CSHEMA

Campus Safety Health and
Environmental Management Association

Emergency Response in Labs

Contact Chapman University EH&S
with any questions on university-specific practices

SAFETY
FIRST

Topics Addressed in this Module

- Overview to Emergency Response
- Response to Medical Emergencies
- Response to Fire Emergencies
- Response to Hazardous Materials Emergencies
- Response to Other Emergencies

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Overview to Emergency Response

Emergency Response in Labs

- Careful planning for emergencies is part of setting up a safe and productive lab.
- Understanding the hazards involved is key to safe work.
- If you are unsure of possible hazards or if you need assistance preparing for emergencies, contact your institution's designated safety/emergency representative.

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Emergencies in labs

- As part of a safe lab, it is imperative that all individuals are well prepared for emergencies.
- At a minimum, personnel should be made aware of the location and proper use of:
  - Emergency telephone numbers
  - Eyewash stations and emergency showers
  - Spill kits
  - Emergency exits, evacuation routes and meeting places
  - Fire extinguishers and alarm pull stations

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Firstly

- It is critical that you report ALL accidents and injuries to your supervisor.
- It is also critical that the supervisor then follows the reporting procedure proscribed by your institution.

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Secondly

- Get to know the Environmental Health and Safety staff at your institution; they will be a great resource to assist you in planning for emergencies in your laboratory.

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Medical Emergencies

Slide Medical Emergencies Title

- Things to do IN ADVANCE!
  - Identify first aid resources
  - Identify EMTs, in-house or municipality resources
  - Identify ambulance transport options
  - Contact your Environmental Health and Safety staff for assistance:
    - For high hazard items, identify specific responses in your Standard Operating Procedure (SOPs)

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More Advanced Planning:

- Identify the emergency phone number for institution to use:
  - Internal Police?
  - Local 911?
  - Something else?
- Ensure that information regarding laboratory emergency situations is prominently posted.
- Run drills of likely situations with lab employees (spills, eye exposures, etc.).

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Emergency Response

- General guidelines:
  - Remain calm
  - Initiate lifesaving measures if you are able and trained
  - Call for emergency help
  - Do not move the injured or affected person unless there is danger of further harm
  - Clear the area of extraneous personnel
  - Do not put yourself at risk for any response

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First Aid

- It is important to check with your institution's legal department to identify who is permitted to perform first aid procedures.
- Some institutions only permit trained personnel to perform first aid.
- Determine the type of first aid kit permitted in labs, in consideration of the same legal reasons.

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Chemical Exposures

- Emergency eyewashes and showers should be present and available wherever hazardous (and especially corrosive) chemicals are present.
- These units should be available to an injured person within a 10 second walk and never separated by a door or stairwell.
- Eyewashes and showers should be routinely tested to ensure clean supply water.

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Chemical Exposures

- Blocking access to both eyewashes and safety showers is a common problem.
- Routinely check to ensure your units are not blocked.

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Punctures and Needle-sticks

- They can occur with any agent:
  - Chemical
  - Biological
  - Radiological
  - No hazardous material present
- You must report all needle stick injuries to your supervisor—this is an OSHA requirement!

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Fire Emergencies

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Fire – Key Points

- Remember that fires in labs have the potential to spread rapidly, depending on the fuel source (e.g., flammable liquids)
- Lab chemicals involved in a fire can rapidly produce toxic gas and smoke
  - SOPs for high hazard research activities are essential and should outline emergency steps (e.g., working with pyrophorics, hydrofluoric acid, etc).
- In case of any fire in a lab, it is essential to never put yourself in danger to extinguish fire or aid others

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Fire – Types of Fire

- There are several classes of fire potentially found in labs:
  - Ordinary combustibles (paper)
  - Flammable liquids (solvents and other fuels)
  - Energized electrical equipment (equipment plugged into an energy source)
  - Energized electrical equipment (equipment plugged into an energy source)
- Each class of fire requires a different approach to emergency planning and potential extinguishment.

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Fire – Sources of Ignition

- There are many potential ways in which a fire may start in a lab:
  - Electricity
  - Open flame
  - Mechanical
  - Chemical reactions
  - Static electricity

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Fire Prevention: Emergency Planning

- Keeping sources of ignition away from potential fuel sources is critical:
  - Use appropriate chemical storage cabinets and never store or use flammable liquids near open flame or other ignition sources
  - Be mindful of where combustible materials are stored. Housekeeping should be a top priority to minimize fire potential

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Fire Prevention: Emergency Planning *(Continued…)*

- Keeping sources of ignition away from potential fuel sources is critical:
  - Ensure electrical and mechanical equipment is in good working condition at all times
  - Perform internal lab inspections, part of which should include emergency planning steps

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Fire Extinguishers

- Lab staff should review their respective institutional policies, including selection, use and hands-on training of fire extinguishers
- If made available for use, by policy, ensure that fire extinguishers are:
  - The proper type for the materials used in the lab
  - Accessible
  - Inspected regularly

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Fire – Small, Slow-Spreading, Trash-Can Size

- If it can be done safely, try to secure the fuel source or de-energize equipment, if applicable (valve, gas line, electrical breaker, etc.)
- Use a fire extinguisher (only if your university provides training and allows use) or smother the fire
  - Always keep a clear path to the exit access
- Alert people in the lab and call emergency response
- Notify your supervisor and follow reporting requirements

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Fire - Small *(Continued…)*

- If the fire continues to burn after initial attempts to extinguish:
  - If possible, close the sash if fire is in a chemical fume hood
  - Evacuate the lab & shut the door
  - Activate the fire alarm & leave the building using exit stairs
  - Meet in a designated location to account for everyone
  - Notify emergency responders on scene and provide any relevant information

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Fire – Major Fire

- Fires that spread rapidly are potentially very dangerous, may rapidly produce flames and large quantities of toxic gases and smoke.
- Never attempt to fight a major fire (generally characterized as larger than a trash can in size or requiring more than 1 fire extinguisher).

