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Document Title: Microbiology Laboratory Safety Manual

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Dwight Hardy, Ph.D	2/17/2006	Safety Procedure Manual 11/6/2001 (SH.CP.SAF.0001.0003)

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Bacteriology	1	File	1
Virology	1		
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CHANGE CONTROL FORM

Document Title: Microbiology Laboratory Safety Manual

Document Number: SH.CP.MC.SAF.0001.000 Version: from 4 To 5

Submitted By: Debra Jesien Date: 12/20/2013

1. Check one:

New procedure ☐	New process ☐	New form ☐	New flow chart ☐
Revised procedure X	Revised process ☐	Revised form ☐	Revised flow chart ☐
New job aid ☐	New labels ☐		
Revised job aid	Revised label ☐		

Brief description of change:

a. Changed references to "Infection Control" to "Infection Prevention".
b. Updated locations of Security Pagers.
c. Safety glasses are available in areas where exposure to harmful UV lights could occur.
d. Expanded Biosafety Cabinet information to include types, primary functions, maintenance and proper usage.
e. Updated link for viewing MSDS.
f. All equipment must be inspected by Clinical Engineering prior to beng put into use.

2. S. O. P. validation needed? (Circle one) (NO) YES If yes, attach validation sheet

3. Process validation needed? (Circle one) (NO) YES If yes, attach process validation documentation

4. Associated procedure and other documents (list those that need to be written or revised): _____

_____

5. Table of Content (TOC) update needed? (Circle one) (NO) YES If yes, attach Updated TOC

Author: Dwight Hardy, Ph.D Date: 2/17/2006
Revised by: Debra Jesien Date: 12/20/13
Approved by: Dwight J. Hardy, PhD Date: 12/24/2013

MICROBIOLOGY LABORATORY SAFETY MANUAL

I. MICROBIOLOGY SAFETY MANUAL OVERVIEW

The University of Rochester has an active safety program with many documents and resources available for employees from their Internet site, http://www.safety.rochester.edu. It conducts safety programs, fire drills and inspections, and serves as a safety umbrella for the diverse activities of the hospital, education facilities, research facilities and clinical laboratories. The web site addresses for relevant specific topics will be found in this document. Additionally, there is a safety policy included in the Strong Health Clinical Laboratory Manual at http://inside.mc.rochester.edu/sites/Pathology/Clinical%20Labs%20Manual/III-01%20Safety.doc

A. Scope: **The Microbiology Safety Manual** is intended to fill the need for more directed information for the safe operation of the clinical microbiology laboratory, consisting of clinical bacteriology, Mycobacteriology, Serology, Mycology, Parasitology, Virology and Immunology. This manual covers general safety principles and practices governing the operation of a full service level 3 Clinical Microbiology laboratory. Within Section 2, Employee Safety, guidelines and resources for employee safety requirements and equipment will be found. Section 3 covers Laboratory Safety, including fire, chemical and equipment. Requirements for mailing specimens will be found in Section 4. Section 5 deals with Infection Control and Emergent Pathogens. Individual and detailed Microbiology section safety considerations are Microbiology section safety considerations are included in the operating protocols for that area. (I.e. AFB)

B. Responsibility: It is the responsibility of all employees to adhere to the practices found in this policy. The directors and supervisors are charged with monitoring the staff compliance with safety policies.

C. Safety Committee: This committee is composed of representatives from each of the sections in Microbiology. They are responsible for, at least annually, updating chemical inventories and MSDS documents, maintaining current evacuation folders, preparing for inspections, and touring with inspectors. An annual safety inspection and separate fire drill is conducted and separate fire drill is conducted by the Department of **Environmental Health and Safety**. Department of Environmental Services Safety team members Safety team members take corrective action when needed. On an ongoing basis, they monitor eyewash station maintenance, hold meetings to discuss safety issues and recommend new or replacement equipment based on safety considerations. They work to reduce safety and chemical hazards.

II. EMPLOYEE SAFETY

A. Safety Requirements

1. **Immunizations**: Each employee must have a pre-employment physical and annual health assessment performed by Occupational and Environmental Medicine. An annual PPD test must be performed. All employees are recommended for immunization against Hepatitis B and annual Influenza virus vaccine. Employees working with cultures of specimen's potentially growing *Neisseria meningitidis* are eligible for the meningococcal vaccine.
2. **Attire**: Each employee will be issued lab coats that are maintained by the hospital. These must be worn in the laboratory and removed when leaving the laboratory. Shoes must protect the front of the foot. Gloves must be worn when handling specimens and in any situation when aerosols may be anticipated. Hands must be washed upon leaving the laboratory.

