Operating Procedure Manual can include a list of the names and phone numbers of people to be contacted in case of emergency, written policies for the handling of toxic and biohazardous materials in the laboratory, and copies of Material Safety Data Sheets (MSDS) indexed for easy reference for all reagents and control solutions in use in the laboratory. Material Safety Data Sheets can be obtained from the distributor or the manufacturer. The Exposure Control Plan, which incorporates the use of universal precautions as a method of infection control, must be established according to specific OSHA guidelines as discussed below.

The Needlestick Safety and Prevention Act of 2000 was enacted to update the Bloodborne Pathogens Standard to clarify the need for employers to select safer needle devices as they become available and involve employees in identifying and choosing the devices.

The updated standard also requires employers who must maintain OSHA illness and injury records (more than 10 employees) to maintain a log of injuries from contaminated sharps. Physician's offices and medical laboratories are partially exempt from keeping OSHA injury and illness records, but keeping a sharps injury log is useful and highly recommended. This log can help you verify that the safest possible sharps are in use and to quickly identify problem areas for needlestick safety in your facility. For the latest information on needlestick safety visit: <http://www.osha.gov/SLTC/bloodborne pathogens.html>.

EXPOSURE CONTROL PLAN

Each employer must have a written Exposure Control Plan as required by the Occupational Safety and Health Administration (OSHA) *Bloodborne Pathogen Standards*. These standards include:

- Implementation of universal precautions.
- Engineering control requirements.
- Work practice control requirements.
- Personal protective equipment requirements.
- Record keeping requirements for the follow up of occupational exposure incidents.
- Documentation of employee training for occupational exposure.

For more specific details on developing a written Exposure Control Plan, you may contact OSHA at (800) 321-OSHA and ask for your free copy of the "*OSHA Regulations on Bloodborne Pathogens*." You can also write to:

OSHA PUBLICATION OFFICE
U.S. Dept. Of Labor
200 Constitution Ave., N.W.
Washington, D.C. 20210

UNIVERSAL PRECAUTIONS

Employers can be fined by OSHA if they do not require their employees to follow the universal precautions when they come into contact with blood and other regulated bodily fluids.

If you are in a physician office, implementation of an adequate safety program is often hampered by the fact that office lab workers frequently know many of the patients, and therefore assume that they are not at risk when drawing blood or working with certain specimens. While it is true that the office lab environment is safer than those of hospital and reference labs (because in the office setting there are fewer specimens and the patients are usually not as sick), there remains some risk for infection. The disadvantages of a haphazard application of standard safety practices are that there are surprises, because you don't always know who is a possible source of infection.

By *always* following recommended procedures, no one is singled out and you are able to quell any patient concern by saying that "WE DO THIS WITH EVERY PATIENT." Because of extensive media coverage, many patients now consider precautions such as wearing gloves to be part of high quality medical care. These patients have come to believe that their safety depends on the lab staff following certain precautions. Universal precautions involve treating all patients and specimens as though they are potentially

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infectious and not ignoring the possible source of risk.

UNIVERSAL PRECAUTIONS SHOULD APPLY TO THE FOLLOWING POTENTIALLY INFECTIOUS MATERIALS:

1. **BLOOD:** This is the single most important source for the hepatitis B virus (HBV) and the HIV infection.
2. **SEMEN AND VAGINAL SECRETIONS:** These secretions are known to contain viruses and other infectious bacteria.
3. **WOUND EXUDATES, TISSUES, CEREBROSPINAL FLUID, SYNOVIAL FLUID, PLEURAL FLUID, PERITONEAL FLUID, PERICARDIAL FLUID, AND AMNIOTIC FLUID:** While the actual risk of transmission of infections to lab workers is not known, the risks are considered real by the Center for Disease Control (CDC) and OSHA.
4. **BODY FLUIDS WHEN BLOOD IS VISIBLE:** This includes sweat, tears, sputum, saliva, nasal secretions, feces, urine, vomitus, and breast milk.

