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The Medical Laboratory Science Program at the University of Ontario Institute of Technology is committed to the safety of students, faculty and staff and to the safety of the learning environment. Safe work practices are the responsibility of the employer, the employee, and the student.

The Medical Laboratory Science Program Biosafety/Safety Manual has been prepared for the benefit of those who handle or work in proximity to potentially infectious biological agents. As this manual does not address the chemical and physical hazards commonly encountered in the laboratory, it is to be regarded as an addendum to the UOIT Laboratory Safety Manual for General Laboratory Operations, the UOIT/Durham College Laboratory Hazardous Waste Manual, UOIT Biosafety Manual, and the UOIT Chemical Safety Training Manual.

This manual is specific for the laboratories used by the Medical Laboratory Science Program and general biosafety procedures can be found in the UOIT Biosafety Manual. The hazards presented by radiation are of physical rather than biological origin and thus are not covered in the Biosafety Manual.

1.1 Definition of Biohazard
A biohazard can be defined as any organism or material produced by such an organism, that is known or suspected to cause human or animal disease. Biohazardous/infectious material falls under Class D, Division 3 of the Workplace Hazardous Materials Information System (WHMIS), and includes:
• microorganisms such as viruses, fungi, parasites, and bacteria and their toxic metabolites
• mammalian blood and body fluids
• unfixed and fixed tissues and specimens from humans and non-human primates
• cell lines and other tissue cultures
• certain types of nucleic acids, such as DNA derived from pathogenic organisms, human oncogenes or transformed cell lines
• genetically altered organisms, including plants
• zoonotic agents

Exposure to biohazardous agents may occur via puncture wounds or as a result of absorption through the respiratory tract, digestive system, skin and mucous membranes. Such exposures may result while handling microorganisms, animals, cell cultures and tissues or diagnostic specimens. All materials handled in the Medical Laboratory Science program are to be considered a biohazard and are to be treated with Routine Practices.
1.2 Routine Practices
These are work practices required for the basic level of infection control and are recommended for the treatment and care of all patients and specimens. Routine Practices are based on the premise that all patients/samples are potentially infectious, and that the same safe standards of practice should be used routinely with all specimens to prevent exposure to blood, body fluids, secretions, excretions, mucous membranes, non-intact skin or soiled items and to prevent the spread of microorganisms. Routine Practices include:

- hygienic practices, such as handwashing after contact with a potential biohazard
- use of personal protective equipment, which may include gloves, gowns, plastic aprons, masks, eye shields or goggles
- appropriate handling and disposal of sharps and other contaminated or clinical waste
- appropriate reprocessing of reusable equipment and instruments
- use of aseptic technique
- use of environmental controls

The implementation of routine practices benefits patients as well as Health Care Workers (HCW). Their use minimizes the risk of cross-infection from HCW to patient, from patient to HCW, and from patient to patient, even in high-risk situations. They are recommended for the care and treatment of all patients and specimens, regardless of their perceived infectious status.

1.3 Containment
The term "containment" is used in describing measures used to provide a barrier between the infectious organism(s) being handled and the worker (and, ultimately, the community at large). Containment is achieved through the use of appropriate safety equipment, facility design and laboratory procedures and practices.

1.3.1 Containment Level: Facility Design and Work Practices
Careful consideration must be given to both facility design and work practices to ensure the protection of laboratory personnel, their colleagues and the community as a whole. Four containment levels are outlined in the Canadian Biosafety Standards and Guidelines. Of the four containment levels, the highest safety standards (Level 4) are reserved for the most hazardous pathogens (Risk Group 4) and the least stringent (Level 1) for those which have minimal impact on health (Risk Group 1).

The Medical Laboratory Science Program uses Laboratories that are designated as Risk Group Level 2 biosafety laboratories. Level 2 containment is appropriate for work with Risk Group 2 agents using the general practices list in section 8.4.

The Medical Laboratory Science Program holds a Biosafety Certificate for the University Of Ontario Institute of Technology which is renewed yearly through the UOIT Biosafety committee (Appendix 3).
2.1 Terms of Reference

The MLSc program Safety and Biosafety Committee exists as a subcommittee of the MLSc Program Committee with the specific intent of ensuring compliance with standards and guidelines identified by the Human Pathogens and Toxins Act, the Canadian Biosafety Standards and Guidelines, the UOIT Biosafety Committee and the UOIT Risk Management Office. The intent is to ensure that MLSc students and staff, undertaking work associated with the Medical Laboratory Science program, do so in a safe manner and in conformance with all relevant legislation and university guidelines.

Duties and Functions of the Committee

1. To review, develop and monitor safety and biosafety standards for students and staff working in the Medical Laboratory Science laboratories.
2. To review, at the end of each semester, any incident reports involving safety or biosafety incidents and, if appropriate, recommend changes in procedures or policies that would help ensure that there are no repeats of similar incidents.
3. Report regularly to the MLSc Program Committee any information on this topic – for information only or for action.
4. Maintain representation on the UOIT Biosafety Committee to ensure continuity of information and process and bring forward to the MLSc Safety and Biosafety Committee actionable items.

The Chair of the Committee

1. The Chair of the MLSc Safety and Biosafety Committee shall be a member of the MLSc faculty.
2. The Chair shall be responsible for reporting to the MLSc Program Committee on a regular basis.

Committee Membership and Operating Procedures

1. The Committee shall consist of MLSc faculty members representing a breadth of disciplines within the MLSc Faculty.
2. The term of membership shall be for one year with renewable terms.
3. The Committee shall meet a minimum of once a semester.
4. The Committee shall maintain minutes of meetings with a copy to be appended to the appropriate MLSc Program Committee minutes and a copy forwarded to the Joint Health and Safety Committee and the UOIT Biosafety Committee.

An invitation to recruit new members will be made annually.
2.2 Medical Laboratory Science Biosafety/Safety Committee Membership

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The following general practices are required for the Medical Laboratory Science Program:

- The safety manual must be available for all staff and students, and its requirements followed; it must be reviewed and updated yearly.
- Personnel must receive training on the potential hazards associated with the work involved and the necessary precautions to prevent exposure to infectious agents and release of contained material; personnel must show evidence that they understood the training provided; training must be documented and yearly retraining must occur.
- Eating, drinking, storing of food, personal belongings, and applying cosmetics is not permitted in the laboratory; wearing jewellery is not recommended in the laboratory.
- Oral pipetting of any substance is prohibited in any laboratory.
- Long hair is to be tied back or restrained so that it cannot come into contact with hands, specimens, containers or equipment.
- Access to laboratory and support areas is limited to authorized personnel. Visitors must sign in using the Visitor Log sheet.
- Doors to laboratories must be kept closed.
- Open wounds, cuts, scratches, and grazes must be covered with waterproof dressings.
- Laboratories are to be kept clean and tidy. Storage of materials that are not pertinent to the work must be removed; paperwork and report writing should be kept separate from biohazard work areas.
- Lab coats must be worn and properly fastened, including visitors, trainees, and others entering or working in the laboratory; suitable footwear with closed toes and low heel must be worn in all laboratory areas.
- Lab coats must not be worn outside of the laboratory and must not be stored in contact with street clothing.
- Contaminated disposable lab coats are to be discarded in the large biohazard waste containers.
- Safety glasses are to be worn where there is a known or potential risk of exposure to splashes. Careful consideration should be given to the identification of procedures requiring eye and face protection, and selection should be appropriate to the hazard.
- Examination gloves must be worn for all procedures that might involve direct skin contact with biohazardous material; gloves are to be removed when leaving the laboratory and disposed of in the large biohazard waste containers.
- Hands must be washed after gloves have been removed, before leaving the laboratory and at any time after handling materials known to be contaminated.
• The use of needles, syringes, and other sharp objects should be strictly limited; needles and syringes should be used only for phlebotomy and aspiration of fluids from bottles and IV bags. Needles should not be recapped, bent, sheared, or removed from the syringe or barrel; they should be promptly placed in a puncture-resistant sharps container for disposal.

• Work surfaces must be cleaned and decontaminated with a suitable disinfectant at the end of the day and after any spill of potentially biohazardous material.

• Contaminated materials and equipment leaving the laboratory must be appropriately decontaminated.

• Disinfectants effective against the agents in use must be available at all times within the areas where the biohazardous material is handled or stored.

• Leak-proof containers are to be used for the transport of infectious materials within facilities.

• Spills, accidents or exposures to infectious materials must be reported immediately to the laboratory instructor. Incidents will be recorded using the UOIT incident reporting system.

