STANDARD: Laboratory Safety

PURPOSE
This standard establishes general safe practices in the Medical Laboratory Science (MLS) biohazard laboratory. Control measures described in this standard are essential for protecting all laboratory occupants from potential biological, chemical, and physical hazards.

ROLES AND RESPONSIBILITIES

Safety Coordinator - Provide guidance and ensure safety in the laboratory

Faculty/Staff/GTA’s - Comply with all MLS safety policies, report unsafe working conditions as well as accidents to the MLS Safety Coordinator or Program Director

Students - Comply with all MLS safety policies

DEFINITIONS

Work Practice Controls – Also known as Administrative Controls, are changes in work procedures such as written safety policies, rules, posted signs, alarms and warnings, and training with the goal of reducing the duration, frequency, and severity of exposure to hazardous chemicals or situations.

Personal Protective Equipment (PPE) – Equipment worn or used to minimize exposure to physical, chemical, or biological agents. Per OSHA regulations, personal protective equipment must prohibit blood or other potentially infectious materials (OPIM) from passing through to clothing, skin, eyes, mouth, or other mucous membranes.

Sharps – Objects that can penetrate skin, such as needles, scalpels, broken glass, and capillary tubes. If blood or other potentially infectious materials (OPIM) are present or may be present on the sharp, it is considered a contaminated sharp.

Standard precautions – 1st tier of basic infection control. A set of precautions applied to all patients designed to reduce the risk of transmission of bloodborne and other potentially infectious materials (OPIM) in the health care setting. All blood, tissue, body fluids, secretions, and excretions (except sweat) are considered potentially infectious.
GENERAL SAFETY

Engineering Controls
Engineering controls are controls designed to reduce work related hazards. They reduce exposure by removing, eliminating, or isolating the hazard.

| Biological Safety Cabinet (BSC) | • Act as a primary barrier to contain hazardous biological materials within the cabinet and away from the laboratorian’s breathing zone.  
|                               | • Includes three classes (I, II, III). Class II is further divided into four types: A1, A2, B1, B2.  
|                               | • The MLS biohazard lab has two (2) class II, type A2 BSC’s.  
|                               | Students will be instructed on the use of the BSC’s as needed based on the class and activity. |

| Centrifuge Safety Equipment | • Protects against release of aerosols  
|                            | • Includes safety cups, rotors with covers, removable rotors, and O-rings  
|                            | • Always check tubes for cracks prior to placing in centrifuge |

| Pipetting Aids | • For the safe use of pipettes  
|               | • Bulbs, pipettes with cotton plugs |

| Splatter shields | • Protects from exposure when opening specimen containers or manipulating specimens in a manner that would cause a splash  
|                  | Students will be instructed on the use of splatter shields as needed. |

| Enclosed Electrical Incinerators | • Reduce splatter when decontaminating bacteriological loops  
|                                | The MLS Biohazard laboratory uses only enclosed electrical incinerators. |

Personal Protective Equipment
PPE is not a substitute for good engineering or work practice controls. PPE is used in conjunction with these controls to ensure safety.

| Fluid Resistant Laboratory Coats | Fluid resistant laboratory coats are to be worn at all times in the MLS Biohazard laboratory. It is at the discretion of the instructor whether or not students need to wear lab coats while in the lab for lecture only. Cloth lab coats are not allowed.  
|                                | • Lab coats must be long sleeved, knee length, button in the front  
|                                |   • Students  
|                                |     • White lab coats  
|                                |     • Purchase through UND MLS Club or UND Bookstore.  
|                                |   • Faculty/Staff/GTA’s - Ceil Blue lab coats |
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- Remove lab coat immediately if it becomes contaminated with hazardous materials. Place contaminated lab coats into marked biohazard bags for laundering.
- Remove lab coat prior to leaving the laboratory. Lab Coats are not to be worn outside of the MLS biohazard lab.
- Lab coats are laundered by UND laundry services. Bringing lab coats home for laundering is prohibited.

