



Occupational Health, Safety and Biosafety

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Learning Objectives

- To become familiar with the emergency response plans in place for OHIRC Laboratories
- To describe the types of emergencies that may occur in OHIRC laboratories
- To know how and to whom an accident should be reported
- To describe the types of emergency equipment available in the containment zone and provide instructions for their proper use
- To identify emergency exits and safe evacuation routes



Accident Reporting and Investigation

- All workplace accidents and near misses must be immediately reported to the Principal Investigator(PI) or Lab Manager so that they can be recorded, investigated and corrected
- A workplace accident is an unexpected and undesired event that results in personal injury or illness, loss of production or service or damage to equipment or property
- A near miss is an unexpected and undesired event that did not cause injury or damage at this time but had the potential to do so
- Reportable accidents are all accidents and suspected occupational diseases that will require medical attention and / or implies a possible loss of working days – this includes critical injuries



Critical Injuries or Fatality

Critical injuries as defined by the Occupational Health and Safety Act are:

- Places life in jeopardy
- Produces unconsciousness
- Results in substantial loss in blood
- Involves the fracture of a leg or arm but not a finger or toe
- Involves the amputation of a leg or arm, hand or foot but not a finger or toe
- Consists of burns to a major portion of the body
- Causes the loss of sight in an eye



Accident Investigation Procedure

- All accidents and near misses that occur in the laboratory must be immediately reported to the principal investigator (PI) or to the person in charge;
- The PI or person in charge will ensure appropriate first aid and medical care is provided to any injured person;
- The PI will carry out an investigation of the circumstances to identify the root cause and implement corrective action;
- All sections of the OHIRC accident report form will be completed. Accident report forms can be downloaded from Heart Hub at the following link:
<https://hearthub.ottawaheart.ca/document/19644>
- Completed forms must be emailed to the Occupational Health and Safety Office (OHSB) to healthandsafety@ottawaheart.ca



Lost Pathogen Reporting

- All releases of pathogens into the environment or lost or missing stock must be reported to the Public Health Agency of Canada (PHAC).
- The lab (PI and personnel) must carry out a thorough investigation of the circumstances in an attempt to locate the missing stock.
- If necessary Protective Services will be consulted to assist in the search for missing stock.
- If the pathogen stock is not found a report must be made to PHAC. The lab must report the missing inventory to the Biosafety Officer (BSO) who is then required to report to PHAC.



Pathogen Exposure Reporting

- All exposures to pathogens must also be reported to PHAC
- Exposure incidents include any incident involving a pathogen or toxin where infection or intoxication is likely to have occurred, and thereby a potential for disease.
- Any incident resulting in a Laboratory Acquired Infection ie disease , or any incident where there is a probable exposure via inhalation, ingestion, inoculation, or absorption involving a **Risk Group 2 (RG2)** human pathogen or toxin that occurs in an OHIRC lab must be reported to PHAC without delay.
- A report to the BSO must be made as soon as possible after the exposure so that a report to PHAC can be made in a timely manner



Fire Safety

In the event of a fire remember the acronym **S.C.A.T.E.E.**

S – **Save** lives, remove patients, visitors and staff to a safe area

C – **Close** the Laboratory door to contain the smoke and fire in the room

A – **Activate** the **Alarm** located near all exits

T – **Telephone** 815555 to report the nature of the emergency and the specific location

E – **Extinguish** – if safe to do so

E – **Evacuate** – Close but do not lock the door





Clothing Fires ...



- If you are by yourself when your clothes have caught fire, remove the garment if it is possible to do so, or STOP, DROP and ROLL / use the emergency deluge shower to extinguish the flames



Fire Emergencies

Clothing fires:

- If your co-worker's clothes are on fire use the EMERGENCY FIRE BLANKET or a LABORATORY COAT or the EMERGENCY SHOWER to extinguish the flames.
- To use the EMERGENCY FIRE BLANKET:
 - Remove the fire blanket from its container and wrap it around the individual on fire
 - Force the person onto the ground
 - Gently pat the surface area to aid in extinguishing the fire
 - NEVER REMOVE THE BLANKET TO CHECK IF THE FIRE IS OUT. The new supply of oxygen could re-ignite the substance that was originally burning.