HEPATITIS B VACCINE

IMMUNIZATION OF LABORATORY STAFF AGAINST HEPATITIS B IS REQUIRED BY OSHA. Employers are required to provide the Hepatitis B vaccine free of charge to all employees who are at risk due to occupational exposure. While HIV has created enormous anxiety with health care workers, Hepatitis B is the most common serious pathogen that can infect laboratory staff. Its transmission is easily preventable by vaccination. Check the CDC's *Morbidity and Mortality Weekly Reports (MMWR)* for the latest hepatitis precautions and recommendations. If you wish to determine the immune status of the lab staff before vaccination, test for the presence of the Hepatitis B core antibody. If the test is positive, there is no need for the vaccine. Any employee who does not wish to be immunized must sign a statement of declination. If the employee later decides to receive the vaccine, the employer must still offer the immunization free of charge. Copies of immunization records must be kept in the employee's personnel file.

PERSONAL PROTECTIVE EQUIPMENT

Gloves: It is very common to have cuts and cuticle tears on your hands. Any break in the skin is a possible entry site for HIV, HBV, or other pathogens. The CDC recommends that gloves be used:

1. Whenever a health care worker has cuts, scratches, or other breaks in the skin.
2. In any situation where hand contamination with blood is likely to occur.
3. When performing finger or heel sticks on adults and children.
4. Whenever you are performing phlebotomy techniques, fresh gloves should be worn for each patient.

Masks/Goggles/Face Shields: Masks, goggles, and/or face shields must be made available anytime there is a likelihood of an employee being splashed by blood or another contaminated substance (biohazardous waste materials, cleaning solutions, etc.).

Laboratory Coats: The major purpose of lab coats is to protect clothing from contamination by specimens of bodily fluids and spills of hazardous chemicals or reagents. Lab coats should not be worn outside of the work area, nor taken home for laundering. Lab coats must be provided by and laundered by the employer.

Eyewash: Equipment to wash out eyes should be readily available in case of an accident. Simple wall units or faucet screw-on units are available from scientific supply companies.

Fire Blanket: Bunsen burners and alcohol lamps can cause fires. A readily available fire blanket can be used to smother flames in case a person's clothing catches fire.

ENGINEERING AND WORK PRACTICE CONTROLS

Hand Washing: Hands should be washed before drawing blood, touching your own eyes or mouth, immediately after contamination from any reagent or specimen, and before leaving to go home.

Avoiding Needle Sticks: Sticking yourself with a contaminated needle is a most serious hazard. It almost always happens when the worker goes to recap the needle after using it. In addition, house-keeping staff can be punctured when handling containers used to collect contaminated needles and scalpels.

- NEVER REMOVE NEEDLES FROM SYRINGES OR HOLDERS BY HAND.
- NEVER RECAP A NEEDLE.
- NEVER BREAK, BEND, OR TRY TO DESTROY NEEDLES OR SCALPELS.
- NEVER LEAVE CONTAMINATED NEEDLES OR SHARPS LYING AROUND.

To protect all people who may come in contact with contaminated "SHARPS" (needles, scalpels, pipette tips, etc.), special "SHARPS" containers should be used. These containers should be located in convenient locations around the laboratory. These should be opaque, tamper proof, spill proof, have puncture proof sides, and be autoclavable. Such containers can be purchased from scientific supply companies.

Pipetting: Never mouth pipette, and never lay contaminated pipettes on the work bench. Pipette bulbs, pumps, or other commercially available pipette aids should be used.

Eating, Drinking, and Hygiene: Never eat, drink, or smoke in the laboratory. Infectious organisms can be easily spread to the mouth. Never store food or drink in the laboratory refrigerator. Disinfect work bench surfaces at the end of the day and after any spills. A 10 percent bleach solution or commercially prepared disinfectant is acceptable.

Waste Disposal: Potentially infectious wastes such as contaminated needles or scalpels should not be thrown out with the regular office rubbish. They must be collected in specially labeled biohazard waste containers. These containers should be puncture proof for the needles, scalpels, and other sharp disposables. Bloody gauze, contaminated paper towels, gloves, etc., should be placed in labeled biohazard bags.