<table>
<thead>
<tr>
<th>Disposable Gloves</th>
<th>Disposable gloves must be worn in the laboratory when performing tasks where contact with blood or OPIM is possible, including surfaces contaminated with these materials.</th>
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<tbody>
<tr>
<td></td>
<td>- Immediately remove gloves that are contaminated with blood or OPIM and discard in the biohazard containers. Wash hands before putting a new pair of gloves on.</td>
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<td>- Gloves should be replaced when they are torn, punctured, wet, or when their ability to function as a barrier is compromised.</td>
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<tr>
<td></td>
<td>- Do not wash or reuse disposable gloves</td>
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<td></td>
<td>- Remove gloves and wash hands when finished working with hazardous materials as well as prior to leaving the laboratory at any time.</td>
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<td></td>
<td>- Remove gloves using an aseptic technique and discard in the biohazard waste.</td>
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</table>

Nitrile gloves are provided by the MLS department. In the case of allergy to provided gloves, other alternatives will be offered by the department.

<table>
<thead>
<tr>
<th>Heat Resistant Gloves</th>
<th>Protect hands when handling hot objects.</th>
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<td></td>
<td>- Use when removing autoclave bins or handling other hot objects such as electrophoresis gels.</td>
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</table>

<table>
<thead>
<tr>
<th>Face and Eye Protection</th>
<th>Safety goggles, face shields, or other eye and face protectors need to be worn when performing activities that pose a risk of splashing hazardous substances into the eyes, nose, or mouth.</th>
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<tbody>
<tr>
<td></td>
<td>- This type of exposure may happen during tasks such as handling chemicals or infectious materials.</td>
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<tr>
<td></td>
<td>- Prescription eyeglasses do not offer adequate protection from splashes. Safety glasses that fit over the top of prescription glasses will be required.</td>
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Safety goggles and/or face masks, including those that fit over the top of prescription glasses, will be provided by the MLS department.
## Sharps Engineering Controls
Additional engineering controls to use when working with sharps.

<table>
<thead>
<tr>
<th>Handling of Sharps</th>
<th>Handle all needles, contaminated glass, and other sharp objects with extreme caution.</th>
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<tbody>
<tr>
<td></td>
<td>• Never purposely bend, break, or re-cap used needles.</td>
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<tr>
<td></td>
<td>o  *OSHA exception: if the procedure requires the contaminated needle to be recapped or removed and no alternative is feasible and the action is required by the medical procedure. If such action is required, then the recapping or removal of the needle must be done by the use of a mechanical device or a one-handed technique.</td>
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<tr>
<td></td>
<td>• Needles with safety shields will be used for all phlebotomy procedures.</td>
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<td></td>
<td>• After use, place all sharps in a puncture-resistant container.</td>
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</table>

## Work Practice Controls

### Infection Control
- Mouth pipetting is prohibited.
- Hands must be kept away from the mouth, nose, eyes, and other mucous membranes to reduce the possibility of self-inoculation.
- Use Biohazard wipes when removing the tops from specimens to minimize aerosol production.
- Never leave a discarded tube or infected material unattended or unlabeled.
- The laboratory door must be kept shut (do not prop open). This is to ensure proper air exchange as well as to reduce the risk of biohazard contamination outside of the laboratory.

### Hand Hygiene
Hands should be washed after the following:
- Removing gloves
- Before leaving the laboratory
- Before and after contact with patients
- Before eating, drinking, smoking or the manipulation of contact lenses
- Immediately after accidental contact with blood or OPIM.

Steps recommended for proper handwashing:
1. Wet hands with clean running water (warm or cold) and apply soap.
2. Rub hands together to make a lather and scrub the well. Be sure to scrub the back of the hands, between fingers, and under nails.
3. Continue rubbing hands for at least 20 seconds. Rinse hands well under running water.
4. Dry hands using a clean towel.
5. Use towel to turn off faucet.
## Decontamination

Decontaminate works areas with an appropriate chemical germicide after a spill with blood or OPIM and at the end of every laboratory session.

- Wear gloves and appropriate PPE when decontaminating work surfaces.
- Commercial disinfectants or a 1:10 bleach solution will be used in the MLS biohazard lab.