• Aseptic techniques and good microbiological laboratory practices intended to avoid the release of infectious agents are to be employed at all times.

• Biosafety cabinets must be used for procedures that may produce infectious aerosols.

• Appropriate signage indicating the nature of the hazard being used (e.g., biohazard sign, containment level) must be posted outside each laboratory; if infectious agents used in the laboratory require special provisions for entry, the relevant information must be included on the sign; the contact information of the laboratory supervisor or other responsible person(s) must also be listed.
Good laboratory hygiene is designed to protect both the worker and the public.

- Entry to the laboratory should be restricted to laboratory staff and students only
- Eating, drinking, smoking or applying make-up is prohibited in the laboratory
- Contact with the mouth such as mouth-pipetting, licking labels and chewing objects is not allowed
- Hands must be washed with soap after handling potentially contaminated specimen containers, after any bacteriological procedure, after removing protective clothing and before leaving the laboratory. Disposable paper towels should be used for hand drying
- No cleaning, service or checking of equipment should be allowed unless a trained technical or professional person is present to ensure adequate safety precautions
- All surfaces and equipment within the laboratory should be regarded as potentially infectious and should be cleaned regularly by appropriate means. Floors should not be waxed but should be mopped regularly to limit dust formation

4.1 Immunization

An important way in which infection control programs prevent infection is through immunization. Everyone working in a Biohazard level 2 laboratory is required to have an up to date immunization including but not limited to Hepatitis B virus (HBV), measles, mumps, rubella (MMR), diphtheria, and tetanus vaccinations. Screening for TB is also included; anyone with a positive TB test is required to receive chest x-ray evaluations to determine their status. All proof of immunization must be received before working in the Biohazard level 2 laboratories.

4.2 Dress Code

Appropriate apparel is essential for protection against infection. Personal clothing needs to be modest in style so that skin is covered by the lab coat (hoods should be tucked under lab coats).
- Restrain loose clothing ensuring that no articles dangle ie: lanyards.
  - Carefully pin loose clothing as not to get caught in moving equipment
  - If aerosols are possible a face shield may be worn, or work should be performed in a biosafety cabinet.
  - Spare clean clothing should be available in case of a chemical or biohazard spill. Instructors will speak to students at the beginning of the semester that may have special dress requirements- in order for them to have spare clothing on site.
• Shoes must be closed toe with heels not more than 1 ¼ inches in height.
• Jewellery needs to be kept to a minimum and removed if possible. Rings with claws are not recommended as soap, bacteria, powder, etc. can get trapped.
• Hair longer than shoulder length needs to be tied back so that it does not come in contact with the hands, specimens, containers or equipment. Hair ties may be available upon request.
• Hats are not permitted, unless for religious reasons.

4.3. Hand Hygiene

Hand hygiene is one of the most important means of preventing the spread of infection provided that it is achieved properly and when required. Hand hygiene is required every time gloves are removed. Artificial nails and nail polish are not recommended as chemicals can react with acrylics and cracks in surfaces make it difficult to decontaminate. Natural nails should preferably be less than ¼ inch in length. Rings should be removed when working in the laboratory.

4.3.1 Hand Washing

Washing is required when hands are visibly soiled and when leaving the laboratory. A routine hand washing procedure requires the use of soap and water to mechanically remove soil and transient bacteria.

Procedure:
1. Stand back so that you do not touch the sink
2. Place hands under faucet so that the water starts to run (sensor at base of faucet)
3. Apply soap by placing hands under soap dispenser (sensor at base of dispenser)
4. Work up soap into a lather, scrubbing all surfaces including between the fingers and around the knuckles. Rub your hands together vigorously. This procedure should take one minute.
5. Rinse hands in a downward motion from the wrists to fingertips, removing soap and dislodged dirt and microorganisms.
6. Dry hands with a clean piece of paper towel, pat, starting from the wrists down.
7. Discard used paper towel in the regular garbage.

4.3.2 Alcohol Based Antiseptic Hand Cleaners

CDC guidelines recommend the use of alcohol-based antiseptic hand cleaners in place of hand washing as long as the hands are not visibly soiled.

Procedure:
1. Pump a dime-size amount of hand cleaner onto the hand.
2. Cover all surfaces of hands, including between the fingers and across knuckles.
3. Allow alcohol to evaporate to achieve proper antisepsis.
PPE provides a barrier against infection; it includes protective clothing and other items worn by an individual to protect mucous membranes, airways, skin, and clothing.

### 5.1 Coats

#### 5.1.1 Lab coat

Lab coats are worn to protect skin and prevent soiling of clothing. Lab coats are required to be worn at all times while in the laboratory and are stored in the laboratory, they are not allowed outside of the laboratory. Lab coats must be done up at all times. Students are provided with disposable lab coats. When visibly soiled or in disrepair they are disposed of in the large biohazard containers and a new one will be issued. Visitors will be required to wear lab coats when work is being done in the laboratory. Staff lab coats will be cleaned and disinfected when required on the premises.

#### 5.1.2 Gowns

Gowns are used during isolation procedures and are placed over lab coats. They are tied at the back and are single use, disposable into the large biohazard containers.

#### 5.1.3 Rubber Apron

A rubber apron is worn when using caustic chemicals. Always use the rubber apron when working in the fume hood as well as a face shield.

### 5.2 Gloves

Gloves must be worn for all procedures that might involve direct skin contact with the hazardous material. Gloves should not be stored in student laboratory kits or in lab coat pockets as they may become compromised and no longer safe to use.

#### 5.2.1 Examination Gloves

Examination Gloves (Non-latex, vinyl, or copolymer) are to be worn when working with biohazard material. These gloves are available in different sizes and provided in the laboratory. The correct glove size should fit snugly with little excess at the fingertips. Gloves are to be removed when visibly soiled, when using non-biohazard equipment such as
the telephone and upon leaving the laboratory. Used gloves are considered biohazard and are disposed of in the large biohazard waste containers.

5.2.1.1 Proper Removal of Examination Gloves

- The wrist of one glove is grasped with the opposite gloved hand
- The glove is pulled inside out over and off the hand
- With the first glove held in the gloved hand, the fingers of the non-gloved hand are slipped under the wrist of the remaining glove without touching the exterior surfaces.
- The glove is then pulled inside out over the hand so that the first glove ends up inside the second glove, with no exterior glove surfaces exposed.
- Gloves are now discarded into the large biohazard containers

5.2.2 The use of Gloves with Chemicals

It is acceptable to wear two pairs of examination gloves while using chemicals. The outer pair of gloves is removed after the use of the chemical, leaving the inner pair on in order to clean up the area. The examination gloves are placed into the large biohazard contains in order to avoid confusion.

5.2.3 Insulated Gloves

When entering the -80°C freezer you must wear insulated gloves. These gloves are also available when using hot plates and water baths over 60°C, and ovens

5.3 Eye and Face Protection

*Do not touch your face at any time while in the laboratory.*

Eye and face protection must be worn in the laboratory when there is a potential for contact with hazards such as splashes, or flying objects. The type of protection needed depends on the hazard.

5.3.1 Goggles and Safety Glasses

Goggles and safety glasses are worn to protect the eyes from splashes and flying objects. They are to be worn when opening up vacutainers, Eppendorf tubes and other vials that may produce aerosols and/or splashes. It is recommended that they are worn during pipetting of any substances but must be worn when pipetting biohazard material. Safety goggles differ from safety glasses as they require ventilation to prevent fogging as they have a tighter fit around the eye.
5.3.2 Face Shields

Face shields are recommended when protection of the entire face is required. They are not to be worn alone but in conjunction with safety glasses or goggles. There are two types of face shields. Personal face shield or visor is worn on the head and covers the entire face. This device is used when pipetting chemicals or when you are required to move around. The Bench typeface shield is attached to the surface of the bench and can be adjusted for height. This device is used when working in a single place and is not placed on the person but in front of the face. This device is typically used when aliquoting body fluids.

5.3.3 Masks and Respirators

Masks are worn to protect against droplets generated by coughing or sneezing and fine dust that can be produced when weighing chemicals.

5.3.3.1 Procedure for Putting on a Mask

1. Locate the top of the mask, it will have a metal strip along the top edge
2. Place loops over ears
3. Pull bottom of mask over chin
4. Pinch metal strip over the bridge of the nose to make a snug fit around nose and cheeks

An N95 respirator is used when there is a threat of air born transmission of disease. Each student must be fitted for size as it is important that they have a snug fit with no air leakage. Fitting will take place before the student starts hospital placement and can be done by either the hospital or the university. A chemical respirator is located in the reagent preparation room and is used when strong fumes are produced. Filters are located with the respirator and must be inserted before use and disposed of afterward.