Fire Extinguishers

Fire extinguishers are to be used to assist you in getting out safely or for fighting small fires.

- Do not attempt to fight a fire on your own.
- As soon as the fire is extinguished, back away from the area carefully.
- Always watch the fire in case it re-ignites, and never turn your back to the fire area.
- Always keep a clear path between yourself and the exit.
- In case of problems with fire extinguishers, or if used, immediately notify the Occupational Health, Safety and Biosafety Office at 17558 **and** Facilities Management at EXT.10311.





Fire Extinguishers

Appropriate Fire Extinguishers have been selected based on the following Classes of Fires and are accessible in Research areas.

- **Class “A”**: Involve common combustibles such as wood, paper, cloth, rubber, trash, and plastic.
- **Class “B”**: Involve flammable liquids, solvents, oils, greases, tars, lacquers, and other oil-based products.
- **Class “C”**: Involve energized electrical equipment such as wiring, motors, switches, and appliances.
- **Class “D”**: Involve combustible metals such as magnesium, titanium, sodium, potassium, zirconium, lithium and any other finely-divided metals which are oxidizable.

Fire Extinguishers and Locations:

- **Water Fire Extinguishers** are designed for Class “A” fires and are located in the fire hose cabinets in the corridor by stairwells KA and KB.
- **CO2 Fire Extinguishers** are designed for Class “B” and “C” fires and are located at exit doors of laboratories.
- **Dry Powder Extinguishers** (with powdered graphite, copper or granular sodium chloride) are designed for Class “D” fires and are located in the PET Radiochemistry Laboratory where combustible metals are used and stored.



Using a Fire Extinguisher

Fire Extinguisher

PASS



PULL



AIM



SQUEEZE



SWEEP

1. Pull the pin
2. Aim at the base of the fire
3. Squeeze the handle
4. Sweep over the fire from side to side



Emergency Exits

- When an emergency code is announced overhead the following building descriptions will be used to describe UOHI buildings:
 - Heart Institute Clinical Services (Patient Care areas) – Building 2 / H
 - **Heart Institute Research Centre – Building 5 / K**
 - Heart Institute Tower – Operating Rooms and life support functions – Building 21 / X
- Stairwell signage convention is as follows:
 - The building letter will precede the stairwell letter to identify the building
 - Each stairwell is identified A, B, C, D etc
 - The Research Centre has 4 stairwells (KA, KB, KD and KE)





Evacuation Plan - Horizontal

In the event of an Emergency Situation that requires the evacuation of the OHIRC laboratories, evacuation will be either horizontal or vertical depending on the circumstance:

If the emergency is confined to one laboratory, a horizontal evacuation will be required:

- If safe to do so, cap and return all hazardous chemicals to the appropriate storage areas;
- If safe to do so, switch off all electrical equipment;
- Exit the laboratory, closing the door on exit and proceed to the elevator lobby, beyond the fire door near stairwell KA. Alternatively, occupants may be required, to proceed to the elevator lobby, beyond the fire door near the stairwell KB. Never cross in front of the room where the fire is located.





Evacuation Plan - Vertical

If the emergency involves multiple laboratories on the same floor, a vertical evacuation will be required:

- If safe to do so, cap and return all hazardous chemicals to the appropriate storage areas;
- If safe to do so, switch off all electrical equipment;
- Exit the laboratory, closing the door on exit and proceed to the elevator lobby, beyond the fire door near the west stairwell. Alternatively, occupants may be required, to proceed to the elevator lobby, beyond the fire door near the south stairwell;
- Using stairwell KA or KB, occupants will descend to the M Level, stage themselves in the Main Lobby and await further instructions
- The Fire Monitors will check all laboratories to ensure they are empty. Anyone refusing to leave will be advised that the Heart Institute is in an emergency evacuation situation and their refusal and location will be reported immediately to Security at 8-14888;
- The decision to use the elevators will be made by the Ottawa Hospital Fire Marshal in consultation with the Ottawa Fire Department.



