1. OBJECTIVE

The purpose of this SOP is to outline the procedures of cleaning up biological spills. It will provide guidance on how to handle possible emergency situations that may arise in any biosafety level 2 (BSL-2) laboratory of Department of Medicine working with biological hazards.

2. SCOPE

This SOP is applicable to all trained staff and students handling biological agents.

3. RESPONSIBILITY AND ACCOUNTABILITY

3.1 It is the responsibility of the Principal Investigators to ensure all staff and students in their laboratory are properly trained to respond safely to biohazardous material accidents and spills, safe use of biological agents in their laboratory, assess the accident/incident and the course of action required to control the accident/incident effectively, an accident/incident report is filed online and submitted to OSHE within 24 hours and implement any corrective measures as stipulated by the relevant parties such as Head of Department, Department Safety Committee, OSHE or Faculty Safety and Health Officer.

3.2 It is the responsibility of all laboratory staff and students performing this procedure to acquire sufficient knowledge in biological safety, aware of potential hazards, understand this SOP and its contents, and obtain necessary training to carry out this procedure safely.

4. POTENTIAL HAZARDS

Laboratories in the Department of Medicine operate under BSL-2 containment where experiments involving agents of potential hazard to laboratory workers and the environment are conducted.

It is important to be aware that there may be potential risks in handling and processing biological materials (especially those of human), microorganisms such as bacteria and viruses (e.g. Hepatitis A, B and C virus, HIV), recombinant DNA, tissue culture and oncogenic viral systems and other human pathogens that are blood-borne, etc. All spills involving biological material and agents should therefore be treated as potentially infectious.

5. BIOLOGICAL SPILL KIT

A basic biological spill kit should include:
- Personal Protective Equipment
- Safety goggles
• N95 mask
• Disposable laboratory gown
• Gloves (latex/nitrile)
• Shoe covers
• Disposable hair net (optional)

Materials:
• Appropriate disinfectant
• Bottle for making dilutions of disinfectant
• Paper towels or other suitable absorbent materials
• Forceps or tongs
• Dust pan with broom
• Yellow biohazard trash bags
• Biohazard spill alert notice
• Biological spill response procedure and emergency contact numbers
• Name list of staff who are test fitted for N95 masks
6. SPILL RESPONSE PROCEDURES (WORK IN BUDDY SYSTEM)

6.1 General Spill Clean-up Procedure (Outside Biosafety Cabinet)

1. Hold your breath and evacuate the room immediately.
2. Notify others (including PI/supervisor) to stay out of the spill area.
3. Remove any contaminated clothing and place in a double biohazard waste disposal bag.
4. Post a “biological spill alert notice” to prevent access to the spill area.
5. Identify any specific biological agent and assess degree of contamination and action required.
6. Wait 30 minutes for aerosol to settle.
7. Put on protective personnel equipment in the correct order: Gloves (inner layer) → Hair net (optional) → N95 mask → Safety goggles → Disposable lab gown → Gloves (outer layer) → Shoe covers.
8. Prepare disinfectant according to manufacturer’s instructions.
9. Cover the spill with paper towels, gently pour the disinfectant over the absorbent materials working from outer edge of the spill to its centre. Avoid splashes.
10. Allow a 30 minutes contact time before wiping up the spill, working from the edges into the centre. Use a dustpan and/or forceps to pick up broken pieces of glass if any, and discard in a sharps bin.
11. Repeat Steps 8 and 9
12. Perform a final cleaning with water by wiping down the entire spill area.
13. Remove protective personnel equipment in the correct order: Shoe covers → Gloves (outer layer) → Disposable lab gown (inside out) → Safety goggles (handle by head band) → N95 mask (handle by straps) → Hair net (optional) → Gloves (inner layer).
14. Dispose all clean-up materials in a double biohazard waste bag.
15. Notify PI/supervisor after clean-up.
16. Report the incident to OSHE via the NUS Accident/Incident Reporting System (AIRS).
17. Replenish Biological Spill Kit contents.

6.2 Spill inside a Biosafety Cabinet

1. Leave the cabinet switched on to prevent contaminant aerosols from escaping.
2. Immediately notify others in the laboratory (including PI/supervisor) that there is a biological spill inside a biosafety cabinet.
3. Remove outer layer of gloves and any contaminated clothing. Place them in a double biohazardous waste bag inside the BSC.
4. Post a “biological spill alert notice” to prevent access to the spill area.
5. Put on protective personnel equipment in the correct order: Gloves (inner layer) → Disposable lab gown → Gloves (outer layer) → Shoe covers.
6. Prepare disinfectant according to manufacturer’s instructions.
7. If the spill is on the work surface area, cover the spill with paper towels. Pour disinfectant from the edge of the spill toward the centre. If necessary, flood the work surface, as well as drain pans and catch basins below the work surface with disinfectant.
8. Allow a 30 minutes contact time before wiping up the spill, working from the edges into the centre. Drain catch basin into a container. Lift the front exhaust grill and tray and wipe all surfaces. Ensure that no paper towels or solid debris are blown into the area.
beneath the grill. Use a dustpan and/or forceps to pick up broken pieces of glass if any, and discard in a sharps bin.