3. **Restrictions**: No food or drink is allowed in the laboratory. Food-only refrigerators are available for employee use in non-laboratory areas. Visitors are discouraged in laboratory areas. Visitors under 12 are forbidden except with director or supervisor approval.
4. **Safety Equipment:** The lab is equipped with Biological Safety Cabinets, chemical hoods, shields, goggles, and respirator masks for use as required or needed.
5. **Accident Reporting**: All accidents must be reported as quickly as practical to the supervisor or the "On-call" microbiologist. Refer to the University Health Service policy at www.rochester.edu/uhs and the Infection Prevention Manual: http://intranet.urmc-sh.rochester.edu/policy/infcontrol/ for more detailed information about reporting incidents. Any incident involving bodily injury must be documented. Any contamination incident must be reported to **Infection Prevention.**
6. **Ergonomics**:
   a. The laboratory continues to assess and improve the ergonomic work environment. Employees are encouraged to maintain proper posture at the workstation and use wrist rests.
   b. More information found at: http://www.safety.rochester.edu/ih/ergonomics.html
7. **Sharps**: Rigid bio-hazard containers are used for all sharps and potential sharps such as slides, pipette tips and blunted venting needles.

   Needles have been removed from use in the laboratory with the following exceptions:

   a. Collection of patient sample for Varicella zoster antigen (tuberculin needle and syringe used).
   b. Safety-glide needles used for entering PD fluid bags, blood product bags, vitreous fluid cassettes and for flushing port-a-cath devices.
   c. Equipment maintenance: Luminometer line flush with sterile water (rarely necessary).

B. Safety Equipment location and operation

1. **First Aid Kits**: Kits with basic supplies are located in Media Prep (2-5327), TB Lab (2-5573), Serology Lab (2-5548), Virology Lab (2-5311), Bacteriology Set up area (2-5232), Main Lab (2-5205), and MSR (Specimen Receiving room 2-5224).
2. **Eye Wash Stations**: Sink mounted stations are located in all laboratories and **MSR**MSR.
   a. Use: **Remove plastic dust covers**. Remove plastic dust covers. Push in silver button or push on handle. Turn on water, preferably room temperature or cool water. Flush eyes well with gentle spray.
   b. Maintenance: Units must be run weekly. Record this activity on the appropriate form.
3. **Showers**: Locations are in the corridors of 2-5200, 2-5300, 2-6400 and 2-5500.
   a. Use: For emergency use if significant contamination with chemicals has occurred. Pull ring to activate.
   b. Maintenance: The hospital maintenance department is responsible for periodic testing and operation.

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4. **Scoops**: Found in all labs.
   a. Use: To pick up sharp objects such as broken glass by using the plastic piece to push material into scoop. Dispose of material in the appropriate receptacle.

5. **Security Pagers**: **Two are located in the Set-up room in the cabinet above the GeneXpert station (Rm 2-5232), one in MSR (Rm 2-5224), one in Serology/Immunolgy (Rm 2-5548) and one in Virology (Rm 2-5311).**
   b. Use: Available for evening and night staff to use to signal security of an imminent threat.
   c. Maintenance: Checked biannually for proper function by Security. (53333)

6. **Shields**: Found in rooms 2-5206, 2-5521, 2-5232 and 2-5548, 2-5210
   a. Use: For splash protection when opening blood tubes. Place so that the face is protected when working behind the shield.

7. **Disposable goggles**: These are located in each lab for eye protection if a safety cabinet or shield is not available, **and for protection from harmful UV light.**

8. **Spill Kits for Acid and Base for Acid and Base**: Located in room 2-5327
   a. Use: For chemical spills. Wear protective apparel and follow the directions on the back of the kit.

9. **Biological Safety Cabinet**: Located in the Bacteriology Set Up area (2-5232), the TB lab (2-5573), Virology (2-5311), Mycology (2-5537) and Bloods (2-5210).

   a. Use: For splash and aerosol protection when processing specimens or cultures containing or potentially containing infectious agents spread by the inhalation route.

   b. **Types of Cabinets:**

   BSL2 Labs: The following units are monitored daily to see that they are operating within appropriate parameters, and magnehelic gauge readings are recorded.