For biohazard spills, notify an instructor immediately.

- Decontaminate work space as soon as feasible after a spill of blood or body fluid.
- PPE and double gloves should be worn when doing the clean-up.
- Saturate the spill with bleach and let sit for five minutes.
- If glass is involved, the spill should be picked up with a biohazard disposal kit or dustpan and broom and disposed of in a biohazard labeled sharps container.

For chemical spills, notify an instructor immediately.

- Follow all directions indicated in the SDS sheet.
- For small spills, use the chemical spill kit located in the safety cabinet
- For large spills, contact the UND Office of Safety Immediately.

## Emergency Aids

### Eyewash Stations

In the event of a hazardous splash to the eye, immediately notify an instructor and proceed to the nearest eyewash station.

- Active the eyewash.
- Hold eyes open and flush for a minimum of 15 minutes, rolling the eyes left to right and up and down to ensure all surfaces are flushed.
- Contact lenses may be gently taken out during flushing.

Immediately seek medical attention after flushing is complete.

### Emergency Shower

In the event of a hazardous splash to the body, immediately notify an instructor and proceed to the nearest emergency shower.

- Stand under the shower and turn water on
- Remove contaminated clothing while under the shower
- Rinse for a minimum of 15 minutes.

Immediately seek medical attention after rinsing is complete.

Instructors will notify UND Office of Safety in the event the emergency shower is used to control the water from leaking to other areas of the building.
Waste Disposal
Students will be instructed on proper waste disposal during safety orientation.

| Biohazard Waste Containers | Specimens, including blood and OPIM must be disposed of in a container that prevents leakage.  
- Containers must have a biohazard label and be red/orange in color.  
- All gloves, plastic transfer pipettes, and anything contaminated with blood or OPIM that is not a sharps must be disposed of in biohazard waste. |
|---------------------------|-------------------------------------------------------------------------------------------------------------------|
| Sharps containers         | All needles and contaminated glass are to be disposed of in sharps containers.  
- Sharps containers must be impervious, puncture resistant, and rigid to eliminate the potential of physical injury.  
- All needles and lancets as well as contaminated glass slides, tubes, and glass pipettes. |
| Regular Waste             | All other waste not sharps or considered biohazard.  
- Paper towels used for handwashing and decontaminating work surfaces  
- Paper products such as wrappers and lens paper/kim wipes. |

Personnel Responsibility

Food, Drink, and Like Substances
- Eating, drinking, smoking, handling contact lenses, or putting anything in one’s mouth while in the laboratories where there is a reasonable likelihood of occupational exposure is prohibited.  
- Chewing gum is acceptable, however, it must be placed in one’s mouth prior to entry into the lab.  
- Food and beverages are not to be kept in refrigerators, freezers, shelves, cabinets, counter or bench tops or other areas designated as work areas by the laboratory or where blood or other potentially infectious materials are present or may be present. |

Cosmetics, Hair, Beards, and Jewelry
- Application of cosmetics in the MLS biohazard lab is prohibited. Hand cream is not considered a cosmetic and is permitted.  
- Hair longer than chin length must be secured back to prevent it from contact with contaminated materials and away from moving equipment such as centrifuges.  
- Jewelry or flowing scarves that can become caught in equipment or hang into infective materials need to be removed prior to working in the lab.  
- Men with beards should observe the same precautions provided for long hair. Long beards are dangerous because they can get caught in moving equipment. All beards are sources of bacterial contamination. |
### Personal Property
- Backpacks must be stored either in the shelves on the south side of the MLS laboratory or in the student’s respective learning community.
- Personal electronic device (e.g., cell phone) use is not allowed in the MLS biohazard lab. Cell phones may be kept in backpacks stored in their designated area in the lab.
  - Instructor’s may keep their cell phones in the drawers at the teaching station.

### Hygiene
Students must maintain proper hygiene while in attendance in the MLS laboratory. This includes, but is not limited to:
- Showering/bathing daily
- Maintaining clean, neat hair
- Using personal care products (e.g. deodorant, toothpaste)
  - Fragrant products such as perfume, cologne, other strongly scented products, and essential oils are not to be used in the MLS laboratory.

