BioSide Lines

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The Newsletter of the Office of Biological Safety, UW-Madison Safety Department
www.fpm.wisc.edu/biosafety

Streamlined Process for Grants and Awards

Individuals who handle the administrative aspects of maintaining the biosafety protocol should pay particular attention to the following information. We now offer a streamlined process that eliminates entering funding information into the Core Registration Information section of the biosafety protocol template.

Sources of active funding must be associated with the biosafety protocol when it is submitted initially and again when it is renewed. Proposals may need to be added to a registered protocol at the time of submission to the granting agency or, more commonly, in advance of release of the award.

In the new procedure, an annotated list of awards from the Research and Sponsored Programs (RSP) Data Queries website, *www.rsp.wisc.edu/queries.html*, is attached to the protocol. Pending awards also may be associated with the protocol in this manner using the Pre-Award Lookup System (PALS).

The RSP website allows the search results to be printed directly or to be exported to a Microsoft Excel spreadsheet, which then can be submitted as a hardcopy or an electronic attachment to the protocol. The necessary data fields are the Agency and/or Donor Description, Project Description, and Account Number. Be sure to clearly indicate the relevant awards if some of the listed awards do not pertain to the protocol.

Of course, we will continue to accept awards entered on the protocol form. Feel free to contact OBS with questions and comments about our protocol process. We always welcome suggestions to improve our procedures.

The Dirty Workplace

Many of us dedicate our professional lives to researching human, animal, or plant pathogens. The work has its dangers and we take proper work precautions by utilizing engineering controls like biosafety cabinets and using personal protective equipment such as disposable gloves, lab coats and protective eyewear. People may worry about contaminants on the lab bench, but less thought is given to potential routes of transmission offered by work surfaces and equipment. These days we routinely find desks, phones, and computer keyboards in the lab.
Recently, Charles Gerba (University of Arizona), William Rutala (North Carolina Health Care Systems) and others performed studies of microbial contaminants on surfaces in offices and hospitals*. The studies varied in approach but supported each others' conclusions and the results are also relevant to the research laboratory.

In the Arizona study, 12 surfaces common to a typical office were tested for pathogenic organisms. The top 5 highest contaminated areas were the telephone, desktop, water fountain handle, microwave door handle, and computer keyboard. The phone and the desktop had 400 times more pathogenic organisms than a toilet seat, which surprisingly had the lowest amount of pathogens of the 12 surfaces tested. Tests during various times of the day showed an increase in the number of pathogens present as the morning progressed. The largest number of pathogens was present right after lunch time.

Another investigation with feline calicivirus (a surrogate for the norovirus pathogen) found the virus could survive on some surfaces (e.g., telephones) for up to 3 days after inoculation. This study illustrates that pathogen viability for extended periods is of concern.

In the office environment, common organisms isolated were *E. coli*, *Klebsiella pneumonia*, *Streptococcus*, *Salmonella*, and *Staphylococcus aureus*. In the hospital environment, *S. aureus* and S. *epidermidis*, diphtheroids, *Micrococcus*, and *Pseudomonas* were isolated from communal phones and keyboards. It is reasonable to assume that work surfaces in the research laboratory may be similarly contaminated. In fact, some laboratories work with concentrated pathogens and it becomes even more important to employ appropriate precautions as outlined below.

Ways to combat the spread of pathogens in the workplace include:

- Clean work areas routinely with a cloth containing disinfectant.
- Remove personal protection like gloves and wash your hands before answering a phone, typing on a keyboard, or opening drawers, refrigerators, doors, etc.
- Wash your hands periodically during the day and before you eat.
- Do not eat, drink, or apply makeup at your workstation.
- Sick workers should stay home to avoid transmitting pathogens to co-workers.

Any type of cleaning is better than none. Even wiping a surface with a damp cloth can reduce the germ content up to 95%, but it is best to use a disinfectant with demonstrated efficacy.

We at OBS would like you to stay healthy so please consider the work station as a source of germs that can get you sick. As Dr. Gerba declared, “Desks are really bacteria cafeterias.” Please maintain cleanliness in shared areas for your good health and the health of your co-workers.

