Biological Safety Management

Information Sheet – Biological Hazard Management

Purpose

The purpose of this information sheet is to provide information and guidance to workers and supervisors on specific information related to biological hazard management. This information sheet should be read in conjunction with the Biological Safety Management chapter and Hazard Management chapter of the HSW Handbook.

Q1 How do I identify and classify biological hazards?

When identifying the hazards consider the whole task from setting up, conducting the activity, cleaning up and disposal. Also consider the hazards associated with a failure in the process (e.g. a bottle breaks while transporting).

- Refer to AS/NZS 2243.3 2010 Safety in Laboratories Part 3 Microbiological safety and containment for examples of microorganisms according to risk groups 2, 3 and 4 (note that the higher the level of risk the higher the required containment level).
- In addition the Public Health Agency of Canada has produced a database of safety data sheet (SDS) for people working with infectious microorganisms. These SDSs contain health hazard information such as infectious dose, viability (including decontamination), medical information, laboratory hazards, recommended precautions, handling information and spill procedures. The database is located here.

Please note: All blood, blood products, other body fluids and associated materials should be regarded as infectious and at all times handled as if they were infected with blood-borne pathogens.

Q2 What factors need to be considered when assessing hazards associated with biological materials?

A task-based risk assessment is preferred when using biological materials as it takes into account the process and the workplace, which is important when considering how a person is exposed. The risk assessment must be documented and kept in a place where it can be retrieved when requested.

Consider the following factors when assessing the risks:

- frequency of contact with biological material;
- all possible transmission routes;
- factors contributing to exposure;
- workplace layout and its contribution to risk;
- decontamination and waste management practices and their contribution to risk;
- the level of training required to perform the task safely;
- suitability of equipment for tasks;
- available control measures; and
- contingency requirements.

Follow the process in the Hazard Management chapter of the HSW Handbook.

Q3 What control measures are relevant for biological hazards?

Where a risk assessment has identified there is a risk to health arising from work with biological material, it is necessary for the area concerned to minimise the risk by controlling exposure. Refer to the Hazard Management chapter of the HSW Handbook. See AS/NZS 2243.3 2010 Safety in Laboratories Part 3 Microbiological safety and containment for information on work practices for the Physical Containment requirements of the laboratory.
Below are some brief examples of control measures that could be implemented.

RISK CONTROL MEASURES (Biological examples)

Hierarchy of control		Examples of biological control measures
Level 1	**Elimination**	• Is there a safer process, which eliminates the need to use such hazardous biological material?
Level 2	**Substitution**	• Is there another biological material which is a safer alternative? e.g substitute non-screened with screened blood products. • Is there a safer alternative for fixing or preserving specimens? e.g. formalin substituted with Histochoice or Carosafe.
	Isolation/ Engineering	• Use a biological safety cabinet when there is a significant risk of aerosols being produced (see question 4 of this information sheet for general information on Laminar Flow and Biosafety Cabinets). ○ A laminar flow does not provide operator protection and should only be used for material in Risk Group (RG) 1. ○ A biosafety cabinet class 1 should be used for material in Risk Group (RG) 2. ○ A biosafety cabinet class 2 should be used for material in Risk Group (RG) 2 or 3. ○ A biosafety cabinet class 3 should be used for material in Risk Group (RG) 4. • Centrifuges with sealed rotors or safety cups for spinning unscreened materials, large volumes or high concentrations of infectious material. • Mechanical pipetting devices (see question 5 of this information sheet for more information on pipettes). • Autoclaves (see Information Sheet Autoclaves) • Immunisation (see Immunisation/Vaccination) refer to the Information sheet Vaccinations.
Level 3	**Administrative**	• Provision of information, training and instruction. • Safe Operating Procedures, work practices relating to the physical containment requirements of the lab such as not re-sheathing needles after use or using Standard Precautions when handling diagnostic samples or patients. • Emergency and waste management plans. • Laboratory and after hours rules.
Level 4	**Personal Protective Equipment**	• Gowns, gloves, safety glasses, face shields, closed footwear etc. (Please note: contact lenses are NOT a form of eye protection. For more information refer to the Information Sheet Personal Protective Equipment

Q4 What general information should I consider when working with laminar flow cabinets and biosafety cabinets and controlling biological hazards?

Laminar flow cabinets (clean benches)

These are better referred to as clean benches and are only for the handling of low risk microorganisms or for providing a clean environment for manipulating solutions. Air that has passed through a high efficiency particulate air (HEPA) filter is passed over the work area and blown at the operator. Hence **they do not offer** any operator protection.

Biosafety cabinets

All of these cabinets provide operator protection as air from the room is drawn into them and then filtered through a HEPA filter before being discharged back into the room.
Class I cabinets do not provide any sample protection as the room air passes from the room then over the sample before filtration.
Class II and Class III cabinets provide both operator and sample protection. These cabinets provide a form of primary barrier that operates by limiting the spread of aerosols away from the source of infection.

Continued

Q4 What general information should I consider when working with laminar flow cabinets and biosafety cabinets and controlling biological hazards? Continued

UV lamps

The biosafety cabinet may be fitted with germicidal ultraviolet (UV) lamps in the work zone. UV can be a useful adjunct to surface cleaning procedures, but should not be seen as a replacement for good cleaning technique. Exposure to UV radiation may cause damage and sunburn. Ensure appropriate controls are in place to avoid exposure.

Q5 What general information should I consider when working with pipettes and controlling biological hazards?

Preventing injuries:

- Mechanical or electronic pipettors must be used for all pipetting tasks; never pipette by mouth.
- Because pipette tips can pierce a biohazard bag, they should be treated as sharps and disposed of in a sharps container.

Preventing aerosol production:

The action of pipetting can form aerosols:

- Pipette slowly, particularly when using pipettes for mixing, to avoid aspirating aerosol or liquid into the pipette body.
- Where aerosol transmission is a risk, carry out pipetting operations in a biosafety cabinet.

Preventing contamination:

- Filtered tips or filter plugs may be required to avoid sample cross-contamination.
- Avoid bringing the body of the pipette into contact with the vessel you're pipetting from.
- Spray or wipe the body of the pipette over with disinfectant after use and store it upright.
- If infectious liquids are aspirated into the pipettor, do not continue to use the unit. Disassemble the unit in a biosafety cabinet (wearing gloves) and decontaminate the components by soaking in disinfectant solution.

Q6 What are Standard Precautions and how do they assist in controlling biological hazards?

Standard Precautions' are the National Health and Medical Research Council (NHMRC) adopted term to define appropriate work practices, based on modules of transmission of infectious agents. These precautions are based on the principle that all blood and body substances are potentially infectious. This principle is applied universally to all patients, regardless of their infectious status or perceived risk.

They include:

- hygienic practices, particularly washing and drying hands before and after patient contact;
- use of protective barriers when necessary, which may include gloves, gowns, plastic aprons, masks, eye shields or goggles;
- appropriate handling and disposal of sharps and other contaminated or clinical waste;
- use of aseptic technique; and
- use of environmental controls.

Q7 Where do I obtain additional information on biological hazard management?

If you require further information, please contact your local HSW Team.