BioSide Lines

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Newsletter of the Office of Biological Safety - Environment, Health & Safety, UW-Madison
www.fpm.wisc.edu/biosafety

Proper Sharps Handling and Disposal – A Reminder

Medical sharps are narrowly defined in Wisconsin as devices designed to cut or penetrate skin, such as razor blades, scalpels, and needles. Other materials, such as fragile glass, have the ability to cut skin, but are not included in this category. Medical sharps require special precautions for handling and disposal to prevent accidents. Take a closer look at a typical container designed for discarding medical sharps. The State's waste disposal regulations specify certain standards that must be met by these containers. They must be closable, puncture resistant, leakproof, and appropriately labeled (e.g., biohazard, sharps, infectious waste).

A standard feature of commercially available sharps containers is a lid that snaps tightly to the base. The purpose of the lid is to prevent retrieval of the medical sharps device after it is placed in the container. These containers always should be used with the lid in place.

Additional important practices for safe handling of medical sharps include the following.

- A medical sharp never should be left on a counter unattended. If you find a needle, use forceps or similar tool to pick it up.
- Never bend or break a needle. Never force sharps into a container.
- The size of the container must be appropriate for the intended use; never select a box that cannot accommodate the volume or size of the medical sharps waste generated.
- The medical sharps device should always be discarded directly after use into the disposal container.
- Avoid passing a sharp from hand to hand.
- Re-use and recapping rarely are allowed. Plan ahead if re-use of a medical sharp is necessary; try to avoid recapping and handle it in a manner that prevents accidents.

Seal the container when the contents reach the "full" mark and dispose of it as special waste. At UW-Madison, these boxes are picked up by MERI (Madison Environmental Resourcing, Inc.), a nonprofit company that properly disposes of medical waste.

Cell Disruption

A common procedure in biological research labs is cell lysis, a process for breaking open cells to release and make available for study the intracellular components. Numerous sources provide guidance on selecting the preferred method for a particular cell type and desired subcellular fraction to be recovered. For cultured mammalian cells, lysis may be done simply by altering the ionic strength (hypotonic shock) of the culture media, causing the cells to swell and burst. Other cells, such as yeast and fungi, can be very difficult to disrupt because they have tough cell walls, and require rigorous mechanical force. The guidance documents typically lack important information on containment. Generation of aerosols becomes a significant concern any time vigorous force is applied to a solution.

Mechanical cell disruption can be accomplished by a variety of means. The following methods all have the potential to release aerosols.

- Mechanical agitation and grinding, e.g., ball mills, mortar and pestle, vortexing, sometimes with added glass or ceramic beads.
- Applying ultrasound (sonicating) by placing a probe in the sample that oscillates with high frequency.
- Homogenizing or blending (rotor-stator processors).
- "Cell bomb" method applies high pressure (ca. 25,000 psi) using nitrogen or other inert gas to the sample, which then is rapidly released.
- French press and valve-type processors, and high shear forces are produced as the cells are forced through a valve.

Containment must be provided when such procedures are done with hazardous materials such as cells and tissues derived from humans (primary and established) or nonhuman primates, cultures of pathogens or materials infected with pathogens, and environmental samples containing unknown or toxic chemicals or pathogens.

Placing the equipment in a fume hood or biological safety cabinet is an acceptable way to accomplish containment. A fume hood is preferred if the equipment generates a high level of vibration (can damage filter seal) or air current (disrupts laminar air flow and compromises containment). Avoid loosely fitting covers; whenever possible, select containers with seals or gaskets. Before using the equipment, perform a trial run with nonhazardous materials and check for leaks. When the process is complete allow aerosols to settle before opening the container. Use hearing protection if the equipment produces high noise levels. And finally, at the end of the work session, decontaminate the equipment and the work area with an appropriate disinfectant.

Automating Biosafety Protocol Procedures

The current system for writing a biosafety protocol and keeping it up-to-date involves significant bureaucratic inefficiencies. The Office of Biological Safety shares the frustrations with investigators who are required to submit these forms. The process requires redundant data entry. Investigators repetitively enter information into documents at their computers, send it to OBS, and we re-enter the information into our database. Communications (paper and email) sometimes are misplaced, yet investigators depend on this system for compliance assurances and release of awards. OBS has recently received approval to move the biosafety protocol into a web-based portal that holds promise for reducing the administrative burdens and improving communications.