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Fire - Major

- Steps to take in a major fire:
  - If possible and can be done safely, close the sash if fire is in a chemical fume hood
  - Evacuate the lab & shut the door
  - Activate the fire alarm & leave the building using the exit stairs
  - Meet in a designated location to account for everyone
  - Notify emergency responders on scene and provide any relevant information

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Clothing on Fire

- If a lab member's clothes are on fire, quick response is essential:
  - Get them to an emergency shower immediately
  - If no shower is available, have the person, "Stop, Drop and Roll"
  - Call for emergency assistance and provide aid

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Pyrophorics in a Lab

- Pyrophoric materials require special emergency planning procedures due to their increased hazard:
  - This includes written SOPs
  - PPE specifically selected for use
- No one should work alone with these materials
- Follow steps in previous slide for response if pyrophoric material comes into contact with clothing

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Hazardous Materials Spills

Chemical, Biological, Radiological

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Spills

- There are several types of spills that potentially require emergency response:
  - Chemical
  - Biological
  - Radiological

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Spills *(Continued…)*

- As with all emergencies, spills in the lab require planning and practice:
  - Prevention is key – use secondary containment!
  - Ensure spill kits are adequately stocked
  - Provide training for proper use of spill kit materials

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Spills – Observation Before Action

- For all spills, observation before action is essential:
  - Clear all persons from the area of the spill
  - Check for personal exposure- treat as necessary
  - Determine the severity of the incident to determine if it is minor or major and respond to the type of spill accordingly

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Chemical Spills – Response kits

- Each lab should have a complete spill response kit:
  - Should contain Personal Protective Equipment (PPE), neutralizers and absorbent materials (enough to deal with a spill from the largest containers in the lab)
  - Absorbents must be compatible with the chemicals in use in the lab
  - If mercury is in use, a mercury spill kit is also essential
  - Should be located in an accessible area
  - Should be checked regularly to ensure fully stocked

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Chemical Spills – PPE in Spill Kits

- Must be adequate for materials in use in the lab
- Must be appropriate for gross contamination (expected during many chemical spills):
  - Splash goggles, not just safety glasses
  - Lab coat with sleeves rolled down (or Tyvek suits, if necessary)
  - Protective (long) gloves, as appropriate for the material being handled
  - Note: respirators should only be used by trained personnel

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Chemical Spill - Initial Response

- Assist contaminated or injured persons.
  - Get them to an emergency shower/eyewash station and flush for 15 minutes
- Evacuate the area.
- Avoid breathing vapors.
- Eliminate sources of ignition (for solvents).

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Chemical Spill - Initial Response *(Continued…)*

- Upright the bottle to prevent further spillage, if possible .
- Confine the spill to a small area using absorbents.
- Prevent others from entering area.
- Notify emergency responders or designated safety representative for assistance.

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Mercury Spills

- If mercury is used in a research lab, a mercury spill kit must be available in the immediate work area.
- Only attempt to handle incidental, non-emergency elemental mercury spills. Anything else should be considered major and handled by emergency response personnel .

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Biological Spills

- Please refer to your institution's Biological Safety Manual (BSM) and guidelines for specific instructions.
- Spills/releases of biological agents must be planned for in advance, as cleanup will depend on the specific agent(s) in question, amount involved, and location:
  - Read and understand your lab specific SOP's
  - Know the signs and symptoms of exposure
  - Identify nearest eyewash station(s)
  - Understand the difference between a minor and major spill/release (per your BSM)

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Biological Spills

- In general, uncontrolled spills or concentrated spills of higher hazard biological material(s) should be handled professionally:
  - Clear area and contact emergency responders. Do not attempt cleanup
  - Decontaminate clothing and exposed skin
  - Seek medical care and follow-up, if exposed
  - Contact your Biosafety Officer for follow-up

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Radiological Spills

- General radiation spill cleanup will depend on the specific material in question. Always refer to the institution's Radiation Safety Manual and guidelines.
- For spills involving radioactive material, it is important to differentiate between a minor and major spill.
- Regardless of the size of a spill, your institution's Radiation Safety Officer should be contacted immediately.

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Summary - For all emergencies

- Plan ahead and practice.
- Communicate your emergency plans with all lab members.
- Ensure emergency contact information is current & available.
- Establish meeting places, in case evacuation is necessary.

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Summary - For all emergencies *(Continued…)*

- Understand and follow your emergency reporting system.
- Learn how to use and respond to the warning system(s) in your building and campus.
- Ensure access aisles and evacuation routes are kept clear at all times.

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