5.4 Donning and Doffing

There is a correct order for putting on and taking off of person protective equipment.

5.4.1 Procedure for Donning (putting on):

1. Perform hand hygiene
2. Put on lab coat and if needed a gown
3. Put on mask or respirator if required
4. Put on eye protection
5. Put on gloves

5.4.2 Procedure for Doffing (removal):

1. Remove gloves – dispose in biohazard waste
2. Remove gown or lab coat– dispose in biohazard waste
3. Perform hand hygiene
4. Remove eye protection
5. Remove mask
6. Perform hand hygiene
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<table>
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<tr>
<th>Procedure Title:</th>
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<tbody>
<tr>
<td>Protective Equipment</td>
<td>MLScAF 6.0</td>
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For more detailed information on protective equipment and Emergency Procedures, refer to Emergency Procedures Health and Safety and the UOIT Safety Manual

6.1 Eye Wash Stations

Eye wash stations are located at the end of every bench and should be used whenever the eyes have been compromised. Eye wash stations are checked weekly by flushing for 15 minutes and checking the water temperature. The temperature should be between 15.5-35.0°C Maintenance is recorded on the eye wash station weekly inspection checklist. If a problem arises, place a ticket to the help desk.


6.1.1 Procedure for the use of eye wash station:
1. Remove protective eye ware
2. Pull head of the wash station out over the sink
3. Press the silver lever down to activate water
4. Check temperature of water
5. Place eyes into the stream of water
6. Flush for a minimum of 15 minutes
7. Seek medical attention
8. Submit online injury and incident report

6.2 Safety Shower

The safety shower is located by the main exit. It is to be used when there is the potential for damage to the skin through contact with a hazardous material. The safety shower is maintained by the university and is checked yearly. Note there is no floor drain so environmental services must be contacted after use.

6.2.1 Procedure for the use of safety shower:
1. Immediately after exposure stand under shower
2. Pull cord
3. Stand under shower for at least 15 minutes
4. Remove all remaining students from the laboratory using the emergency exit
5. Remove contaminated clothing in order to remove caustic chemical
6. Seek medical attention
7. Submit online injury and incident report
6.3 Fume Hood

The fume hood is used to protect against exposure to hazardous chemicals. It is designed to contain dilute and disperse gases, vapours and aerosols to the external environment. Nothing should be stored in the fume hoods. Medical Laboratory Science has two types of Fume Hoods. Bench top styles are located in UB3085 and are used for staining. Three large floor model fume hoods are located in UB3095 and the reagent preparation room.

6.3.1 Procedure for using a large floor model fume hood
1. Place all equipment at least 6 inches back into the fume hood
2. Wear appropriate PPE including rubber apron and face shield
3. Ensure that the front glass panels overlap each other and have no gaps
4. Adjust the front sash for your height so that it is as low as possible but you are still able to work.
5. No electrical equipment is to be used in the fume hood when making up reagents
6. Ensure that the fume hood is working by observing the flow meter reading.

6.4 Biosafety Cabinet

Biosafety Cabinets (BSCs) provide effective primary containment for work with human pathogens. BSCs are used for procedures with the potential to produce infectious aerosols and for high concentrations or large volumes of infectious material. We do not use our biosafety cabinets for work with toxic or volatile chemicals. Medical Laboratory Science laboratories have two biosafety cabinets, UB3092 Class II Type B1 and UB3095 Class II Type A2. Maintenance and service are done every year.

6.4.1 Class II, Type A2 Cabinets
- Protects worker
- Protects product
- Exhausts 30% HEPA-filtered air back into the laboratory and recirculates 70% in the cabinet.

Cabinet air may be re-circulated back into the laboratory or ducted out of the building by means of a "thimble" connection (i.e., a small opening in the cabinet exhaust filter housing) whereby the balance of the cabinet is not disturbed by fluctuations in the building exhaust system.
- Maintain a minimum average face velocity of 0.5 m/s (100ft/min).
- Have ducts and plenums under negative pressure.
- Not to be used with flammable or toxic chemicals
6.4.2 **Class II, Type B1 Cabinets**

- Protects worker
- Protects product
- Ducted to the outside
- Hard-ducted through a dedicated duct exhausted to the atmosphere after passage through a HEPA filter; contain negative pressure plena.
- Maintain a minimum average face velocity of 0.5 m/s (100ft/min).
- Recirculate 30% of the air within the cabinet and exhausts 70% HEPA-filtered air to the outside
- Is suitable for work with low levels of volatile toxic chemicals and trace amounts of radionuclides.

(The Medical Laboratory Science program does not use volatile or toxic chemicals in the Biosafety cabinets.)
6.4.3 Use of the Biosafety Cabinet (BSC)

**Start-up procedures** when preparing for work in the BSC:
1. Turn off UV lights if in use and ensure that the sash is in the appropriate position.
2. Turn on fluorescent light and cabinet blower, if off.
3. Check the air intake and exhaust grilles for obstructions.
4. If the cabinet is equipped with an alarm, test the alarm and switch it to the "on" position.
5. Confirm inward airflow by holding a tissue at the middle of the edge of the viewing panel and ensuring that it is drawn in.
6. Disinfect the interior surfaces with Conflikt®.
7. Assemble all materials required for the procedure and load them into the cabinet; do not obstruct the air grilles; the working surface may be lined with absorbent paper with plastic backing; segregate "clean" items from "contaminated" items.
8. Wait 5 minutes to purge airborne contaminants from the work area.

**Follow these procedures for working in the cabinet:**
1. Don protective clothing and gloves as appropriate.
2. Perform operations as far to the rear of the work area as possible.
3. Avoid movement of materials or excessive movement of hands and arms through the front access opening during use; when you do enter or exit the cabinet, do so from straight on; allow the cabinet to stabilize before resuming work.
4. Keep discarded contaminated material to the rear of the cabinet; waste will be placed in the large biohazard containers when full or at the completion of the task.
5. If there is a spill during use, surface decontaminate all objects in the cabinet; disinfect the
working area of the cabinet while it is still in operation (do not turn the cabinet off). See Emergency Procedures Biological spill.

Follow these procedures upon completion of the work:
1. Allow the cabinet to run for 5 minutes with no activity.
2. Close or cover open containers before removing them from the cabinet.
3. Disinfect the surface of objects in contact with the contaminated material before removal from the cabinet.
4. Remove contaminated gloves and dispose of them in the large biohazard waste container; wash hands.
5. Don clean gloves and ensure that all materials are placed into biohazard bags within the cabinet.
6. Dispose of small bags into the large biohazard waste.
7. Using Conflikt®, disinfect interior surfaces of the cabinet; periodically remove the work surface and disinfect the area beneath it (including the catch pan) and wipe the surface of the UV light with disinfectant.
8. Turn off the fluorescent light and leave the cabinet blower ON
9. Turn on the UV light if appropriate (do not turn on when people are working close by)

6.5 Centrifuge

All centrifuges must be sealed units, and safety buckets used if available. Always balance the tubes placed in the centrifuge. Never stop a centrifuge with your hands. If a tube breaks during centrifugation, stop the centrifugation and do not open the lid for 30 minutes. After 30 minutes, disinfect thoroughly.

6.6 Fire Pull Stations

The pull station is located at the back of the laboratory by the emergency exit door. Pulling this alarm will set off the fire alarm system for the university and will alert the emergency response team (Fire Department).

6.7 Fire Extinguisher

A type ABC fire extinguisher is located by the main exit. It is checked monthly by the university and documented on the extinguisher. ABC fire extinguisher is used for combustibles, liquid fuels and electrical. The correct use of an extinguisher is by using PASS:
P-pull the pin
A-aim at the fire
S-sweep
S- from side to side
6.8 First Aid Kit

Located by the exit area, the first aid kit contains basic first aid contents. The incident report is found online under the Health and Safety UOIT website. Documentation is filled out online. Blueline taxi tab charge coupons are available for use when transporting a student to an emergency aid facility.