Hazardous Materials Spills

- Hazardous Materials Spills maybe chemical, biological or Radioactive in nature. Appropriate contingency plans have been developed.
- A minor spill is one where the quantity of material spilled can be safely handled by personnel in the laboratory using materials contained on the HazMat Cart on the 3rd floor
- A major spill is one that cannot be safely contained or cleaned up by staff on site and requires assistance from the Ottawa Hospital Code Brown Assessment Team.





Hazardous Material Spills - Chemicals

Minor Chemical Spills:

- All principal investigators are responsible to ensure that appropriate measures are taken to neutralize, absorb or clean up any minor chemical spill that occurs in their laboratory
- The materials and equipment contained on the hazardous materials spill cart located on the 3rd floor of the Research Centre may be used for the clean up.
 - Appropriate personal protective equipment must be donned before proceeding with spill clean up
 - The spill should be contained using absorbent socks, pillows or pads contained on the spill cart or by creating a dike with absorbent material
 - The universal sorbent ENSORB is supplied on the cart. ENSORB can be used to treat all liquid spills **except** Hydrofluoric Acid
 - Starting from the perimeter add sorbent to the spilled material covering the spill completely
 - Allow 30 minutes for the liquid to be absorbed
 - Sweep up the residue and place in clear plastic bags
 - Rinse the area with soap and water
 - All materials used in and generated by the clean up is hazardous waste. Label as hazardous waste chemical and contact waste@toh.ca to request removal from the laboratory
- The Occupational Health, Safety and Biosafety Office (OHSB) must be notified whenever materials are used so that they are replenished.



Hazardous Material Spills – Chemicals

Major chemical Spills:

In the event of a spill that cannot be handled or controlled safely by the personnel in the area because of dangers to personnel or a threat to the environment, the TOH Code Brown procedure must be followed as described below:

- Turn off ignition sources, if it is safe to do so, evacuate the immediate area and close the door to the area. Cordon off the area and use signs to prevent access to the area;
- Contact TOH Contact Centre at 8 -1-5555 to report a major spill and the exact location of the spill;
- Contact OHSB at 1-4032, 1-7558 or 1-5153 to report the major spill and the exact location of the spill.
- Ensure that the SDS for the spilled material is available to the Code Brown Assessment Team and OHSB when they arrive.



Hazardous Materials Spills - Biologicals

Spills of biological materials can occur in one of three locations as follows:

- Spills within the biological safety cabinet
- Spills outside the biological safety cabinet (laboratory or corridor)
- Spills in the centrifuge

Unintentional release of biological agents could result from a spill or container breakage in the laboratory. Decontamination and clean up must be initiated immediately. All laboratories must have available at all times effective disinfectants for the microbial agent used in the particular laboratory.





Spills within the Biological Safety Cabinet

This procedure covers a large spill in the biosafety cabinet. For small drops clean up immediately with an appropriate wipe such as Virox or Accel.

- Leave the fan on in the BSC
- Use appropriate personal protective equipment - disposable gloves, laboratory coat and splash goggles
- Carefully cover the spill with absorbent paper (prevents aerosolization)
- Flood the spill with appropriate disinfectant material from the perimeter towards the centre
- Allow 30 minutes of decontamination time
- Cover the spill with a second layer of absorbent paper, pick up and place in the biohazard garbage container
- Wipe down a second time using an appropriate wipe like Virox or Accel
 - If bleach was used in the clean up rinse the surface of the BSC thoroughly with water to remove all bleach residue
 - Allow the surface to dry completely
- Run the fan for an additional 10 to 15 minutes
- Place all waste generated by the clean up into the biohazard waste container/grey biotub for pick up by Housekeeping