   Bloods (2-5210) – primarily used for subculturing positive blood bottles – Ductless, Class II Type A2

   Set Up (2-5232)
   Sterile specimen Cabinet – Ductless, Class II Type A
   Non-sterile specimen Cabinet – Ductless, Class II Type A
   STAT tests Cabinet – Ductless, Class II Type B3

   Virology (2-2-5211)
   Media Preparation ONLY Cabinet – Ductless, Class II Type A
   Virology Culture Preparation Cabinet – Ductless, Class II Type A
   Virology Culture Preparation Cabinet – Ductless, Class II Type A

   Mycology (2-5537) Hard Ducted, Class II Type A
   Work up of mold, Actinomycete and Acanthamoeba cultures
   May be utilized as a BSL3 when needed

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BSL3 Lab: Negative pressure maintained in outer and inner room, continuously monitored via digital monitoring system. Cabinets equipped with digital readout which displays effectiveness of HEPA filters, and audible/visual alarms which signal inadequate airflow or other malfunctions.

TB Lab (2-5573)

Specimen processing Cabinet – Ductless, Class II A2
Positive culture work up Cabinet – Ductless, Class II A2

c. Maintenance: **UV bulbs within the cabinets are routinely exchanged every 6 months by SMH Facilities Department. UV bulbs on ceilings of Mycology and TB Lab are changed as needed**. An industrial hygienist checks cabinet operations bimonthly, except for the TB lab that is checked monthly. Annually an independent consultant recertifies each unit. **Records for all surveys, certifications and repairs are kept on file for each cabinet, for the life of the cabinet.**

d. Precautions:
(1) Before using the cabinets for the first time, review the informational literature and watch the training program.
(2) Do not use cabinets when UV lights are on.
(3) Preferably leave the blowers on at all times. If the unit has been turned off, let the blowers run for 20 minutes before using.
(4) Use an incinerator instead of an open flame burner, or assure that "flameboy"units are off when the unit is unattended.
(5) Control traffic in area around cabinets, which can disturb airflow and impede effectiveness of the cabinet, when in use.
(6) Be sure all needed supplies are in the hood before beginning to work.
(7) Use minimal, slow, movement when working in cabinets to maintain the proper air curtain. Do not block air grills.
(8) Disinfect the unit after use, and wait 3-10 minutes before reuse.
(9) Keep a minimum of supplies in the unit.
If the unit will not be used for a period of time, turn on the UV disinfecting lights.
(10) In case of a large spill, flood with appropriate disinfectant. Allow for sufficient contact time before removing or draining the material. If the drain is used, re-decontaminate.
(11) If the spill involves a CDC Biosafety 2 or 3 agent of sufficient hazard such as TB, close the view screen. Never use these hoods for a Biosafety 4 agent.
(12) Never work with volatile liquids or gases in a biosafety cabinet. Use a fume hood for these substances.

e. Safe handling of sharps in the cabinet: Assure that plastic sharps containers are sealed, then removed and boxed prior to handling by Environmental Services staff members.

10. **Fume Hoods**: Located in rooms 2-5537 and 2-5327.
a. Use: For removal of vapors, gases and particulate material

b. Maintenance: Each day of use, verify that fume hood is operating properly by assessing air movement into the hood. Yearly inspections are performed by EH&S.

11. **Autoclaves**: Located in room 2-6431
    a. Use: For sterilization of media and decontamination of waste.
    b. Maintenance: Weekly spore testing is performed.

12. **Respirators:** Refer to the Department Specific Infection Prevention Policy (see link in section V of that: policy)

13. **Biological spill handling**: Refer to the Department Specific Infection Control Policy at:

http://inside.mc.rochester.edu/sites/Pathology/Shared%20Documents/SMH%20Infection%20Control%20-%20Dept%20Specific%20Policies%20for%20Clin%20Micro%20-%20Mar%202%202010.pdf

13. **Biological spill handling**: Refer to the Department Specific Infection Control Policy at:

http://inside.mc.rochester.edu/sites/Pathology/Shared%20Documents/SMH%20Infection%20Control%20-%20Dept%20Specific%20Policies%20for%20Clin%20Micro%20-%20Mar%202%202010.pdf policy).