UOIT does not have a protocol for the contents of a First Aid kit but defers to WSIB (Workplace Safety and Insurance Board) First Aid Regulations Reg. 1101. The poster entitled *In Case of Injury at Work* (Form 82) must be displayed at the first aid station as required by Section 1 of the Regulation and must contain:

- Current edition of a standard St. John Ambulance First Aid Manual;
- 1 card of safety pins
- Dressings consisting of:
  - 12 adhesive dressings individually wrapped,
  - 4 sterile gauze pads, 3 inches square,
  - 2 rolls of gauze bandage, 2 inches wide,
  - 2 field dressings, 4 inches square or 2 four-inch sterile bandage compresses, and
  - 1 triangular bandage.

6.9 Chemical Storage

All hazardous chemicals are segregated by reactivity classes. Acid, Base, and Flammables storage areas are located under the fume hoods. Caustics and non-volatile, non-reactive solids are stored on shelving units located in the reagent preparation room and have been categorized alphabetically.

7.10 Ordering

Prior to ordering a potentially hazardous reagent, a risk management assessment will be done by the instructor ordering the chemical. The instructor will have answered the following questions:

- What has changed in the laboratory that this reagent is now needed?
- Whenever a new chemical is introduced the question of whether the educational value outweighs the relative hazard level of using this chemical must be asked and is there no satisfactory substitute?

The teaching faculty will approve as a group the acquisition of hazardous reagents prior to ordering. The chemical will then be added to the chemical inventory and MSDS available prior to the chemical entering the laboratory.

7.11 Chemical Inventory

MLSc chemical inventory is performed each year during the summer. All reagents are documented on the chemical inventory and a printed Safety Data Sheet will be available in the laboratory. The chemical inventory is supplied to the UOIT Health and Safety Officer on a yearly basis. The chemical inventory
will state which instructor utilises the chemical (thereby primarily responsible for its safe storage and use), and where the chemical is stored in the laboratory. The storage cabinets, including flammable, acid and base cupboards are numbered and colour coded and chemicals stored in each location have a corresponding colour code. At the beginning of each laboratory, students will be made aware of each reagent hazard and the protocols surrounding its safe use.

6.12 Pipetting Safeguard

Pipetting must be done by mechanical means and never by mouth. Pipette aspirator bulbs are available for graduated, volumetric and pasture pipettes. A bottle top dispenser can be used to deliver repetitive aliquots of reagents.

6.13 Eppendorf Tubes Safeguard

Students and staff are required to use absorbent pads while opening Eppendorf tubes. The absorbent pad is held close to the lid to prevent aerosols. Students and staff are also required to wear safety goggles when opening Eppendorf tubes.
Always maintain good housekeeping in the laboratory. This minimizes the potential for a laboratory accident. General housekeeping activities such as cleaning of floors, walls, etc. and removal of non-hazardous waste are performed by non-laboratory staff.

7.1 Chemical Disinfectants

Disinfection is a process that results in the destruction of specific pathogenic microorganisms. Chemical disinfectants are routinely used in laboratories to decontaminate bench surfaces, biological safety cabinets, and other laboratory equipment. They can also be used to decontaminate biological spills.

7.1.1. Work Surfaces

Decontaminate all work surfaces with Conflikt®, or other suitable disinfectants at the end of each day. Work surfaces include sinks, bench top, and stools.

Conflikt® Detergent Disinfectant is a pre-diluted, ready-to-use quaternary ammonium based disinfectant that exhibits antibacterial, antiviral, antifungal, mildewstat, and deodorizing capabilities (Appendix 14). It is specially formulated with surfactants for cleaning and sanitizing inanimate hard surfaces, glass, plastics, stainless steel, ceramics, laminates, etc.

7.1.2 Cleaning Surfaces with Conflikt®

1. Personal Protective equipment must be worn while cleaning surfaces
2. Blood and other body fluids must be thoroughly cleaned from surfaces and objects before application of Conflikt®.
3. Spray all surfaces with Conflikt®.
4. Allow surfaces to remain wet for a minimum of 5 minutes.
5. Dry surfaces with paper towel
6. Dispose of paper towel in the large Biohazard container

Conflikt®, when used on environmental, inanimate, non-porous surfaces, exhibits effective virucidal activity against:
(10 minutes): Canine Parvovirus, Hepatitis A Virus (HAV), Poliovirus Type 1
(5 minutes): Hepatitis B Virus (HBV), Hepatitis C virus (HCV), Bovine Viral Diarrhea
Virus (BVDV)

(2 minutes): Human Coronavirus, SARS-associated Coronavirus, Avian Influenza A (strains H3N2 and H9N2) Kills pandemic 2009 H1N1 Influenza A virus

(3 minutes): Paramyxovirus (Mumps), Rhinovirus type 39, Rotavirus

(1 minute): HIV-1 (associated with AIDS)

(30 seconds): Norovirus (Norwalk virus), Feline Calicivirus, Rabies virus

7.2. Liquid Biohazard Waste

The liquid biohazard waste produced by the Medical Laboratory Science laboratories contains blood or serum and does not contain hazardous chemicals or radioactive material. Liquid biohazard waste that does contain such hazardous must be disposed of according to the UOIT Biosafety Manual. Liquid biohazard waste is rendered harmless with the use of 1% sodium hypochlorite. A 1% sodium hypochlorite solution is made in house by diluting household bleach (concentration of household bleach is dependent on the manufacturer). A volume of 500mL is recommended and can be kept for 1 month if stored at room temperature in a brown bottle.

7.3. Disinfection of Small Equipment

It is necessary to disinfect small equipment when it becomes contaminated or for removal from the laboratory. Follow the procedure for cleaning surfaces with Conflikt®.

7.4. Disinfection of glass pipettes

Reusable glass pipettes are washed in the laboratory. Pipettes are placed with tips facing up into pipette wash container that is filled with one scoop of detergent and deionized water. The water level must be high enough to cover the tips of the pipettes. Wear safety glasses when placing pipettes into the container as any contents remaining in the pipette may splash. The tip should be immersed in the deionized water first, rinsing the tip of the pipette and diluting out any contents. Placing pipettes with the tip down do not allow for correct washing and draining and will result in dirty pipettes. When the pipette container is full the pipettes are removed to an automatic pipette washer. A detergent tablet Alcotab is added to the bottom of the washer and hooked up to tap water. Washing is carried out for 30 minutes and then rinsed with deionized water for another 30 minutes.

7.5. Disinfection of Glassware

Glassware is placed in wash buckets in the reagent preparation room. The wash bucket contains one scoop Alconox and tap water. The glassware is left to soak for 12 hours before being washed by hand or in a dishwasher.

7.5.1 Hand Washing Glassware

The sink is filled with one scoop Alconox and warm tap water, wearing rubber gloves wash each item then rinse with deionized water and set aside to dry.
7.5.2 Dishwasher
Use with laboratory glassware only, personal items are not allowed. One scoop of detergent is added to the detergent holder. Program the dishwasher for the type of load and run.

7.6 Heat Sterilization

Sterilization is a process that results in the destruction of all forms of microbial life. Heat kills microorganisms by irreversibly denaturing their enzymes and structural components. The time required to kill an organism depends on its heat resistance and conditions of sterilization. Spores are the most heat-resistant microbial forms, so they are used to test autoclave performance. Thermal death proceeds more rapidly in saturated steam than in dry heat because the temperature at which denaturation of proteins occurs is inversely proportional to the amount of moisture present.

7.6.1 Autoclave
An autoclave is an instrument for decontamination of heat-stable materials by physical means. The sealed chamber allows conditions of heat, pressure, and atmosphere to be created and held for an optimal time of exposure. The autoclave is located on the 4th floor UB building and is maintained by the Faculty of Science.

7.6.2 Incinerators
A micro incinerator is a device used in microbiology laboratories to sterilize instruments. This sterilization instrument consists of a ceramic tube surrounded with metal and with a hollow portion at the center. When plugged in and turned on, the micro incinerator can reach temperatures of 800°C, more than sufficient to incinerate any organic material on an inoculation loop. In a microbiology laboratory, contamination of sterile materials must be avoided and this can be difficult since bacteria and fungal spores are present throughout the surrounding environment. Avoiding contamination requires the use of aseptic technique as well as being constantly mindful of each action performed in the microbiology laboratory.