Spills outside the Biological Safety Cabinet

- Evacuate the area for 30 minutes to allow aerosols to settle
- Wear appropriate personal protective equipment - disposable gloves, laboratory coat and splash goggles
- Carefully cover the spill with absorbent paper
- Flood the spill with appropriate disinfectant material (10 % sodium hypochlorite for example) from the perimeter towards the centre
- Allow 30 minutes of decontamination time
- Cover with a second layer of absorbent paper, pick up and place in the biohazard garbage container
- Apply disinfectant to all surfaces exposed to the spill and wipe down a second time
- Place all waste generated by the clean up into the biohazard waste container/grey biotub for pick up by Housekeeping



Spills in the Centrifuge

- Leave lid of the centrifuge closed for at least 1 hour to let aerosols settle – use a tag or label to indicate to others in the laboratory the centrifuge is temporarily out of use
- Wear appropriate personal protective equipment - disposable gloves, laboratory coat and splash goggles
- Wipe down outside then inside of centrifuge, including the lid, with paper towels soaked in disinfectant or with appropriate wipes like Virox or Accel
- Remove broken tubes if applicable
- Wipe down entire rotor with paper towels soaked with disinfectant or wipes
- Remove rotor from centrifuge and repeat disinfection
- Rinse both rotor and centrifuge with water if bleach was used
- Place all waste generated by the clean up into the biohazard waste container/grey biotub for pick up by Housekeeping



Hazardous Materials Spills – Radioactive Materials

- A minor radioactive material spill is one that can be readily handled by the personnel on site with the materials contained in the radiation spill kit. Such a spill would not involve personal contamination or have any widespread impact on the work area.
- A major radioactive spill is one in which a significant amount of radioactive material has been released and has the potential to cause personnel contamination or exposure, or the potential for the spread of radiation beyond the normal work area.
- Ensure the Radiation and Laser Safety Department is advised of all spills by contacting 8-15555





Hazardous Materials Spills – Radioactive Materials

Minor Spill Procedure:

- Stop procedure and alert other personnel in the room
- Contain the spill by covering with absorbent material like paper towels or absorbent pads
- Don clean personal protective equipment (goggles, booties, gloves etc)
- Indicate the boundaries of the spill by marking off with tape
- Decontaminate, ensuring to wipe from outside towards the centre of the spill so that contamination is not spread
- Monitor the area and all personnel involved in the spill. Ensure the counts are at background
- Submit a radiation incident report to the Radiation and Laser Safety Department. Ensure it is signed by both the employee who generated the spill and the supervisor of the laboratory



Hazardous Materials Spills – Radioactive Materials

Major Spill Procedure:

- Stop all work in the area and notify personnel in the room
- Evacuate the room and close to prevent other people from entering the area – use appropriate signage
- Isolate personnel involved in the spill to a waiting area to be checked for contamination
- Contact Radiation Safety by calling Telecommunications at 8-15555
- Wait for the Radiation Safety Officer to direct clean up and survey staff for exposure



First Aid

- First Aid kits have been installed in the main corridor of every floor of the research centre – at least one employee in each lab should be trained in first aid and CPR
- First aid provision in OHIRC is limited to the treatment of injuries which do not ordinarily require medical care such as cleaning minor cuts, scrapes or scratches, treating a minor burn, applying bandages and / or dressings, cold compress, cold pack or ice pack.
- If an injured person in the lab needs to be transported to the Emergency Department call 911 ... if calling from an internal extension the Heart Institute Communication Centre will answer and redirect your call to external 911 Dispatch Centre. Provide the following information:
 - Your name
 - Description of the accident circumstances
 - Exact location of the incident
 - Number of casualties and types of injuries
 - Phone number where you can be reached