While the new system will improve protocol management by OBS, the gains in efficiencies will be especially valuable for investigators and for ancillary groups who rely on this data, including individuals who seek information regarding appropriate containment procedures for lab activities and animal handling, and for grants administrators. Improved coordination through direct electronic links will show whether relevant assurances have been issued. Core information about personnel, such as full name, title, address, and contact information, will be drawn from institutional records.

Information will be entered within the protocol portal once, and relevant sections then can be amended as needed. The electronic forms will have fields that request information similar to the current paper protocol template. Imbedded instructions will clarify the questions, saving significant time to complete a submission. OBS will communicate with the investigators directly about protocol specifics, e.g., need for revisions, by placing electronic notes directly on the relevant section.

Click Commerce has been selected as the vendor for developing the biosafety protocol portal. This vendor has the critical elements to implement the protocol review and committee management processes, such as ability to assign relevant roles and read/write permissions. Their software has also been selected by the Graduate School for managing submissions for the animal care committees and for SMPH Institutional Review Board (human subjects).

We anticipate completing the biosafety protocol web portal by summer 2008. Implementation will use a phased approach, starting with new protocols and 3-year updates. An important part of the development process is a thorough test of every aspect of the system. We will seek input from users to ensure this new system meets their needs and provide training in several formats.

Precautions for Shared Equipment and Facilities

Many departments and research buildings are increasingly sharing equipment and facilities. Hazard communication in such circumstances is essential. It is important to let everyone using the shared equipment/spaces know what materials are being handled and what precautions are needed. Good communication leads to collegiality; lack of communication can result in mistrust and safety problems. Operation of shared facilities needs to be managed to optimize efficiency and safety.

Following are some safety considerations that arise with facilities and equipment that are used by a number of individuals:

- Mixed hazard levels – When materials handled are of varied types that require different precautions (e.g., biosafety level 1 (BSL-1) and BSL-2, biological and chemical hazards), procedures must be instituted that protect against all hazards present. Thus for mixed BSL-1 and BSL-2 work, BSL-2 precautions and containment are necessary.
- Hazard signage – In situations where there may be less direct communication and multiple parties involved, breakdowns in communication can occur more frequently. Hazard signage becomes especially important to communicate information on current materials being used and current precautions necessary for using the joint equipment and facilities. Signage should be posted on the door and locally (e.g., equipment such as centrifuges, incubators, etc.).
- Training – Additional instruction beyond the laboratory-specific training is necessary to cover what other users are handling and what standard precautions should be employed. Thus, for people who are accustomed to using BSL-1 procedures, an understanding of BSL-2 precautions is needed. The circumstances are not static and the training should be ongoing. OBS and the EH&S Department can provide basic safety training, but the day-to-day safety information and concerns should be covered in regular meetings of the people involved.
- Awareness of Signs and Symptoms of Exposure – The possibility of lab-acquired infections and injuries needs to be recognized. Material safety data sheets (MSDSs) or equivalent information on each hazardous material present must be readily available.
- Disinfection – All microbes including pathogens present on surfaces need to be effectively inactivated prior to disposal. Rather than switching between different disinfectants depending on the various agents handled, it might be advisable to set a policy for routine use of a broad-range efficacy disinfectant. The disinfectant and other cleaning and spill supplies should be readily available.
- Precautions for aerosol-transmitted pathogens and aerosol-generating activities – Appropriate containment and safety precautions to avoid exposure to aerosolized hazards need to be implemented.
- Emergency Preparedness – Plans for what to do in case of exposures or spills should be devised and put in place with training that includes exposure response plans and spill protocols.
- Equipment and Room Maintenance – Individuals should be designated who will coordinate routine maintenance and repair of shared equipment and regular cleanup of shared facilities.
- Transportation Precautions – Safety procedures for transporting hazardous materials to and from the shared facilities should be planned and put into practice.