7.6.2.1 Procedure for the use of an incinerator
Warning: do not bring any flammable items close to the incinerator (i.e. lab coat)
1. Turn on incinerator
2. Warm up approximately 10 minutes
3. Insert loop into the opening, at least halfway into the sterilizing element to avoid aerosolizing any residual contaminants. Take care not to scrape the element walls as this may reduce the efficiency of the heating unit.
4. Sterilize for 7-10 sec or until loop appears red hot.
5. Cool before use

7.6.3. Hot Air Oven
Hot air ovens can be used to sterilize or decontaminate glassware, instruments, and anhydrous materials. Dry heat is recommended for the sterilization of closed containers and anhydrous material over steam autoclaving. The moisture component of saturated steam at
121°C to 132°C results in the rapid destruction of microbes, and will not penetrate anhydrous materials and closed containers. The contact time required to sterilize an object in a hot air oven takes into account the lag time required to reach the appropriate temperature. The hot air oven located in the regent room is not used for sterilization, but for drying pipettes and melting wax. Insulated gloves must be used when removing items from the oven.
Waste disposal requires well-defined procedures to prevent exposure to hazardous materials. Improper disposal of sharps and needles, glass and biohazardous waste puts the waste handlers at risk and jeopardizes the University’s access to municipal waste transfer facilities. Segregate biohazardous and non-biohazardous waste at the point of generation.

**Materials contaminated with hazardous biological agents must be collected in the appropriate containers labeled as "biohazardous waste".** Nonbiohazardous waste is collected through UOIT Facilities Management.

### 8.1 Regular Waste

Regular waste includes any household waste that has not been contaminated such as paper towels used for drying hands, plastic bags, and packing material.

### 8.2 Recycle Waste

Place paper, cardboard, and plastics that are not contaminated into the blue recycle bin, available in the laboratory. Large clean cardboard boxes can go outside the laboratory if broken down.

### 8.3 Glass Waste

The white cardboard box is used for clean glass that has been broken or damaged. Large glassware that has been chipped or cracked and is clean will go into this container. When full the container is sealed and placed beside the regular waste for pick up.

### 8.4 Biohazard Waste

Biological waste includes:

- liquids such as used cell culturing media, supernatant, blood or blood fractions (serum), etc., which contain viable biological agents;
- materials considered pathological, including any part of the human body, tissues and bodily fluids, but excluding fluids such as urine, extracted teeth, hair, nail clippings and the like that are not infectious;
- non-sharp, solid laboratory waste (empty plastic cell culture flasks and petri dishes, bench sheets, empty plastic tubes, gloves, wrappers, absorbent tissues, disposable plastic pipettes etc.) which may be, or is known to be, contaminated with viable biological agents;
- all sharp and pointed items used in medical care, diagnosis, and research, such as plastic
pipette tips, phlebotomy needles, and disposable loops.
- Laboratory glassware, which is known or suspected to be contaminated with hazardous biological agents such as glass test tubes.

8.4.1. Large Biohazard Waste Containers

Biohazardous waste containers are rigid cardboard boxes. They must be labelled with either the words "Biohazardous Waste," or with a biohazard symbol and the word "Biohazard". The labels must be placed on both the lid and the sides of the container. The labels must be visible from all sides of the container. Biohazardous waste containers must be lined with yellow biohazardous waste bags before adding the waste. The labels on the container must be visible once a biohazardous waste bag is added.

The large Biohazard Waste containers are used for all dry Biohazard Waste and are disposed of through an external company. The large biohazard containers are provided by the external company.

8.4.1.1 Preparation of Large Biohazard Waste Containers for Pickup

Biohazard bags are sealed with a zip tie. The top of the boxes are closed and taped shut with packing tape. Stericycle® supplies stickers that are applied to the side of each box. The biohazard waste is picked up once a week on a predetermined day. Stericycle® provides a manifest which is signed by a staff member. Documentation of removal is provided within one week. All paperwork is kept within the faculty of Medical Laboratory Science and a manifest copy is sent to the Ministry of Environment; Environmental Monitoring and Reporting.

8.4.2 Large Plastic Biohazard Waste Containers

The large plastic biohazard waste container that is a plastic 20L pail and labelled biohazard is used for contaminated objects, which if broken, would puncture the skin. Place all contaminated test tubes, vacutainers, vials and large broken glass pipettes in this container. A lid is provided and should remain on the pail. When full the pail’s lid is secured onto the bucket then removed by Stericycle®.

8.4.3 Biohazard Sharps Containers

Sharps containers are provided at every workstation. They are puncture resistant containers and should only be filled ¾ full. Overfilling can result in a needle bouncing back and a potential needle stick injury can occur. All contaminated objects that could pierce the skin must be placed in this container including plastic pipette tips, needles, blades, glass pasture pipettes, disposable loops, and broken contaminated glass. Full sharps containers are placed in the large Biohazard waste container after securing the lid. Do not shake sharps containers.
8.4.4 Bench-Top Biohazard Waste Containers

Bench Top biohazard waste containers are provided at each workstation and labelled with a Biohazard warning. They are used to collect dry biohazard waste that would be unsafe to carry to the large biohazard container. The small bench top biohazard containers are lined with clear bags and can be kept uncovered. At the end of each laboratory session, the bench top biohazard container will be taken to the large biohazard container, the bag will be removed and disposed of. The bag will be replaced and the container returned to the workstation.

8.4.5 Liquid Biohazard Waste

Certain liquid medical/biohazardous wastes that have been disinfected, such as cell culture media and blood, can be discharged to the sanitary sewer system. To disinfect the waste, add 100mL of 1% household bleach to every litre of liquid waste. Let the mixture stand for a minimum of 20 minutes before disposing down the drain. **Remember** the waste must not be defined as chemically hazardous or radioactive reference liquid waste disposal.

8.4.6 Pick-up and Disposal of Untreated Biological Laboratory Waste

The university has a contract with a commercial firm, which is licensed to remove, and transport biologically contaminated laboratory waste to a designated disposal site. The current company is Stericycle® 1-866-783-7422. If Stericycle® is unavailable, Detox®, the MLSc disposal backup company, should be contacted at 905-623-1367.

<table>
<thead>
<tr>
<th>Types of Contaminated Waste</th>
<th>Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry biohazard waste: Contaminated paper, bench sheet, gloves, dry V350 reagents, used disposable lab coats, Petri dishes, swabs, <strong>All contaminated waste that is not liquid, glass or sharps</strong></td>
<td>Large Biohazard waste container</td>
</tr>
<tr>
<td>Contaminated glass including all contaminated test tubes, vial, vacutainers,</td>
<td>Large plastic Biohazard waste container</td>
</tr>
<tr>
<td>Contaminated Sharps, including plastic pipette tips, disposable loops all needles, metal lids on vials, ampoules, and microtone blades.</td>
<td>Sharps container</td>
</tr>
<tr>
<td>Full sharps containers</td>
<td>Large Biohazard waste container</td>
</tr>
<tr>
<td>Bench-Top Biohazard containers bags</td>
<td>Large Biohazard waste container</td>
</tr>
<tr>
<td>Small amounts of dry biohazard waste including Kimwipes, disposable plastic</td>
<td>Bench-Top Biohazard container</td>
</tr>
</tbody>
</table>
8.5 Chemical Waste

A licensed chemical waste contractor as required collects chemical wastes for disposal. The generator is responsible for contacting their local waste coordinator to identify the need for a waste pickup and for bringing the waste to the central collection location at a specified date and time. At that time, the waste will be inspected and, if appropriately packaged and labeled, accepted for disposal.

Any waste not appropriately packaged and labeled will not be accepted for disposal and the generator will be required to return it to their laboratory.

Chemical wastes must be kept in the generating laboratory or other designated storage area in a safe location between scheduled pickups. If the material is generated which requires special handling or immediate disposal contact the local Waste Coordinator.

8.5.1 Definition

Generally, waste is defined as any surplus, unneeded or unwanted material. It is usually the laboratory worker or supervisor who decides whether to declare a given laboratory material a waste.

Note that if a chemical is not a waste, then the WHMIS requirements apply. Once the material has been declared a waste, then the waste labeling and storage requirements outlined in this manual apply.

