



Laboratory Safety

Health Worker Safety Training Module 4

Topics

- Best practices for laboratory safety
- Hazardous chemical/substance spills
- Chemical storage
- Standard lab safety equipment



Best Practices for Laboratory Safety

General Precautions for Lab Safety:

- Glove guidelines
 - Wear gloves when handling infectious materials or where there is possibility of exposure to blood or other body fluids.
 - Discard gloves when they are thought to be contaminated. Wash hands and put on new gloves.
 - Do not touch your eyes, nose, or other exposed membranes or skin with gloved hands.
 - Do not walk around the lab or leave the workplace wearing gloves.
 - Wash hands with soap and water immediately after contamination and after work is completed and/or gloves are removed



Photo by David Snyder

General Precautions for Lab Safety:

- Wear a lab coat whenever in the lab and remove before leaving
- When working with material potentially infected with HIV, close the lab door and restrict access to the lab
- Keep the lab clean, neat and free from unnecessary materials and equipment
- Disinfect work surfaces when procedures are completed and at the end of each work day



Photo by David Snyder

General Precautions for Lab Safety:

- If possible, avoid using needles and other sharp instruments
 - Place needles and sharps into a puncture-resistant container
 - Do not recap used needles
 - Do not remove needles from syringes
- Never pipette by mouth
- Work to minimize creating aerosols, droplets, splashes or spills
- Do not eat, drink, smoke, or store food or personal items in the lab
- Ensure there is an effective insect and rodent control program

Safe Lab Practices

- **Hair:** Long hair must be tied back to prevent possible contamination and injury.
- **Laundry:** Lab coats and other potentially contaminated clothing must be washed separately from other laundry items.
- **Hand Washing:** Hands and forearms must be washed prior to leaving the laboratory.
- **Pipetting:** Pipetting by mouth is not allowed. Use mechanical pipetting devices only.
- **Housekeeping:** Containers, glassware, and other apparatus should be kept clean and properly arranged or disposed of when not in use.

Lab Workers Must NOT:

- Store food or drinks in technical areas or refrigerators meant for samples or reagents.
- Eat in the lab
- Smoke in the lab
- Apply cosmetics in the lab
- Wear jewelry that can be caught in equipment or hang into infective materials
- Store personal property in technical areas
- Wear sandals/open-toed shoes



Personal Protective Equipment (PPE)

- PPE is required in all laboratories with chemical hazards.
- The minimal PPE is:
 - chemical resistant gloves or gloves appropriate to the hazard
 - lab jacket or apron
 - goggles
 - closed- toed shoes
- Lab coats must not be worn in eating and food preparation areas



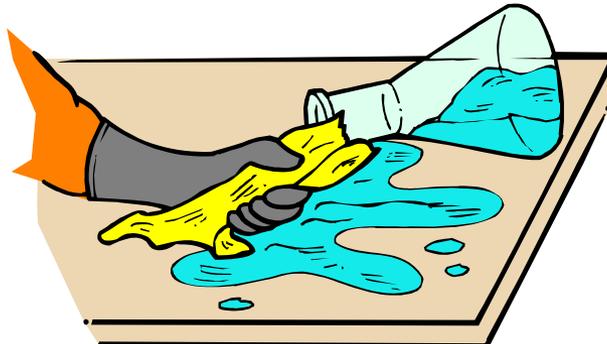
Photo by David Snyder



Hazardous Chemical/Substance Spills

General Chemical Spill Guidelines

- Determine the extent and type of spill
 - Spill category?
 - Chemical release into the environment?
 - Acutely hazardous chemicals spilled?
 - Available personnel trained in proper procedure for cleaning chemical spills?



Chemical spill categories

Category	Quantity	Response	Treatment Materials
Small	Up to 300 milliliters (ml)	Chemical treatment	Neutralization or absorption spill kit
Medium	300 ml – 5 liters	Absorption	Absorption spill kit
Large	More than 5 liters	Call the engineering department	Call the engineering department

In case of a chemical spill:

- Immediately alert area occupants and supervisor, and evacuate the area, if necessary
- Attend to any people who may have been exposed.
 - Contaminated clothing must be removed and skin flushed with water for at least 15 minutes.
 - Clothing must be laundered separately from other garments before re-use.
- Use the appropriate PPE for the hazard involved.
- Block floor drains or other routes of potential environmental release.
- Absorbent materials used on the spill will probably need to be disposed as hazardous waste.
- Clean the surface where the spill occurred using a mild detergent and water.