Infectious waste solutions such as blood, urine, and most reagents must be contained in leak proof bio-hazard receptacles until they are disposed of by a

waste disposal contractor. If specimens or reagents are handled over the laboratory sink and spillage occurs, be sure to flush the drain with lots of water to prevent erosion in plumbing pipes.

Contaminated culture plates should not be autoclaved in a physician office laboratory. Office autoclaves are generally far too small and the odor would overwhelm the entire practice facility. Check with your state laboratory for recommendations for decontaminating your dirty culture plates, if applicable.

There is increased concern regarding the contamination of the environment by medical wastes. *NOTE: Contact your state health officials and state OSHA office for the most up-to-date information on federal, state, and local regulations or recommendations for regulated waste disposal.*

Arrangements for the disposal of biohazardous waste should be negotiated with a professional biohazardous waste disposal contractor. Your reference laboratory or local hospital can be useful in providing the name of a reputable waste disposal contractor.

Chemical Hygiene: Protect employees by ensuring proper ventilation and make use of a fume hood if hazardous chemicals are used in your laboratory. Train employees in the proper storage, handling, and disposal of hazardous chemicals. Obtain and have available the Material Safety Data Sheet (MSDS) for all hazardous chemicals in use.

Adequate Space: Clutter can be a major problem in any size laboratory. Make sure all chemical or reagent containers are tightly capped. Build small shelves over the bench to provide space for all the small bottles and containers.

Remember to store larger bottles containing toxic chemicals on low shelves or storage space below the benches. There should be adequate counter space to avoid spills, mix-ups, and crowding of instruments and specimens. The laboratory should not be a heavy traffic area or an area where patients must pass through on a routine basis.

Laboratory Equipment: Keep the surfaces of all equipment clean. Clean up spills as soon as they happen. Follow the manufacturer's recommended cleaning schedule for automated instruments.

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Hemocytometers (counting chambers for manual blood cell counts) should be decontaminated in a disinfectant solution.

Centrifuges: Centrifuges can cause severe injury if operated improperly. **Never slow them down by hand.** If tubes break in the centrifuge, turn off the centrifuge immediately. Put on gloves and use forceps to remove the tube holders and pieces of broken tube, and then clean out the inside with paper towels and disinfectant. Soak the removed tube holders in disinfectant before returning them to the centrifuge.

Centrifuges should only be operated with closed lids (all centrifuges must have lids) or capped tubes to prevent aerosol exposure to staff.

Fire Extinguisher: Mount a small multi-purpose fire extinguisher on one wall in the lab. Instruct all workers in its proper use. Make sure the gauge on the extinguisher shows that it is properly charged and that it is tagged to indicate annual inspection validation. Many fire departments will provide free training on the use of a fire extinguisher and information related to local fire codes.

Electrical Safety:

- Have an adequate number of grounded outlets.
- Be sure all equipment has safe cords and plugs approved by the Underwriters Laboratory (UL) or similar group.
- Do not use regular extension cords.
- Do not remove the grounding prong from any plug.
- Do not handle any electrical equipment with wet hands.
- Immediately disconnect any piece of equipment that produces a “tingle” when touched. Have it checked and repaired before using again.

Each lab worker must be instructed on shock hazards and precautions and should know the location of the lab fuses in the office breaker box. In case of electrical shock, turn off the power at the source before attempting to touch the person!

DOCUMENTATION OF OCCUPATIONAL EXPOSURE INCIDENTS

Establish a protocol for reporting accidents. Any injury or laboratory accident should be followed up with an incident report. Include person’s name, type of accident, and date. For needle-stick accidents include the name and the medical diagnosis of the patient involved.

DOCUMENTATION OF EMPLOYEE OCCUPATIONAL SAFETY TRAINING

OSHA requires a copy of its regulations be given to each employee who is at risk for occupational exposure to bloodborne pathogens.

Training records must include dates of training sessions, topic covered, names and qualifications of the trainers, and job titles of the trainers. The records must be kept for three years from the date of the training session.

The laboratory director is responsible for maintaining the safety training program.