Chemical waste includes solids, liquids or gases containing or contaminated with any of the following:

- Flammable or combustible liquids (organic solvents)
- Corrosives (strong acids and bases)
- Reactives (oxidizers, cyanides, sulphides, explosives, unstable materials, water reactive materials)
- Toxic materials (mutagens, carcinogens, acutely toxic materials)
- Polychlorinated biphenyls (>50 ppm concentration)
- Leachate toxic materials (heavy metals, pesticides)
- Non-returnable gas cylinders
8.5.2 Packaging

- Wastes must be stored in containers that are compatible with the material stored. For example, corrosive materials should be stored in glass or plastic containers, not metal ones. Hydrofluoric acid must not be stored in glass containers.
- Do not completely fill containers of liquid waste. Leave between 20-25% of air space to allow for vapour expansion and to reduce the potential for spills when moving containers.
- Compatible wastes can be accumulated within a common container, however, care must be taken to ensure that the chemicals are compatible.
- Never mix incompatible chemicals together in a single container. This has the potential to cause heat generation, gas evolution or other reaction and a subsequent explosion.
- Flammable and combustible solvents shall be segregated and packaged separately into two categories:
  - Halogenated solvents
  - Non-halogenated solvents
  The two should not be mixed as there is a premium cost for disposal of halogenated solvents.
- Solvent safety cans should be used to collect and temporarily store large volumes (>10-20 L) of flammable organic waste solvents. The generating laboratory is responsible for providing these containers and they will be returned to the laboratory when the material is bulked at the time of waste collection.
8.5.3 Labeling

Attach a Chemical Waste Label directly to each waste container. These labels are available from UOIT Chemical Stores or from the Waste Coordinators. All information requested on the label must be provided. Chemical generic names of the chemicals must be listed. No abbreviations, acronyms or trademark names are to be used. Vague categories such as “solvent waste” are not acceptable. See Figure 1 for an example of the chemical waste label.

FIGURE 1 – CHEMICAL WASTE LABEL

<table>
<thead>
<tr>
<th>UOIT</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL WASTE</td>
<td></td>
</tr>
<tr>
<td>Name of Generator</td>
<td>ID#</td>
</tr>
<tr>
<td>Building and Room Number</td>
<td>Phone #</td>
</tr>
<tr>
<td>Major Chemical Constituents</td>
<td>Approximate %</td>
</tr>
</tbody>
</table>

NO SHARPS, BIOHAZARDS OR RADIOACTIVES
Check the appropriate boxes

☐ Halogenated Solvents   ☐ Acid
☐ Non-halogenated Solvents   ☐ Alkali
☐ Unstable/Explosive   ☐ Aqueous Inorganic
☐ Air/Water Reactive   ☐ Organic Peroxide
☐ Other (specify)   

WASTE WILL NOT BE ACCEPTED IF THIS LABEL IS INCOMPLETE
8.5.4 Storage

In addition to the general storage requirements, these specific requirements for chemicals must be followed:

- Chemical waste is to be stored in a safe, out-of-the-way location in the generator’s laboratory or other designated area between scheduled collection days.
- Flammable solvents should be stored in a flammable storage cabinet. If circumstances require that they be stored in a fume hood, they should be limited to small amounts and be kept in a location such that they do not interfere with work in the fume hood or obstruct the airflow and decrease the fume hood efficiency.
- Flammable chemicals should never be stored in refrigerators, unless they are special flammable storage refrigerators.
- Waste should be segregated according to compatibility groups such as acids, bases, flammables, oxidizers and water reactives.
- Dispose of aging containers promptly. Some chemicals are time sensitive and may degrade into very hazardous by-products. e.g. ethers may degrade to form explosive organic peroxides. Where safety considerations would indicate not waiting until the scheduled collection day, contact the local Waste Coordinator.

8.5.5 Chemical Compatibility

When preparing chemical waste for disposal it is the generator’s responsibility to ensure that incompatible chemicals are not mixed in the same container. The first step in determining chemical incompatibilities is to review the Material Safety Data Sheet where incompatibilities will be listed in the section on reactivity.

Some general examples are:

- Acid-reactive compounds (e.g. cyanides, sulphides) which liberate gaseous products when acidified should not be mixed with any inorganic acid (e.g. sulphuric or hydrochloric acid).
- Organic acids (e.g. glacial acetic acid) should be segregated from inorganic acids. Generally, inorganic acids are oxidizing agents while some organic acids may be either reducing agents or combustible.
- Water reactive materials (e.g. sodium, potassium) should be kept well away from any water sources.
- Oxidizers (i.e. any inorganic compound that assists fire such as hydrogen peroxide, lead nitrate) should never be mixed with organic materials (e.g. organic bases such as pyridine, aniline, amines, flammable solvents such as toluene, acetone) or reducing agents (e.g. water-reactive chemicals such as sodium).
- Perchloric acid, although an inorganic acid, is a powerful oxidizing agent and should be considered a powerful oxidizer in its concentrated form.

Appendix 1 of this manual provides a table giving general classes of incompatible chemicals. For specific chemicals, consult the safety data sheet.
8.5.6 Special Cases

The preceding procedure deals with most common teaching and research chemical wastes. On occasion, some wastes may be generated which require special handling.

8.5.6.1 Gas Cylinders

Gas cylinders should be treated as high energy sources. Use the smallest size necessary to do the work. Prior to purchasing, check if empty cylinders can be returned to the supplier. UOIT Facilities Management department will arrange for the disposal of gas cylinders.

8.5.6.2 Mercury

All free liquid mercury should be collected in a leak-proof container. Mercury contaminated solids such as glassware, gloves and cleanup materials should be packaged separately.

8.5.6.3 Peroxidizable Compounds

Peroxidizable compounds should be ordered in small quantities (less than 6 months’ supply) and dated when the container has been opened. Even if a commercial inhibitor has been added by the manufacturer, organic peroxide formation can begin within 6 months following exposure to air. Organic peroxides are explosive. The ordering of smaller quantities and the reduction of the volume of these materials in storage encourages the quick turnover of inventory and reduces the likelihood of peroxide formation.

The following materials have the potential to form organic peroxides:
- Ethers such as Isopropyl ether, dimethyl ether, diethyl ether
- Acetal
- Decahydropaphthalene
- Dicyclopentadiene
- Diethylene glycol
- Dioxane

8.5.6.4 Polychlorinated Biphenyls (PCBs)

The handling of PCB contaminated material requires special consideration for handling, storage, and disposal. In Ontario, any waste material with a concentration of PCBs in excess of 50 ppm is considered to be PCB contaminated. Sources of PCBs include transformers containing askarel. PCBs were also used in capacitors, hydraulic equipment, electromagnets, heat transfer equipment and vapour diffusion pumps.

If the material is suspected to contain PCBs it should not be mixed with other wastes. For testing of the material, contact the local Waste Coordinator.
8.5.7 Collection Schedules

Collection and disposal will be arranged by the Waste Coordinators as required. There will normally be at least two scheduled collections per year, at the end of the fall term in December and the end of the spring term in May. Special pickups may be arranged by contacting the local Waste Coordinator.
9.1 Biological Spill

The efficient and effective control of a biological spill requires that all staff and students are trained and practiced in the established response techniques. Evacuation of the room is required if the spill produces an aerosol. Re-entry of the area should not happen for at least 30 minutes in order for aerosols to disperse and settle.

9.1.1 Larger Spill

1. Hold breath and move away from the spill.
2. Inform others in the area, and move out of the room for 10-30 minutes to allow aerosols to disperse and settle.
3. Follow procedures for small spills.

9.1.2 Small Spill

1. Cover the spill with a paper towel to avoid splashing.
2. Gently pour disinfectant onto the paper towels, working in a circular motion, from the outside to the center.
3. Wait for 30 minutes.
4. Remove the towels with forceps.
5. Repeat steps 1-4.

9.1.3 Centrifuge

1. First, turn off the centrifuge
2. Inform others in the vicinity and do not open the centrifuge for 30 minutes to allow aerosols to disperse or settle.
3. Sealed safety buckets are to be opened in the biological safety cabinet.
4. Slowly open centrifuge lid, remove all broken tubes, buckets, rotors etc. to a basin filled with Conflikt® and allow to soak for 10 minutes
5. Place broken tubes in a sharps container.
6. Rinse centrifuge parts in tap water and place back in a centrifuge.
7. Unbroken capped specimens that have been disinfected can be processed.
8. Wipe down the bowl of the centrifuge twice with Conflikt® and paper towels, and rinse with water; dry.
9.1.4 Small Equipment.

Spills inside small equipment are to be treated as either a small or large biological spill. This includes incubators, fridges, fume hood, and instruments.

9.1.5 Biosafety Cabinet Spill

1. Leave fan on
2. Follow procedure for small spills.
3. If spilled material goes through perforated work surfaces or grilles to catch tray beneath, pour Conflikt® to dilute spill tenfold.
4. Let stand, drain tray through drain cock into a plastic bucket and clean.

9.1.5.1 In Case of Equipment Failure (Fan Failure or Loss of Electrical Power):
1. Immediately cease all work and close all open containers within the hood.
2. Close the sash fully.
3. Remove gloves and thoroughly wash hands.
4. Wait at least 30 minutes for any aerosols to settle.
5. Use a suitable chemical disinfectant and cautiously wipe down the exterior of all items before removing them from the hood.
6. Do not use cabinet until the problem is resolved.