Chemical Contact with Skin

- Remove contaminated clothing – brush off powders from skin and clothes as much as possible
- Rinse the affected area with copious amounts of cool running water (at least 15 minutes)– use the emergency deluge shower
- Do NOT use water on chemical burns from any metals such as sodium, potassium, magnesium and aluminum
- Do NOT apply any ointments unless you are certain it is appropriate for the chemical involved
- Seek medical attention Have the victim transported to the Emergency Department





Chemical Contact With Eyes

- **Proceed to the eyewash immediately** and activate it.
- Hold the eyelids apart and flush the eyes with plenty of running water **for a minimum of 15 minutes.**
- If a tap or hose is used direct the water on the bridge of the nose, water will run into the eyes automatically.
- Seek medical attention



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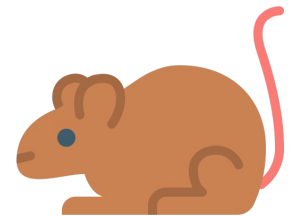
Other Accidents....

Asphyxiation:

- If safe, remove the victim from the area and loosen tight clothing. A person trained in CPR should monitor the victim's airway and vital signs. Seek medical attention by transporting the victim to the emergency department or call 911.

Cuts and Animal Bites:

- Allow the wound to bleed uninhibited for a few seconds to purge the wound. Apply pressure to the cut or bite with a sterile pressure dressing except when an object is protruding from the wound, in which case apply pressure around the wound. Wash wound if bleeding stops. Seek medical attention for even small cuts and all bites. Advise medical staff if the animal has been infected with a microorganism.



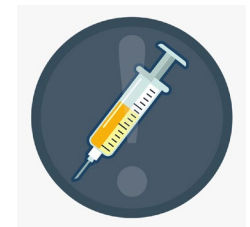


Needlestick Injuries

If the needlestick involves exposure to human blood, tissues or bodily fluids or to a pathogen first aid measures administered immediately following the injury can minimize the exposure to bloodborne pathogens.

The steps are:

- Remove contaminated clothing or gloves
- Bleed the wound if possible
- Wash the affected area with soap and water
- If the eyes, nose and mouth are involved, flush them with copious amounts of water or normal saline



The injured person should seek medical attention immediately by reporting to the nearest hospital emergency department. Advise the triage nurse that the injury is a needlestick injury involving exposure to human tissue or to a pathogen if applicable.



Equipment Failure – Fume hoods

- Fume hoods serve to control exposure to toxic, offensive or flammable vapours.
- Be sure the hood is working properly. A continuous monitoring device such as a narrow strip of tissue paper can be a good indicator of air flow.
- **In emergency situations** (i.e. fires, gaseous emissions, spills), pull the sash down completely and make sure hood fans are turned on. **Call EMERGENCY EXT. 15555.**
- For maintenance and repairs or if the alarm is sounding, contact Facilities Management at **10311.**





Equipment Failure – Biosafety Cabinet

When used properly, in conjunction with good microbiological practices, biological safety cabinets (BSCs) have been shown to be highly efficient in reducing exposure of laboratory personnel to microbiological agents and reducing cross contamination of cultures due to the production of aerosols. If the BSC stops working:

- Immediately stop all work and close all containers within the hood
- Close the sash fully and wait 30 minutes for aerosols to settle
- Remove lab coat and any other personal protective equipment
- When 30 minutes have elapsed, wipe the exterior surfaces of all items in the hood with appropriate disinfectant before removing them from the BSC
- Inform your supervisor immediately of the incident – the cabinet must be identified as “ Out of Order; Not in Use” until it has been repaired
- In case of loss of containment / exposure, report the incident to the Biosafety Officer



Power Failure

- Power failures must be reported to Facilities Management by calling 10311.
- The TOH Facilities Team will investigate the cause of the power failure and take appropriate action to return the power to normal operation as quickly as possible.
- Report power failure to the Principal Investigator (PI), Lab Manager or person in charge, as the outage may affect fridges, freezers and other equipment in the area.





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**Follow the link below to go to the related quiz
.... The password is healthandsafety**

<https://www.classmarker.com/online-test/start/?quiz=gvn646e470dce383>