III. LABORATORY SAFETY

A. Fire Safety:

1. **Basic fire principle:** If there should be a fire in your area, remember **RACE**-Remove, Alarm, Contain, and Extinguish.
    a. **Remove** any other person endangered by the fire.
    b. **Alarm** by calling extension 13 or pulling the alarm.
    c. **Contain** the fire by closing doors as you leave.
    d. **Extinguish** the fire if you can.

2. **Removing others from the fire**: Announce the fire or respond to the evacuation order, Fire Alert or Fire Alert confirmed (condition 3-0) by making sure everyone leaves and that someone takes the Evacuation folder for each lab with them. If possible, turn off burners and incinerators, leave the lights on, and leave the fans running in the Biological Safety Cabinets. Employees should first go to their designated meeting place that is indicated in the folder to wait for further instructions. If further evacuation is necessary, use the stairs to go to the vertical meeting place on the ground floor. Help handicapped persons down the stairs.

3. Activate the alarm by calling extension 13 or pulling the alarm. Notify the supervisor who should check that all employees are out of the fire area. If possible, page information over the intercom.

4. Contain the fire by closing doors. **Assure that the specimen receiving window in MSR is closed.**

5. Extinguish the fire if it is small by using a fire extinguisher. Note the type of fire and use the proper extinguisher. Remove the pin and spray the base of the fire.

6. Further instructions should be given by the fire department or the command center. They may say to go horizontally or vertically away from the fire. A designated individual may call extension x53333 to obtain information, if the general paging system is not working. **If possible, bring a cellular phone to notify Client Services or SMS if there is a localized fire or drill that will have an extended effect on the phone communications in Microbiology**

7. When employees gather, one individual should record the names of those present and those missing and their possible locations such as cafeteria, etc. The supervisor or fire department will use the list to find missing individuals. If ordered to move to a new location, a second roll call should be made.

B. Chemical Safety:

1. **Training**
   a. Each employee is informed about the nature of potentially hazardous chemicals in the department.
   b. Each employee is required to have annual safety training. The Chemical Hygiene Program consists of chemical safety, formaldehyde safety, blood borne pathogen information and personal protective equipment use.

2. **Chemical Information**
   a. Each chemical is labeled with the appropriate hazard warning of Health, Flammability, Reactivity and Other Hazards.
   b. An MSDS for each chemical is **available online via Pathology SharePoint site or at:**

      http://www.mdsxchange.com/english/index.cfm

3. **Storage**
   a. Flammable chemicals must be kept in a Flammable Safety Cabinet except for the quantity needed for daily use.
   b. Containers should be tightly closed, and stock rotated.
   c. Minimal quantities should be stocked. No more than 10 gallons of alcohol should be stored in the Media Prep area.
   d. Special requirements for safe storage should be observed. Refer to:

      http://www.safety.rochester.edu/ih/chpplan-2.html#chemical and
      http://www.safety.rochester.edu/ih/chpappendix-6.html

4. **Handling**
   a. Appropriate hand and body protection must be observed when using chemicals.
   b. Always add acid to water, not vice versa.
   c. Fume hoods should be used as required. Be aware of cumulative exposure potential.

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5. **Disposal**
   a. Each waste chemical must be properly labeled and placed in the area designated for this purpose. Segregate aqueous waste, organic solvents, halogenated solvents, oil, acids and bases from each other. Total volume must be indicated on the waste tag.
   b. Appropriate containers must be used to prevent leakage or corrosion.
   c. Do not let waste chemicals accumulate. Hazardous waste management will pick up and dispose of correctly tagged chemicals. Refer to:

      http://www.safety.rochester.edu/restricted/labwastetable.pdf

6. **Spills**
   a. Absorb in paper towels dispose of into the biohazardous waste can. Complete the process of handling small spills. (a few drops or milliliters)
   b. Medium sized chemical spills may be absorbed using the acid or base kits located in room 2-5327. Follow the manufacturers directions for use, then label as chemical waste and call EH&S for pickup.
   c. Larger spills must be handled by EH&S. Notify them immediately at x52341.
   d. Mercury spills require proper disposal by EH&S. Collect the droplets into a non-metal container using a piece of paper. (As of December 2005, Mercury is no longer used in the Microbiology laboratory.)