The bottom line is that the operation of shared facilities needs to be coordinated for efficient use of the space and more importantly, to prevent safety problems from occurring. Each unit (department, building, etc.) affected should decide how best to govern how the facility is shared to ensure that appropriate safety precautions are in place. One option is to appoint a safety coordinator. Another option is to have detailed standard operating procedures (SOPs) on “the rules” for joint facilities with oversight by a safety committee. A fundamental goal is ongoing communication and training so that any issues that do arise can be addressed promptly and effectively.

The Importance of Hazard Signage

The purpose of hazard communication is to let anyone potentially affected know what hazards may be present and what precautions should be used to protect against those hazards. The necessity of communicating information to people directly handling hazardous materials is clear. It is also our responsibility to communicate to people who may be indirectly affected such as animal care workers, custodians, maintenance workers, co-users of shared space and equipment, and even people in offices next door to a laboratory using hazardous materials – as part of a "Good Neighbor" policy.

Hazard communication can be accomplished by various means. Ongoing training that gives hazard information and states precautions to be used is essential. Another major route of hazard communication is use of signage. Examples of hazard signage include door signs, local signage such as stickers (e.g., biohazard, chemical hazard, etc.) on equipment that is potentially contaminated, and cage cards on animal housing. Signage needs to include identity and hazard characteristics of the agent, precautions to be used, and contact information and must be specific to the type of hazard (biological, chemical, radiation) involved.

Recently, new hazard signage guidance was given in the 5th edition of Biosafety in Microbiological and Biomedical Laboratories (BMBL) that indicates that the name of the agent (pathogen) does not need to be given on biohazard door signs when security is a concern. This appears to conflict with directives from the NIH Guidelines for Research Involving Recombinant DNA Molecules which dictate that the agent information must be posted for work subject to the NIH Guidelines. The UW-Madison Institutional Biosafety Committee (IBC) set the following policy: "Agent names will be identified on biohazard door signs." Both safety and security are vital but safety (hazard communication in this case) takes precedence.

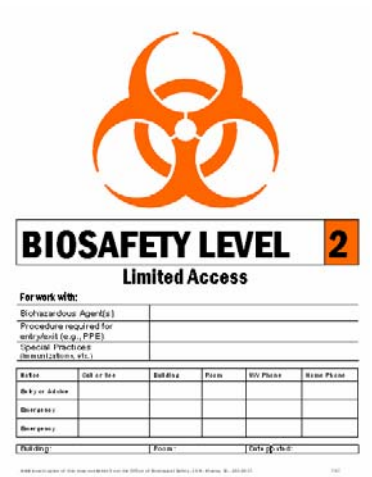
Hazard signage is especially important in cases where there may be limited direct communication (e.g., lab to animal care workers, joint users of shared facilities and equipment, individuals with English as a second language, etc). Basic safety training is also critical, but cannot provide clear up-to-date information on what hazards may be present at any given moment. This function is fulfilled by signage. Signage is therefore a key tool in hazard communication and in prevention of exposures and injuries.

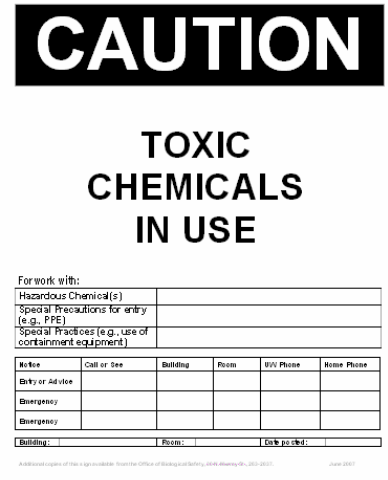
Examples of Hazard Symbols

Radioactive Material

Carcinogen/Mutagen

Biohazard





Door signs for hazardous chemicals and biosafety level 2, communicating that access is limited to authorized personnel.