References:

Rutala, White, Gergen, Weber, Bacterial Contamination of Keyboards: Efficacy and Functional Impact of Disinfectants, Infection Control and Epidemiology, April 2006, Vol. 27, No. 4; http://www.journals.uchicago.edu/ICHE/journal/issues/v27n4/2005161/2005161.web.pdf

First In-Office Study Dishes the Dirt on Desks, Market Wire, April 15, 2002; http://www.marketwire.com/mw/release_html_b1?release_id=40596

Talkin’ trash

Your active participation is required to implement a small but significant change in the campus’ waste handling. The Safety Department in cooperation with the custodial management team has developed a simple means to identify trash from laboratories that custodians may safely handle. By affixing the green “OK To Trash” label, you will clearly communicate to the custodial staff that the waste is properly packaged for routine disposal. Custodians will soon be instructed not to handle this waste unless the label is affixed.

Affix the “OK to Trash” label to the following types of waste:

- Biological waste that has been chemically inactivated (e.g., bleach treated) or autoclaved, including bags marked with the biohazard symbol and hard plastic containers in which pipettes and pipette tips were collected. Use of this label replaces the previous instruction to deface the biohazard label after decontamination.
- Containers of fragile glass and other materials that have the potential to cause harm but are not items designed to cut or puncture skin (medical sharps). Non-medical sharps must be correctly packaged and sealed before affixing the label.

The green labels have spaces for identification of a room and an indivi-dual for the rare occasion when we need to trace a container to its origins.

Labels will be distributed this summer to buildings across campus with the assistance of building managers and departmental administrators. They are provided at no charge, although the minimal cost may need to be recovered in the future. Contact the Safety Department if you need labels (262-8769).

The “Sharps and Laboratory Glass Disposal” poster has been revised to illustrate use of the “OK To Trash” label. The updated poster can be printed from the Safety Department website or requested by calling the Safety Department (262-8769).

The procedure for handling containers of medical sharps is unchanged. They are not allowed in normal trash under any circumstances. They must be labeled with the biohazard symbol and disposed of via the MERI (Madison Energy Recovery, Inc.) waste stream in compliance with state regulations.
Never affix the green label to a container that has a medical sharp in it. It is important to segregate medical sharps from other waste because the MERI waste stream should be limited to waste that cannot be managed otherwise.

With the exception of a few west campus facilities of the medical school, hospital, and clinics, custodians do not handle medical sharps and infectious waste. For most buildings, it is the responsibility of laboratory personnel to transport the sharps container to the MERI collection container. Questions about the MERI collection container should be directed to the building manager.

Juggling Precautions for Mixed Hazards

Life is not simple! For example, not only do many laboratories and animal facilities handle different types of hazardous materials but some experimental procedures call for simultaneous handling of different types of hazards. What are the best ways to protect yourself, others, and the environment from mixed hazards?

Some precautions are very similar for different types of hazards. For instance, standard personal protective equipment (PPE) for biological, chemical, and radioactive materials is gloves, lab coats, and protective eyewear though the specific types of PPE needs to be tailored to the type of hazard. This article does not attempt to detail all the precautions to be used for handling hazardous materials, but instead focuses on developing precautions that protect against mixed hazards.

When treating cells or animals with hazardous chemicals, a risk assessment is necessary that evaluates a number of factors including: hazardous nature of the chemical, volatility, potential for generating aerosols, route of administration, doses, metabolism, hazardous nature of the metabolites, type of animal treated, number of animals to be treated, potential infectivity of cells or animals, quantities of the chemical or hazardous metabolites present in excreta, etc.

One recurring theme in the examples below is that increased precautions are merited for highly toxic and/or volatile chemicals. Another common thread regards use of respiratory protection in lieu of containment equipment for situations where containment is not feasible (e.g., treating large animals with hazardous materials). Bill Deppen (Safety Department Industrial Hygienist; 262-9179) can provide guidance on appropriate respiratory protection.

Following are 5 examples of situations that present challenges for handling mixed biological and chemical hazards with suggested methods to best guard against all hazards present. We can offer only general guidelines because a risk assessment of the specific materials and procedures needs to be done for each situation.

Scenario 1: You are administering hazardous chemicals to potentially-infectious cells (e.g., human or Old World monkey cell lines). Optimal containment for hazardous chemicals is a fume hood while optimal containment for cell lines is a biosafety cabinet (BSC). What containment should be used that protects against both chemical and biological hazards and also ensures that sterile conditions are maintained?

