Bloodborne Pathogens Training

Department of Environmental Health and Safety

412-624-9505
www.ehs.pitt.edu
Training Slides

Slides from this presentation are available at

http://www.ehs.pitt.edu/training
Purpose of Training

• Define bloodborne pathogen transmission

• Recommend protective measures

• Review University biosafety policies

• Complete OSHA and University required training
  – Annual training required according to OSHA Bloodborne Pathogen Standard (29 CFR 1910.1030) and the University of Pittsburgh’s Exposure Control Plan
  – Annual retraining can be completed online at [http://cme.hs.pitt.edu](http://cme.hs.pitt.edu) or [http://www.ehs.pitt.edu/training](http://www.ehs.pitt.edu/training)
What are Bloodborne Pathogens?

- **Microorganisms present in blood or body fluids that can cause disease in humans**

- Examples:
  - HIV
  - Hepatitis B
  - Hepatitis C
  - Herpes B

*Image from the Public Health Image Library (PHIL)*
Sources of BBP Exposures:
Human sources

- Human blood, blood products, body fluids and wastes
- Human cell lines
Sources of BBP Exposures: Research Animals

- Research animals exposed to biological agents
- Research animals naturally carrying human pathogens
Sources of BBP Exposure: Cultures

- Bacteria or viruses used in research
  - Adenovirus
  - Salmonella
  - Lentivirus
  - Hepatitis
  - Herpes
  - Human Blood/Body Fluids
Body Entry Routes

Percutaneous (through the skin)
- Puncture wounds (needle sticks, sharps injuries)
- Damaged skin (cuts or dermatitis)

Mucocutaneous (mucous membranes)
- Splashes into eyes, nose, and mouth
- Mouth pipetting
Human Immunodeficiency Virus (HIV)

- Causative agent of AIDS (Acquired Immune Deficiency Syndrome)
- HIV-1 (worldwide) and HIV-2 (Africa)
- Transmission has occurred via:
  - Health care accidents (punctures from needles, sharps; blood splashes)
  - Sexual contact
  - Transfusions
  - Needle sharing
Human Immunodeficiency Virus (HIV)

• Appears to be lifelong infection
• Symptoms of the infection:
  – Acute Infection: Flu-like symptoms 1-4 weeks
  – Asymptomatic Infection: 4-12 weeks after infection
    May last month to years, but virus can be transmissible to others
  – Symptomatic Infection/AIDS: Months to years after infection,
    symptoms of continual immunosuppression, opportunistic infection
How Serious is the Risk of HIV?

- Over 1.1 million people in United States are infected
  - 1 in 6 are unaware of their infection
- 58 documented cases in health care workers since 1985-2013 (150 possible cases)
- 25 of the 58 employees who had an occupational exposure have developed AIDS
- No preventative vaccine for HIV
- Incidence of transmission from contaminated needlestick < 0.3%
- HIV can survive outside the body at least 2-3 days in a viable blood droplet
Documented Occupational Transmission of HIV

58 documented cases in health care workers since 1985:

Occupations:

- Laboratory workers – 20 cases (16 clinical lab)
- Housekeeper/Maintenance – 2 cases

Injuries:

- 49 exposures – percutaneous (puncture/cut)
- 5 exposures – mucous membrane
- 2 exposures – both puncture/mucous membrane
- 2 exposures – unknown
FIGURE. Number of confirmed cases (N = 58) of occupationally acquired HIV infection among health care workers reported to CDC — United States, 1985–2013
Bloodborne Viral Hepatitis

- **Hepatitis B** – 800,000 to 1.4 million people in the U.S. chronically infected

- **Hepatitis C** – estimated 4.0 million cases in the U.S. (3.2 million chronically affected)

- **Hepatitis D** – estimated 15 million cases worldwide; requires Hepatitis B for replication
How Serious is the Risk of Hepatitis C?

- Estimated 17,000 new U.S. cases in 2007 according to Center for Disease Control (CDC)
- Chronic infection 55-85% of infected people
- Estimated 1% of healthcare workers infected
- Approximately 8,000 to 10,000 people each year in the U.S. will die due to chronic HCV infections
- Incidence of transmission from needlestick 3-5%
- HCV can survive on environmental surfaces at room temperature at least 16 hours but not longer than 4 days and still be capable of causing infection
- No vaccine available

* Per 100,000 population.
† Until 1995, acute hepatitis C was reported as acute hepatitis non-A, non-B.
How serious is the Risk of Hepatitis B?

- Easier to contract compared to HIV
- Incidence of transmission from needlestick 6-30%
- HBV can survive outside the body at least 7 days and still be capable of causing infection
- Number of new cases in the U.S. has declined 80% since 1991 as a result of vaccinations and a national strategy to eliminate HBV infection

* Per 100,000 population.
Hepatitis B Vaccination

• NO COST to the employee
• No live virus injected – safe vaccine
• Now recommended for newborns and children
• Employee MUST sign Declination Form
• No current recommendation for booster

Image from: www.thehealthage.com
Three shot HBV Series

- Three shot series; 2\textsuperscript{nd} shot one month after the first; 3\textsuperscript{rd} shot 6 months later
- If pregnant now or within 6 months ask your doctor about getting HBV vaccination
- HBV immunity effective for 97% receiving three shot series
- If you have not received all 3 shots, contact Employee Health at 412-647-4949 for instructions
# In Review....