Preparing Lab Equipment for Service, Transfer or Decommissioning

Laboratory equipment is commonly taken out of service for repairs, transfer to a different lab, lab close-out, storage, or disposal. Regardless of the reason a piece of equipment is removed from service, either temporarily or permanently, it must be properly cleaned and decontaminated to protect the environment and workers who may handle or service it. Ensuring that equipment is thoroughly decontaminated is the responsibility of the Principal Investigator or the designated lab supervisor. After decontamination, all hazard signage should be removed.

All laboratory equipment used to process/store biological material is included in these procedures, particularly freezers, refrigerators, incubators, biological safety cabinets (BSCs), water baths, centrifuges, PCR machines, walk-in temperature controlled rooms, etc. Contamination includes biohazardous materials, biological samples, radioisotopes, hazardous chemicals, and organic materials that can support the growth of microorganisms.

Procedures for Decontamination

- Assess the type of contamination that may be present. This may require interviewing several individuals including those in other labs sharing a piece of equipment.
- Remove all contents. Treat unlabeled containers as potentially hazardous.
- Contact Radiation Safety for assistance with radioisotope decontamination, and Chemical Safety for assistance if hazardous chemicals are of concern (265-5000).
- Wearing gloves, sanitize all surfaces with a broadly efficacious disinfectant. If a bleach solution is used for equipment that will be returned to service, rinse surfaces after 10 minutes contact time as bleach is corrosive.
- Special consideration must be taken when selecting a chemical disinfectant to clean a walk-in temperature controlled room as these areas lack the ventilation of a normal lab.

Equipment Needing Repair

- Contact the service company to determine if they require written verification of decontamination before they will service equipment. Certifying that equipment has been properly decontaminated is the responsibility of the lab.
- Consult the equipment manual for cleaning/decontamination procedures, policies, and chemical compatibility.
- If it is not possible to decontaminate the equipment, it must be packaged to prevent exposure, and labeled to communicate the potential hazards present.

When a service person (University or outside contractor) needs to work on lab equipment:

- Prepare a working area which is clean. Clear space around the equipment for easy access.
- Remove any hazardous items stored near, on, or under the equipment.
- Inform the individual of potential hazards in the laboratory.
- Provide personal protective equipment to service personnel, if necessary.

Lab personnel cannot decontaminate the inner plenum of a BSC. Prior to decommissioning or repair, Environmental Health Program (262-1809) will gas decontaminate it. For decommissioning, EHP will then disassemble it in preparation for pick up by UW Waste and Recycling (262-1324). If a BSC needs service or will be transferred, EHP will repair it after decontamination, replace HEPA filters if necessary, and recertify it.

Safety Products/New Gadgets - Disinfection Mats

Entry and exit precautions for some laboratory and animal facilities require methods to prevent tracking of contamination by shoes. The preferred option is often use of disposable booties, but this method is not feasible in some situations.

Another option that may be adequate in some circumstances is stepping on disinfection mats or through footbaths. The main drawback of disinfection mats and footbaths is difficulty in ensuring sufficient contact time with the disinfectant. Another key variable is choosing an effective disinfectant for the organisms present or potentially present. Using a broad-range efficacy disinfectant such as Virkon S or an iodophor is recommended.

If disinfection mats meet your particular needs, there are a number of different companies that make various types. Two examples are Gempler's (www.gemplers.com/disinfection) and Food Safety Source (www.foodsafetysource.com/store/index.cfm – look under Maintenance/Supply>>Sanitation Specialties).

Classes Offered by OBS

Shipping Infectious Substance and Other Biological Materials; Packaging Workshop

- **Class: Tuesday January 15, 2008** 1:30 – 4:00 p.m. at Union South
- **Optional Workshop: Tuesday January 15, 2008** 4:00 – 5:00 p.m. at Union South
- A web training module for shipping dry ice as the only dangerous good is now available.

Basic Biosafety

- **Wednesday January 30, 2008** 1:30 – 4:00 p.m. at 6201 Microbial Sciences Building

Advanced Biosafety

- **Wednesday February 13, 2008** 9:00 - 11:30 a.m. at 6201 Microbial Sciences Building

Registration is required for these courses.
Contact OBS at 263-2037 or biosafety@fpm.wisc.edu for more detailed information.

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