9.2 Chemical Spill

Chemical spills are divided into different groups based on the size and type of the spill. A small spill is less than 500mL, a large spill greater than 500mL. The type of spill is volatile, acid, caustic or formaldehyde.

9.2.1 Large Chemical Spill:

Refer to the UOIT General Laboratory Safety Manual
In the event of a large chemical spill of volatile toxic, corrosive or flammable chemical:
1. Turn off hotplates and other ignition sources if flammable materials are involved but only if you can do so safely.
2. Evacuate the laboratory and prevent re-entry
3. Take the MSDS sheet and name of the chemical
5. Provide the following information about the spilled material to the operator.
   Location
   Street Address
   Building/Department
   Room Number
   Injuries
Chemical Name
Quantity
Hazards
6. Do not hang up until the operator releases you.
7. Contact the Hazardous Materials Spill Reporting (24 hours) at 1-800-268-6060 if the spill is a reportable as defined by the Ontario Ministry of the Environment. Provide information such as the MSDS.
8. Wait for emergency response personnel outside the main entrance of the building.
9. Inform Laboratory Supervisor or Department Head.

9.2.2 Small Chemical Spill

Small spills involve small quantities of known materials which present minimal hazards. A minor spill will generally meet the following criteria.

- The quantity of material spilled is small (no more than a 500 mL)
- The spill will not spread extensively beyond the local area of the spill
- There is no respiratory hazard
- The spill will not endanger people or property
- The spill will not endanger the environment

In general, such spills can safely be dealt with by laboratory personnel without outside assistance using the precautions and instructions on the MSDS using spill cleanup kits and protective clothing readily at hand.

The types of spill cleanup kits available are Volatile, Acid, Caustic and PIG (PIG is used for formaldehyde spills).

9.2.3 Procedure for Using the Spill Cleanup Kit

1. Turn off hotplates and other ignition sources if flammable materials are involved but only if you can do so safely.
2. Evacuate the laboratory and prevent re-entry.
3. Be sure fume hood and other local exhausts are operating.
4. Select the appropriate eye, skin, and respiratory protective equipment required for safe re-entry into spill area.
5. Refer to MSDS for choosing the correct spill kit.
6. Determine the method and materials required to clean up the spill.
7. Contain the spill by building a dike with the powder or pillows found in the Spill Control Kit. Start slowly and work from the perimeter inwards toward the spill. Create a barrier so that the chemical does not run under cabinets or into drains.
8. Cover the spill with neutralizer if applicable.
9. Continue until the entire spill has been absorbed or neutralized. Note neutralizers contain a pH indicator that is useful when determining whether neutralization is complete.
10. Using the scoops and scrapers in the spill kit collect the spill and place in the plastic bags provided. Place all contaminated items including scoops and gloves in the plastic bag when finished.

11. Wash the spill area.

12. Package all contaminated materials in the safety kit or plastic bucket for removal. Attach the provided label indicating the type of waste and submit for waste disposal.

13. Request a replacement spill cleanup kit.
Certain items of equipment may create microbiological hazards when they are used. Other items are specifically designed to prevent or reduce biological hazards.

### Equipment that may create a hazard

<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>HAZARD</th>
<th>HOW TO ELIMINATE OR REDUCE THE HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Needles</td>
<td>Accidental inoculation, aerosol or spillage</td>
<td>• Do not recap or clip needles&lt;br&gt;• Use a needle-locking type of syringe to prevent separation of needle and syringe, or use a disposable type where the needle is an integral part of the syringe unit&lt;br&gt;• Use good laboratory techniques&lt;br&gt;• Use a biological safety cabinet for all operations with infectious material</td>
</tr>
<tr>
<td>Microtome</td>
<td>Lacerations, Accidental inoculation</td>
<td>• Check section thickness 4 microns&lt;br&gt;• Lock the Hand wheel when not cutting&lt;br&gt;• Use the blade guard&lt;br&gt;• Never leave unattended unless blade is removed&lt;br&gt;• Always position sample first then put in blade&lt;br&gt;• Use forceps to retrieve ribbons from the knife edge</td>
</tr>
<tr>
<td>Scalpels, blades</td>
<td>Lacerations, Accidental inoculation</td>
<td>• Store in covered container&lt;br&gt;• Dispose in sharps container&lt;br&gt;• Never leave on counter top</td>
</tr>
<tr>
<td>Centrifuges</td>
<td>Aerosols, splashing and tube breakage</td>
<td>• Use sealable buckets (safety cups) or sealed rotors. Open buckets or rotors after aerosols have settled (30 min) or in a biological safety cabinet</td>
</tr>
<tr>
<td>Culture stirrers, shakers, agitators</td>
<td>Aerosols, splashing and spillage</td>
<td>• Operate in a biological safety cabinet or specially designed primary containment&lt;br&gt;• Use heavy-duty screw-capped culture flasks, fitted with filter-protected outlets, if necessary, and well secured</td>
</tr>
<tr>
<td>Water baths</td>
<td>Growth of micro-organisms</td>
<td>• Ensure regular cleaning and disinfection.&lt;br&gt;• Do not use sodium azide for preventing growth of organisms</td>
</tr>
<tr>
<td>Incinerator</td>
<td>Fire</td>
<td>- Keep all flammables away e.g. Lab coat, paper</td>
</tr>
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<td>---------------------</td>
<td>----------------------------------------------</td>
<td>---------------------------------------------</td>
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<tr>
<td></td>
<td></td>
<td>- Never leave a loop in the incinerator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Do not touch while in use</td>
</tr>
<tr>
<td>Microbiology</td>
<td>Aerosol, accidental burns and bacterial</td>
<td>- Loops must be properly sterilized after</td>
</tr>
<tr>
<td>Loops</td>
<td>contamination</td>
<td>each use. (See proper use of incinerator</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7.6.2). Loops are never left in the</td>
</tr>
<tr>
<td></td>
<td></td>
<td>incinerator unattended. Loops must be</td>
</tr>
<tr>
<td></td>
<td></td>
<td>properly cooled before using to prevent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>aerosols. Never walk around the laboratory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>with contaminated loops</td>
</tr>
</tbody>
</table>
University of Ontario Institute of Technology

<table>
<thead>
<tr>
<th>Procedure Title:</th>
<th>Procedure Number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation of Laboratory Specimens</td>
<td>MLScAF 11.0</td>
</tr>
</tbody>
</table>

11.1 Interdepartmental

The manner in which a task is performed can minimize the likelihood of exposure to biohazardous materials in the laboratory. Many laboratory practices are designed to prevent transmission of infectious material. Safe transport of laboratory specimens within the laboratory or to other areas can minimize the potential for accidental spills and exposures.

- All specimens for interdepartmental transfer must be placed in a sealed plastic bag and then in a closed leak-proof secondary container. The purpose is to contain any leaks or spills that may result from accidental breakage or failure of the primary container during transport.
- A sealable hard-shelled plastic secondary container fitted with racks or foam inserts is suitable when transporting bulk laboratory samples throughout the facility. It is important that these containers be regularly decontaminated using Conflikt®.
- An individual sample such as a culture plate or tube may be safely transported using a sealed biohazard bag placed in a secondary container. The bags are suitable for a single use only and must be discarded as biohazardous waste.

11.2 External Transportation of Laboratory Specimens - Dangerous Goods

Transportation of infectious substances to, from or within Canada is regulated by the Transportation of Dangerous Goods Regulations (TDGR), Transport Canada, and by the International Air Transport Association, Dangerous Goods Regulations (IATA DGR). There are nine classes of dangerous goods as listed in the Dangerous Goods Regulations. Laboratory specimens are classified in “Class 6.2, Infectious substances.”

In Canada, surface transport of dangerous goods is regulated by the TDGR. Air transport of dangerous goods (within Canada) is regulated by both the TDGR and the IATA DGR.

It is the intent of these regulations to protect the public, carriers, acceptance staff and the environment from accidental exposure to or direct contact with the infectious material by ensuring that packages arrive at their destination fully intact with the contents confined to the inside of the package.