Chemical Storage

Guidelines for Chemical Storage

- Minimize the quantities of chemicals stored within the lab
- Bulk quantities of chemicals (larger than one gallon) must be stored in a separate area
- Chemicals must be stored at an appropriate temperature and humidity level
- Chemicals should be dated when received and opened. Shelf-life expiration should be included
- Chemicals should have a designated storage area and be returned after use.





Standard Laboratory Safety Equipment

Fume Hoods

- A fume hood is one of the most important pieces of laboratory safety equipment for lab workers
- A fume hood prevents the inhalation of potentially harmful substances, deters uncontrolled splashes and spills from entering the lab environment, and removes flammable vapors from the indoor atmosphere.
- A chemical fume hood cannot provide complete safety against all hazards.
- A functioning fume hood and appropriate laboratory ventilation will provide adequate protection during standard laboratory manipulations.
- When to Use a Chemical Fume Hood:
 - Working with hazardous or suspect hazardous chemicals
 - Working with chemicals having unknown properties
 - Pouring, mixing, weighing and dispensing chemicals

Fume Hood Safety Rules

1. Keep all apparatus at least 6 inches from the face of the hood
2. Do not put your head in the hood when contaminants are being generated
3. Do not use the hood to evacuate containers of volatile waste chemicals
4. Minimize the quantity of chemicals and apparatus being used in the hood
5. Maintain the slots in the hood baffle free from obstructions.
6. Minimize traffic in front of the hood while in use
7. Do not remove hood labels that indicate maximum safe operating level of the sash
8. Ensure all fume hoods have a spill protection lip



Thank You

Bibliography

- Maxwell Adams, J. (1994, reprint 2004). *Electrical Safety 2004: A guide to the causes and prevention of electrical hazards*. London. The Institution of Electrical Engineers.
- Central Board of Health (2003). *Zambia Infection Prevention Guidelines*. JHPIEGO Corporation. Baltimore, Maryland.
- Damani, N.N. (2003). *Manual of Infection Control Procedures: 2nd Edition*. Cambridge. Cambridge University Press.
- Emory University Environmental Health and Safety Office. (2009, September). *Safety Toolbox Training: Avoiding Electrical Shocks*. http://www.ehso.emory.edu/content-guidelines/ToolboxTraining_AvoidingElectricalShocks.pdf.
- Kenyatta National Hospital (2006). *Policy Guidelines on Antiseptics, Disinfection, Sterilization and Waste Disposal*.
- Muralidhar, S., PK Singh, RK Jain, M Malhotra & M Bala (2010). "Needle stick injuries among health care workers in a tertiary care hospital in India." *Indian Journal of Medical Research*. Mar; 131: 405-10.
- Office of Safety and Health Administration. (April 2009). OSHA Academy Course 715: *Electrical Safety Basics Student Manual*. <http://www.oshatrain.org/courses/mods/715e.html>.
- Prasad, R., Z. Quezado, A. St. Andre, & N. O'Grady (2006). *Fires in the Operating Room and Intensive Care Unit*. *Anesth Analg* 2006;102:172-4.
- Patterson W B., Craven DE., Schwartz DA., Nardell EA., Kasmer J. & Noble J. (1985) *Occupational Hazards to Hospital Personnel*. *Annals of Internal Medicine*. May; 102:658-68.
- Tanzania Ministry of Health and Social Welfare. (2004). *National Infection Prevention and Control Guidelines for Health Services in Tanzania*.
- Tanzania Ministry of Health and Social Welfare. (2003). *Tanzania Waste Management Guidelines*.
- Tanzania Ministry of Health and Social Welfare. (2009). *Injection Safety in the Context of Infection Prevention and Control, Participants' Manual Tanzania*.
- Tanzania Ministry of Health and Social Welfare. (2006). *Standards and Procedures for Healthcare Waste Management in Tanzania*. Pul: Ministry of Health and Social Welfare, United Republic of Tanzania, 28pp.
- Wenzel, RP, editor. (1994). *Prevention and Control of Nosocomial Infections*. Baltimore. Williams & Wilkins.