- Use fume hoods for treating cells/tissues where sterility is not a concern for subsequent steps (e.g., cells intended for isolation of DNA, fixing tissues).
- Use a BSC that provides adequate ventilation for the type of chemical: BSCs that recirculate some air to the lab (e.g., Class II-A2) are usually adequate for small quantities of many nonvolatile chemicals while BSCs that vent to the outside of the building (e.g., Class I, II-A2 canopy exhaust connected, II-B1, or II-B2) should be used for hazardous chemicals that are volatile and/or highly toxic.Class II-B1 BSCs are preferred by the UW as they provide high containment and maximum flexibility.

- If preparation of stock solutions of hazardous chemicals in a fume hood is not desirable because sterile conditions are needed: consider purchasing the chemical already in solution, purchasing a small quantity in a septum vial so solvent can be injected through the septum in a BSC, or sterile filtering the solution after preparing it in the fume hood.

Scenario 2: Your lab plans to add a project that involves administration of hazardous chemicals to animals and you need to decide whether containment equipment should be used for the administration step. Some guidance follows:

- Aerosols are generated when loading syringes and preparing feed that contains hazardous chemicals so these steps should be done in a fume hood if possible.
- Administration of hazardous chemicals to small animals should be done in containment (e.g., a fume hood) when feasible. Use of respiratory protection may be appropriate for administration of hazardous chemicals to large animals, especially if the chemical is highly toxic and/or volatile.
- When choosing route of administration, keep in mind that different hazards are posed depending on route of administration. Hazardous chemicals that are administered in food/water or topically are more difficult to contain than chemicals that are injected.
- It may be possible to keep small animals in the fume hood for a sufficient time after administration of a hazardous chemical to minimize exposures to chemical hazards. This is especially important for hazardous chemicals that are administered topically such as DMBA (7,12-dimethylbenz(a)anthracene) or administration of highly toxic chemicals such as MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine).

Scenario 3: You know that necropsy of animals can generate aerosols and that doing necropsies in containment is recommended for small animals that are infectious or potentially-infectious. What you want to find out is whether necropsies of animals that have been administered hazardous chemicals should also be done in containment equipment.

Necropsy of animals that are not potentially-infectious but that have been administered hazardous chemicals (or handling of blood/tissues from such animals) does not generally present a high aerosolization risk. By the time necropsy is done, sufficient time has usually passed such that hazardous chemicals have been metabolized and excreted. This may not always be the case, however.

Some chemicals and harmful metabolites can bioaccumulate in specific tissues. Situations that merit necropsy of chemically-treated animals in containment (or alternatively, use of respiratory protection) include volatile or highly-toxic chemicals or metabolites that bioaccumulate (e.g., dioxins bioaccumulate in adipose tissue).

Scenario 4: Changing cages/bedding can generate aerosols. Doing cage changes in containment (or alternatively, use of respiratory protection) is advised if hazardous material (biological, chemical, or radioactive) is present in the wastes at sufficient quantities to merit

concern. You want some guidance on how to advise animal care staff regarding use of containment equipment for cage/bedding changes of animals that have been administered hazardous chemicals.

The determination should be based on characteristics of the animal and chemical involved. Some hazardous chemicals are not metabolized extensively so that high quantities of unchanged chemical are present in wastes/bedding (e.g., streptozotocin) while metabolites of some hazardous chemicals are themselves hazardous (e.g., one metabolite of cyclophosphamide is acrolein which is toxic, volatile, bioaccumulates in tissues such as kidneys, and is excreted in urine).

Scenario 5: You are charged with the task of determining appropriate disinfection/disposal routes for animal wastes/bedding that contain both biological and chemical hazards. Wastes/bedding from small animals that have been administered human pathogens or potentially-infectious material such as human cell lines are commonly disinfected by autoclaving. This may not be advisable, however, if the wastes/bedding also contain hazardous chemicals.

Factors that are important to consider include: whether the chemical is toxic in small quantities, volatility of the chemical and its metabolites, doses administered, type and number of animals treated, and whether a high amount of unmetabolized chemical or harmful metabolites are present in wastes.

A chemical may be available that both disinfects the biological material and inactivates the hazardous chemical, or special disposal through the Safety Department may be warranted. Bleach, for example, is a disinfectant that inactivates some hazardous chemicals. UW Chemical Safety in conjunction with the Office of Biological Safety can help you determine the best decontamination and disposal routes for mixed hazard wastes.