Always consult the most recent edition of the applicable Dangerous Goods Regulations prior to shipping dangerous goods.
11.3 Transportation of Dangerous Goods Training

The Canadian TDGR and the IATA DGR specify that no person shall handle, offer for transport or transport dangerous goods unless he/she is trained or is performing the duties under the direct supervision of a trained person. Only a trained person with a valid Transportation of Dangerous Goods certificate can sign the shipping forms (F-SD-S-011 and F-SD-S-015) and by signing assumes responsibility for regulatory compliance.

It is the responsibility of the employer to provide training to all employees involved in the transportation of dangerous goods as specified by the applicable regulations. The shipper is specifically responsible for the following aspects of the transportation of dangerous goods:

- Classification and identification
- Packing, marking and labeling
- Accurately completing all necessary documentation
- Ensuring that all of the applicable transport requirements are met prior to shipping dangerous goods.

University of Ontario Institute of Technology (UOIT) provides training to all staff involved in the transportation of Dangerous Goods. The training program is in compliance with the Canadian TDGR and the IATA DGR.

11.4 Members Currently Certified in Transportation of Dangerous Goods

Recertification is required every 3 years

Joanne Free
Laboratory Technician
Medical Laboratory Science Program
Faculty of Health Science, UOIT
905-721-8668 ext. 3283
Expire on July 2019

Donna Smeeton
Senior Lecturer
Medical Laboratory Science Program, UOIT
905-721-8668 ext. 5354
Expire on May 2020

Ruth Simpson
Senior Lecturer
Medical Laboratory Science Program, UOIT
905-721-8668 ext. 2704
Expire on July 2019
12.1 Purpose

The Public Health Agency of Canada has published biosafety guidelines “Canadian Biosafety Standards and Guidelines” which require all facilities that handle infectious agents to have a Biosafety program and a Biosecurity plan in place. The Medical Laboratory Science (MLSc) Program Biosecurity plan has been implemented to prevent the theft, misuse or intentional release of pathogens. The main components of the biosecurity plan include physical protection, personnel suitability/reliability, pathogen accountability, and incident and emergency response.

12.2 Designation of a Responsible Official

In the MLSc program laboratories, the laboratory instructors and the UOIT biosafety officer are responsible for the development, training and implementation of safety, security and emergency response plans relating to biohazardous materials. In the event of any theft, loss or release of biohazardous material, the University’s biosafety officer will be contacted as soon as possible by the laboratory staff.

12.3 Identification of Biohazardous Materials with a Biosecurity Risk

The senior laboratory instructor is responsible for classifying the risk assessment of agents used in the respective laboratory exercises. The risk assessment is done by utilizing the Canadian Biosafety Standards and Guidelines published by the Public Health Agency of Canada (PHAC). These risk assessment guidelines are also found in the UOIT Biosafety Manual. The completed risk assessment is submitted to the Biosafety Committee for approval. There is also a mechanism to refer agents to the PHAC and ask for aid in assigning a risk group. Further guidance can also be found by contacting the Centers for Disease Control and Prevention/National Institute of Health Biosafety in Microbiological Laboratories.

While in UOIT laboratories, students will work with only Risk Level 1 and 2 potential human pathogens. Students will have sufficient biosafety training and practice. Factors such as weaponization risk, a consequence of release and level of threat will be considered when assessing the biosecurity risk of a biohazardous material. Student manipulation of these certain bacteria, for example, *Shigella*, would be highly supervised and limited.
12.4 Physical Protection

Different strategies have been implemented in the Medical Laboratory Science laboratories to ensure the security of laboratories containing biohazardous materials. These strategies are listed below:

- The laboratory door shall remain closed and locked at all times
- Preparation and storage rooms have secondary locks
- Incubators have locking devices
- The freezer is locked when not in use
- Students have limited access to preparation areas and storage rooms
- Students access refrigerator content only while under supervision
- Outdoor coats/backpacks are not allowed within the laboratory proper
- Lab kit contents and lab coats are not allowed to leave the laboratory
- All equipment is disinfected prior to removal from the laboratory
- A separate log book is maintained for each of the following:
  - when biohazard waste is disposed
  - when stock microbiology material is removed from the -80°C freezer and subcultured or destroyed
  - when the student laboratory benches are disinfected
  - all visitors to the laboratory
  - decontamination of equipment

12.5 Personnel Suitability & Reliability

Personnel access to both MLSc program laboratories is restricted to authorized individuals (specifically identified MLSc faculty and staff). Students working in these laboratories are under the direct supervision of an MLSc laboratory instructor responsible for the laboratory exercises/techniques being performed. Maintenance and janitorial staff only enter these laboratories under direct supervision by authorized individuals. Biosafety and biosecurity training are mandatory for all students, faculty, and staff working in laboratories that contain biohazardous materials. Hazardous materials awareness training is required for all maintenance and janitorial staff accessing laboratories on campus. Visitors must be escorted by an authorized individual such as a laboratory instructor or the laboratory technician.

12.6 Biohazard Accountability

An inventory of all biohazardous materials will be maintained from acquisition to disposal. The inventory will include the type, quantity, and location of the material and is updated on a regular basis and the documentation is maintained for a year.

All biohazardous materials will be clearly labeled. All individuals who have access to the material will be identified. Loss, theft, or misuse of a biohazardous material will be reported immediately to the UOIT Biosafety Officer.
12.7 Incident and Emergency Response

All individuals working with biohazardous materials will report all security incidents to the Biosafety Officer and Campus Security as soon as possible. Security incidents include, but are not limited to, breach of containment, unauthorized removal of pathogens, and unauthorized personnel in restricted areas. Please refer to the UOIT Biosafety Manual for information on biohazard spill response procedures and other emergency procedures (e.g., earthquake, fire).

12.8 Management of Exposure to Blood and Body Fluids

- Immediately on exposure, the student must report to the laboratory instructor.
- Administer First Aid.
- It is the laboratory instructor’s first responsibility to attend to the student. At an appropriate time, the laboratory instructor MUST complete a UOIT Accident/Injury report. This is to be done electronically. This form can be found at [http://www.uoit.ca/forms/accidentinjury/](http://www.uoit.ca/forms/accidentinjury/). Copies are to be sent to the Manager of Insurance and Risk Management and a copy kept in the Medical Laboratory Science Program.
- It is the responsibility of the laboratory instructor to arrange transportation and to accompany the student to one of the following emergency departments:

  **Lakeridge Health Oshawa**
  
  1 Hospital Court
  
  Oshawa, ON
  
  Tel: 905-576-8711 x 3214/4560
  
  Fax: 905-721-4749

  **Rouge Valley Health**
  
  580 Harwood Avenue
  
  Ajax, ON
  
  Tel: 905-683-2320 x 1210
  
  Fax: 905-428-8277

- Transportation should be via Blueline Taxi Services. Blueline can be contacted at 905-440-2000, state that this is an emergency and that the taxi is to proceed to the Main Entrance of Durham College, off Commencement Drive and wait. Blueline Taxi Services chits can be found in the laboratory first aid kits.
- Because the maximum benefit of immunoprophylaxis is achieved the sooner it is initiated, (preferably 1 or 2 hours post exposure).
- If an alternate instructor is not immediately available to replace the laboratory instructor attending the student, the Faculty of Health Sciences reception desk, at extension 3166, is to be called to help arrange for another instructor or staff member to come to the laboratory to remain with the second instructor and students. If an alternate instructor or staff member cannot be found and it is not considered safe to continue the laboratory session with only one instructor, the students are to be excused from the laboratory.
• Call Security, extension 2400, so that they are aware that a taxi is arriving to take the student and staff member to the hospital. Then proceed to the Durham College main entrance.
APPENDICES
Appendix 1

References


UOIT Laboratory Safety Manual for General Laboratory operations and WHMIS retrieved from http://healthandsafety.uoit.ca/manuals/index.php

APPENDIX 2

WASTE COLLECTION INVENTORY FORM

PART 1 – TO BE COMPLETED BY THE WASTE GENERATOR

<table>
<thead>
<tr>
<th>Waste Category (see list below)</th>
<th>Type of Container</th>
<th>Number of Containers</th>
<th>Physical State</th>
<th>List of Contents</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

List of Waste Categories

- Halogenated Solvents
- Non-halogenated Solvents
- Aqueous Inorganic
- Acid
- Alkali
- PCB
- Air/Water Reactive
- Unstable/Explosive
- Other (list chemicals)

Originator’s Signature:
__________________________________________________________________________

Signature verifies that the above information is complete and accurate.
PART 2 – TO BE COMPLETED BY THE WASTE COORDINATOR

Disposal Date: _________________________________

Waste Manifest Reference #: _________________________________

Waste Coordinator Signature: _________________________________