9. Repeat Steps 6 and 7.
10. Perform a final cleaning with water by wiping down the entire spill area.
11. Allow BSC to run for at least 10 minutes (with UV on if available) before resuming work.
12. Remove protective personnel equipment in the correct order: Shoe covers → Gloves (outer layer) → Disposable lab gown (inside out) → Gloves (inner layer).
13. Dispose all clean-up materials in a double biohazard waste bag.
15. Report the incident to OSHE via the NUS Accident/Incident Reporting System (AIRS).
16. Replenish Biological Spill Kit contents.
17. If the entire interior of the BSC needs disinfection, contact the contracted certification vendor.

6.3 Spill inside a Centrifuge

1. Turn off the centrifuge immediately if you hear a tube break. Do not open the centrifuge lid for 30 minutes to allow aerosols to settle. If you discover broken tubes after the centrifuge has stopped, close the lid and wait 30 minutes.
2. Notify others (including PI/supervisor) that there is a biological spill inside a centrifuge.
3. Prevent access to the laboratory by posting a “biological spill alert notice”.
4. Put on protective personnel equipment in the correct order: Gloves (inner layer) → Hair net (optional) → N95 mask → Safety goggles → Disposable lab gown → Gloves (outer layer) → Shoe covers.
5. If the spill occurred in a sealed bucket, remove rotors and buckets to the nearest biosafety cabinet for cleanup. Open and disinfect inside the biological safety cabinet.
6. Apply disinfectant to all contaminated surfaces within the chamber taking care to minimize splashing. Allow 30 minutes contact time before cleaning up the chamber.
7. Use forceps to remove all pieces of broken glass. Place all broken glass inside a puncture-resistant biohazard sharps container
8. Repeat Steps 5 and 6.
9. Perform a final cleaning with water by wiping down the entire spill area.
10. Remove protective personnel equipment in the correct order: Shoe covers → Gloves (outer layer) → Disposable lab gown (inside out) → Safety goggles → N95 mask → Hair net (optional) → Gloves (inner layer).
11. Dispose all clean-up materials in a double biohazard waste bag.
12. Report the incident to OSHE via the NUS Accident/Incident Reporting System (AIRS).
13. Replenish Biological Spill Kit contents.

7. TRAINING

All individuals handling biological spill are required to complete the relevant safety training (Biological Safety, Safe Handling of Human Tissue and Fluids and Biological Spills and Emergency Response) via IVLE @ https://ivle.nus.edu.sg/.
8. WASTE DISPOSAL

Materials used in biological spill clean-up must be disposed of as biohazardous waste and collected by the licensed waste collector. Label PI name, laboratory location and contact number on the bag.

9. ACCIDENTS AND INCIDENTS REPORTING

Accidents resulting in injuries or spill incidents must be reported to the PI, laboratory supervisor and safety lead immediately after first aid is applied. Seek medical attention when necessary at the University Health Centre (UHC) for a medical assessment or proceed to the Accident & Emergency units of National University Hospital after office hours. All incidents or accidents have to be notified to OSHE within 24 hours via the online NUS Accident and Incident Management System (AIMS) @https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360_aims.html

10. REFERENCE


11. APPENDIX

<table>
<thead>
<tr>
<th>Dilution instructions - PRESEPT® Hard Surface Disinfectant Tablets</th>
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<tbody>
<tr>
<td><strong>Disinfection of</strong></td>
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<tr>
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</tr>
<tr>
<td>Blood spillage†</td>
</tr>
<tr>
<td>Pipette jar†</td>
</tr>
<tr>
<td>General laboratory/ environmental use†</td>
</tr>
<tr>
<td>Glassware, rubber and plastic tubing</td>
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<tr>
<td>Soiled linen</td>
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<td>Work surfaces, cupboards, floors, etc.</td>
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†Howie Code requirements for laboratory use. IA 1% compatible detergent should also be added.
12. APPENDIX

**BIOLOGICAL SPILL CLEAN-UP PROCEDURE**

**SPILL EVALUATION**
(Risk assessment by Principal Investigator & lab personnel)

- **MINOR SPILL**
  - Spill volume manageable & Poses no immediate danger to personnel

- **MAJOR SPILL**
  - Spill volume NOT manageable or Poses potential risk to personnel

- **LAB EVACUATION**
- **RESTRICT ALL LAB ENTRY POINTS**

**CLEAN-UP PROCEDURE**

**Prior to re-entering laboratory**
- Allow aerosols to settle for 30 mins
- Turn off all flames (if used)
- Prepare clean-up materials & disinfectant
- Wear Personal Protective Equipment (PPE)

**Upon entering laboratory**
- Trace splatters
- Lay appropriate absorbents over the spill, from periphery to centre
- Apply disinfectant over absorbents, from periphery to centre
- Allow at least 20 mins contact time
- Pick up sharps & dispose in a sharps bin
- Pick up treated absorbents with tongs & dispose them in double yellow biohazard bag
- Clean treated area with disinfectant/water
- Remove & dispose PPE into biohazard bag
- Label the waste bag
- Wash hands

**REPORT**
Report lab accident/incident to AIMS (OSHE) within 24hrs

https://inetapps.nus.edu.sg/osh/portal/eServices/ehs360_aims.html
13. REVISION HISTORY

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<th>Author</th>
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<tr>
<td>16-03-2016</td>
<td>001</td>
<td>Wang Juling / Yeo Soh Bee</td>
<td>Section 9: Revised Accident and Incident Reporting System (AIRS) to Accident and Incident Management System (AIMS)</td>
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<td>18-10-2016</td>
<td>002</td>
<td>Wang Juling / Yeo Soh Bee</td>
<td>Section 12: Appendix “Biological Spill Clean-up Procedure” by YLL SoM Safety Committee is added</td>
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