7. Methanol, acetone and formaldehyde pose specific hazards. Review MSDS before using these chemicals.

8. Chemicals must be inventoried annually. The carcinogenic potential of chemicals in use should be evaluated, and substitute products sought for those posing hazards. See:

   http://www.safety.rochester.edu/pdf/standops.pdf

9. Unneeded chemicals should be made available to other departments or discarded appropriately.

C. Equipment Operation
   1. **Fume hood** - use for all flammable or toxic chemical manipulation) located in Media Prep (**2**-5327) and Mycology (2-5537). Do not use for organism transfer.
      a. Check the blower operation before use.
      b. Place chemicals well back from the front of the hood.
      c. Use the baffles and sash appropriately.
      d. Do not leave chemicals in the hood for extended periods of time.

   2. **Autoclave** - located in (2-6431)
      a. Read directions prior to use.
      b. Do not open the door until the door unseal light is on, then stand back and open it just a bit to let residual steam escape.
      c. If the autoclave makes unusual noises or water appears on the floor, contact the Facilities (x 34567) and a supervisor immediately.

   3. **Electrical equipment**
      a. **All equipment/instrumentation is inspected, cataloged and marked as approved by Clinical Engineering (x55501) prior to be put into use.**

b. All equipment must be grounded.
c. Appropriate service intervals should be observed.

4. Pneumatic tube

a. Listen to make sure no incoming carrier is expected before removing other carriers from the basket.
b. Attend the basket frequently to avoid carriers falling to the floor.

5 .Departmental equipment safety instructions will be found in the operating procedures.

IV.ENVIRONMENTAL SAFETY

A. Packaging of Shipped Specimens

1. **Training requirements**

Biennial training must certify any employee that has any responsibility for any aspect of offsite shipment by commercial carrier. Records of this certification must be maintained in the employee record. This can be accomplished through EH&S website at:

http://www.safety.rochester.edu/restricted/ShippingBiologicalMaterials.html

2. **Regulating agencies**

a. DOT is the agency regulating ground transportation.
b. IATA regulates air transportation. Dry ice poses significant problems with air shipment.
c. There are some differences in the requirements of these agencies as well as differences in the willingness of commercial carriers to handle these shipments.

3. **Definitions**

a. Diagnostic specimens are patient samples for testing.
b. Infectious substances are generally subcultures of organisms. However patient samples that may have group 4 organisms are considered to be infectious. There is a list of these organisms in the regulations.

4. **Packaging systems**

c. For diagnostic packaging, triple layers are mandated, with some variation based on whether the specimen is liquid or solid.
d. Infectious substances have an additional labeling requirement, and the sending location must maintain standardized records of each shipment for a designated number of days.
e. All laboratory employees can access up to date transport and shipping information at www.medtraining.org A supervisor can give you a password to this website.

V.INFECTION PREVENTIONPREVENTION

Covered in the document *"Department Specific Infection Control Policy -Clinical Microbiology Laboratory"* and can be found at the following website

http://inside.mc.rochester.edu/sites/Pathology/Shared%20Documents/SMH%20Infection%20Control%20-%20Dept%20Specific%20Policies%20for%20Clin%20Micro%20-%20Mar%202%202010.pdf

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Relevant topics and locations within the Department Specific Infection Control Policy are:

A. Specimen Handling: Section V.
B. Specimen Disposal: Section V. B
C. Sharps Disposal: Section V. C
D. Culture Handling: Section VII.
E. Decontamination: Section VIII.
   Special Note: Decontamination of Non-disposable Contaminated Material can be found in Section VIII. 6
F. Culture Disposal: Section IX.
G. Environmental Cleaning: Section XIII.
H. Special Protocols for Handling Emergent Pathogens
   1. CJD: Section X.
   2. SARS, Avian Flu: Section V, 8 b & c
   3. Bioterrorism Organisms: Section XIV.

References:
Clinical Laboratory Safety: Approved Guideline, September 1996, College of American Pathologists

Laboratory General Checklist 12/29/04 College of American Pathologists

Protection of Laboratory Workers from Occupationally Acquired Infections; Approved Guideline- Second Edition, NCCLS (CLSI), 2001

Clinical Laboratory Waste Management: *Approved Guideline-* Second Edition, NCCLS (CLSI) 2002

Packaging and Shipping Diagnostic and Clinical Specimens, Infectious Substances, and Biological Agents 11/18/2005 American Society for Microbiology

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