The above examples illustrate some of the complications that arise when mixed hazards are handled. Contact the Safety Department for guidance in tailoring precautions to your specific circumstances.

Safety Products/Gadgets Corner NEW

Where can I get that nifty safety product mentioned by an OBS staff person at a recent lab visit? OBS often receives requests for such information and plans to supply it in this corner of the BioSide Lines newsletter. This information is provided as a service to UW staff and students and is not intended as endorsements of particular products or specific vendors; alternative products and vendors are usually available.

Safety glasses: Willson Z87+ safety glasses are inexpensive and appropriate for many (but not all) activities in the laboratory. Make sure to choose safety glasses appropriate for your particular application. Available from Fisher Scientific (www.fishersci.com) under Willson A400 series (catalog # 19-053-701A; $1.97/pr, UW price through MDS).

Virkon S: Peroxygen disinfectants such as Virkon S have broad-range efficacy. An alternative broad-range efficacy disinfectant is bleach which is less expensive but may not be appropriate for some applications. More information on Virkon S can be obtained from Dupont Animal Health Solutions (http://www.antecint.co.uk/main/virkons.htm). Available from Ivesco (Wisconsin contact # 888-891-3110; UW-Madison price quote is $49.15/10 lb. drum).

HEPA (high efficiency particulate air) in-line vacuum filters: HEPA filters should be used in addition to vacuum traps to prevent contamination of vacuum systems (see January 2003 BioSide Lines article) and can also be used in tubing that connects CO_2 tanks to incubators to prevent contamination (e.g., mold). Choose a filter appropriate for your uses. Available from Fisher Scientific (www.fishersci.com) under Whatman filters (catalog # 09-744-79, $61.94/pack of 10, UW price through MDS).

Advanced Biosafety Training

This class builds on the Basic Biosafety class and focuses on biosafety level 2 (BSL-2) precautions and containment in lab and animal research. Topics include risk assessment, proper use of containment equipment and personal protective equipment, and disinfection procedures for various types of Risk Group 2 pathogens (viruses, bacteria, fungi, parasites, prions). A major goal of the class is to provide safety information on commonly-used viral vectors since viral vectors are becoming a widespread research tool. The Basic Biosafety class should be taken prior to the Advanced Biosafety class either by attending the Basic Biosafety class on August 8th or by reviewing the training available at the OBS website.

Tuesday, September 19, 2006
Union South 1:00-3:30 p.m.

Registration is required. Contact OBS at 263-2037 or biosafety@fpm.wisc.edu.

OBS Training via Internet

Online training offered by OBS includes re-certification for Shipping Infectious Substance and Other Biological Materials, Basic Biosafety, and Biosafety Cabinet Training.

Shipping Infectious Substance and Other Biological Materials

The Office of Biological Safety will provide training and certification for shipping Infectious Substance and other biological materials, with a focus on safety and regulatory compliance for research laboratories. The Department of Transportation requires that people involved in shipping hazardous materials in commerce be trained and certified in proper handling of these materials.

Thursday, July 27, 2006
Union South 1:00 – 3:30 p.m.
Refreshments will be served.

Registration is required. Contact OBS at 263-2037 or biosafety@fpm.wisc.edu.

All staff are welcome to attend this class for initial training or re-certification. Computer-based training is available only for those who attended the class for their initial certification.

HazMat Packaging Workshop

An optional hands-on HazMat packaging workshop will be offered after the regular HazMat Shipping class. Trainees will decide how example materials should be shipped (e.g., Infectious substance; Biological substance, category B; Exempt patient specimens) and then will package the surrogate materials in appropriate containers. Feedback and tips on packaging will be provided. People with current HazMat certification may register for the workshop only.

Thursday, July 27, 2006
Union South 3:30-4:30 pm

Basic Biosafety Class Offered

This class will give an overview of basic biological safety. Topics include biosafety levels and biohazard containment, good microbiological techniques, waste disposal, risk assessment, and emergency preparedness. It is intended primarily for students and staff who are new to this institution and/or new to working with biological materials in a laboratory. Everyone is welcome to attend.

Tuesday, August 8, 2006
Health Sciences Learning Center, Room 1345
1:00 – 3:30 p.m.

Registration is required. Contact OBS at 263-2037 or biosafety@fpm.wisc.edu.

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