### CLOTHING/ATTIRE

#### Clothing
Proper clothing is essential while working in the laboratory. The dress code for the laboratory is casual: jeans/pants/scrubs are all OK. Absolutely no shorts. Dresses are allowed provided they cover the entire leg (see clearance guideline below) and are worn with socks and appropriate shoes.
- Clothing must be clean, neat, and in good repair.
- Clothing must fit appropriately.
- Legs must be completely covered in the laboratory.
  - No skin may show around ankle area.
  - Pants must not have any holes.
- Pants or dresses may not drag on the floor when in the lab. Dresses and pants should have 1 to 1.5 inches of clearance from the floor.

#### Footwear
- Shoes should be comfortable, rubber-soled, and cover the entire foot, including the toe, heel, and instep. Clog-style shoes are not appropriate footwear, even if they have a heel strap.
- Canvas shoes are not recommended as they may absorb chemicals and infectious fluids. Leather, vinyl, or synthetic fluid-impermeable material is suggested.
CHEMICAL SAFETY

General

- Students will be informed as to any hazards associated with chemicals used for laboratory tasks.
- Always add acid to water
- Never smell a chemical directly. Vapors should be wafted toward the nose if necessary.
- Safety Data Sheets for all chemicals are kept in the SDS binder in the Safety Cabinet in the MLS Biohazard lab.
- All chemicals must be properly labeled. Primary containers must be labeled according to the Globally harmonized System (GHS) of classification. Secondary containers may either be labeled according to GHS regulations or by the National Fire Protection Agency (NFPA) regulations.

Note: It is a direct OSHA violation to re-label primary containers.

NFPA labeling

- Department of Transportation requirement for shipping chemicals.
  - Color coded diamond with four quadrants
    - Blue: Health hazard
    - Red: Fire hazard
    - Yellow: Reactivity hazard
    - White: Indicates water reactivity, radioactivity, biohazards, or other special hazards.
  - Numbers are used in the upper three quadrants to signal the degree of emergency
    - A numerical scale of 0 to 4 is used
      - 0 = no unusual hazard
      - 1 = minor hazard
      - 2 = moderate hazard
      - 3 = severe hazard
      - 4 = extreme hazard

[Image of NFPA labeling]
- Chemical Labeling requirements include:
  o Product Identifier, Supplier Identification, Precautionary, Hazard Pictograms, Signal Word-severity of hazard, Hazard Statements, Precautionary statements.
  o Pictograms included in chart below.

### GHS Labels

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Description</th>
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<tbody>
<tr>
<td>Oxidizers - Can burn without air, or can intensify fire in combustible materials</td>
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<tr>
<td>Explosives - May explode if exposed to fire, heat, shock, friction</td>
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<tr>
<td>Corrosives - May cause skin burns and permanent eye damage</td>
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<tr>
<td>Gases Under Pressure - Gas released may be very cold. Gas container may explode if heated</td>
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<tr>
<td>Flammable - If exposed to ignition sources, sparks, heat. Some substances may give off flammable gases</td>
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<tr>
<td>Toxic to aquatic organisms and may cause long-lasting effects in the environment</td>
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<td>Toxic material which may cause life threatening effects even in small amounts and with short exposure</td>
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<tr>
<td>May cause serious and prolonged health effects on short or long term exposure</td>
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<tr>
<td>Irritant - May cause irritation (redness, rash) or less serious toxicity</td>
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### FIRE SAFETY and EVACUATION

| Fire Safety/ Evacuation | All students receive safety training each semester they are enrolled in a MLS laboratory course, including summer session. Staff/Faculty/GTA’s receive safety training upon hire. The following fire safety information is included in the training:
- Location of fire extinguishers
- Location of fire pull box
- Location of all exits
- Map of floor plan with exits and evacuation routes

In addition, evacuation routes and designated storm shelter areas is covered.

Open flames are prohibited in the MLS biohazard lab, including the use of Bunsen burners. |
REFERENCES