<table>
<thead>
<tr>
<th>Virus</th>
<th>Rate of Needlestick*</th>
<th>Survival Outside of Body</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatitis B</td>
<td>6-30%</td>
<td>Up to 7 days</td>
<td>Yes</td>
</tr>
<tr>
<td>C</td>
<td>3-5%</td>
<td>Up to 4 days or 16 hours at room temperature</td>
<td>No</td>
</tr>
<tr>
<td>D</td>
<td></td>
<td>Hepatitis B must be present</td>
<td>Hepatitis B</td>
</tr>
<tr>
<td>HIV</td>
<td>&lt; 0.3%</td>
<td>2-3 days in a viable blood droplet</td>
<td>No</td>
</tr>
</tbody>
</table>

*Incidence rates from known infected sources
Hepatitis B Vaccination

• If you wish to receive the vaccination series, go to:
  Employee Health Clinic
  MyHealth@Work
  3708 Fifth Avenue
  Medical Arts Building, Suite 500.59
  Normal Work Hours 7:00 AM – 3:30 PM Monday – Friday

• Appointment not necessary, proper ID required
Prevention of BBP Diseases

- University Exposure Control Plan
- Universal Precautions
- Engineering Controls
- Safe Laboratory Work Practices
- Personal Protective Equipment
University Exposure Control Plan

Exposure Control Plan Contains:
• Exposure determination procedure
• Methods of compliance
• HBV vaccination plan information
• Exposure incident “follow-up” procedure
• Training requirements
• Recordkeeping plan
• Available at www.ehs.pitt.edu – follow lab safety link
To access the Exposure Control Plan, click “Lab Safety”
Next, click “Bloodborne Pathogens”
**Bloodborne Pathogens**

**Exposure Control Program**

Faculty, staff, and students who may reasonably anticipate skin, eye, mucous membrane, or parenteral (under the skin) contact with human blood or other potentially infectious materials during the performance of their job duties are covered under the Bloodborne Pathogen Exposure Control Program.

Potentially infectious materials include:
- All human blood and body fluids;
- Any visibly unjured tissue or organ other than intact skin from a human, living or dead;
- Human cell lines or cultures, human tissue cultures, human organs cultures;
- Non-human primate blood, bodily fluids or other tissues;
- Liquid or solid culture medium or other materials containing biological agents capable of causing diseases in healthy adult;
- Blood, body fluids or other materials from experimental animals infected with bloodborne pathogens;
- Liquid or solid culture medium or other materials containing or potentially contaminated with recombinant or synthetic nucleic acids.

**Bloodborne Pathogen Training**

All University faculty and staff who are occupationally exposed to bloodborne pathogens are required to complete Bloodborne Pathogen training annually. Visit the Training section for the live training schedule and online training options.

**Hepatitis B**

Hepatitis B virus vaccination is recommended for all faculty and staff who are exposed to bloodborne pathogens. Those who consent to vaccination will receive it at no cost. Contact MyHealth@Pitt at MyHealthWorkPitt@pitt.edu or 412-647-4949.

**Exposure Control Plan**
Universal Precautions

Also known as “Standard Precautions”

Treat all human blood, body substances, and other potentially infectious material as if they were infectious for HIV, hepatitis or other bloodborne pathogens

Universal Precautions are very similar to safe laboratory practices recommended for Biosafety Level 2
Biosafety Levels

**Biosafety Level (BSL)** - combination of practices, safety equipment, and facilities for the operations performed, the agents handled, and the lab function

<table>
<thead>
<tr>
<th>BSL</th>
<th>Severity</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Typically does not cause disease in healthy adults</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>Can cause disease; Not airborne</td>
<td>Yes</td>
</tr>
<tr>
<td>2+</td>
<td>Indicates BSL-3 work practices in laboratories equipped for BSL-2 work (required for work with lentivirus and lentiviral vectors)</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>Can cause disease; Airborne transmission</td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Potentially fatal</td>
<td>No</td>
</tr>
</tbody>
</table>
Biohazard Signage and Labels

Biohazard Entrance Signage must be displayed outside laboratory handling biological materials or agents.

Small biohazard labels must be attached to:

- Containers of regulated waste
- Refrigerators or freezers containing blood or other infectious materials
- Other containers used to store, transport, ship blood or other infectious materials
Biohazard door signs

University Department
Building and Room Location
Authorized Personnel Only

Biosafety Level 2

In Case of Emergency, contact
University Police 412-624-2121
Investigator Name Emergency 000-000-000
Normal Business Hours Lab Manager Office 000-000-000

BIOHAZARD AREA
ADMITTANCE TO AUTHORIZED PERSONNEL ONLY

Hazard Identity: ________________________________________________
Responsible Investigator: _________________________________________
In Case of Emergency Call: _______________________________________
Daytime: _______________________________________________________
Off Hours: _____________________________________________________
Entrance Requirements: _________________________________________

Biosafety Level: 1 2 2+ (circle one)

DATE POSTED: ________________________________
Engineering Controls

Engineering Controls — Eliminate or reduce exposure through the use of engineered machinery or equipment
Biosafety Cabinets

- Biological safety cabinets (BSCs) provide primary containment for work with human pathogens
  - BSC protects laboratory personnel (and visitors) from potential exposures
  - BSC protects research samples from contamination
  - BSC protects the environment from biological aerosol releases
Biosafety Cabinets
How does a BSC work?

30% exhaust, 70% recirculated

HEPA filters remove only particulates, NOT chemicals
Puncture-resistant sharps containers
Centrifuge safety cups or sealed rotor heads
Mechanical pipetting devices
Eye and hand wash wash stations

Hand washing is a valuable tool in preventing infection
Engineering Controls

Safety Engineered Sharps Devices

- Self-sheathing or retractable needles
- Shielded scalpels
- Shielded IV catheter insertion devices

Required for certain procedures

Contact EH&S for more information
Safe Work Practices

Work Practice Controls for BBP Control

- No recapping of needles
- No needles, glass, or scalpels in trash
- Treat all contaminated tools as infectious
- No eating, drinking, smoking in risk areas
- No applying cosmetics, lip balm, contact lenses
- Use good hygiene practices (hand washing with disinfectant soap)
- Use proper lab techniques and wear appropriate laboratory attire
Personal Protective Equipment (PPE)

- Provided by employer at no cost to employees
- Must be specifically selected for tasks performed:
  - Appropriate gloves
  - Protective coveralls / lab coats
  - Eye protection / face shields
  - Surgical masks
  - Resuscitation bag / pocket mouthpiece
Guidelines for Safe Use of PPE

• **Remove PPE:**
  – If integrity compromised
  – If contaminated
  – When task complete
  – Before leaving laboratory space
  – Before entering public areas

• **Properly dispose of used PPE**

• **Wash hands after removing PPE**
Spill Clean-up
Spill Clean-up

• Wear personal protective equipment (PPE)
  – Latex gloves, face protection, lab coat

• Cover spill with a paper towel
Spill Clean-up

- Pour disinfectant (1:10 bleach) over covered spill

- Allow adequate contact time (15-20 min)
Spill Clean-up

• Remove absorbent and dispose as bio-waste
  – If broken glass or sharp objects are present, use shovel or tongs to dispose

• Remove gloves and dispose of as biological waste

• Wash hands thoroughly
Biological Waste Disposal / supplies

- Biological Waste Boxes
  - Available in designated areas of research buildings (consult EH&S, department administrator, other researchers)
  - EH&S Department provides biological waste BOXES and LABELS free of charge
Biological Waste Disposal /Supplies

• Biological Waste Bags
  – Bags must be labeled with a biohazard symbol and are required to be red or orange in color
  – Investigators (Department) MUST purchase biohazard bags and sharps containers
Biological Waste Disposal / Supplies

- Sharps Containers
  - Must be labeled with a biohazard symbol and are required to be puncture resistant with a lid
Biological Waste Disposal

Biological Waste Supplies

- Biohazard Bags and Sharps Containers can be purchased via the Dietrich School Scientific Stock room
  - 412-624-8551 or 412-624-4260
  - stockroom@pitt.edu
Solid Biological Waste

- Solid wastes (culture plates, gloves, PPE, etc.) which have come in contact with potentially infectious material are disinfected and placed in an approved biohazard bag.
- Waste bags are placed in approved biohazard waste box, labeled, and sealed (top and bottom) with packing tape.
- Maximum box weight limit – 30 lbs. (based on Transportation Guidelines).
- Each building has a designated area for pick-up.
- Check [www.ehs.pitt.edu](http://www.ehs.pitt.edu) for pick-up schedule (pick-up usually every Thursday).
Liquid Biological Waste

- Liquid wastes (blood, virus, stock, cell culture waste, etc.) should be treated with appropriate disinfectant (bleach or other EPA registered disinfectant) to inactivate potentially infectious material
- Following sufficient contact time, the solution should be poured down the drain (avoid splashing and aerosol generation)
- Large volumes of liquid waste should be autoclaved prior to drain disposal
- Liquid wastes are not permitted to be disposed in biohazard bags
Autoclaving

- Autoclaves are equipment used to sterilize equipment and supplies by subjecting them to high pressure steam.

- Things that might cause a failure to achieve sterility:
  - Overfilling the autoclave
  - Not running the cycle for long enough
Sharps Disposal

- All sharps must be disposed of in puncture resistant rigid containers with self-closing lids
- No sharps disposal in regular trash or broken glass containers
- Sharps containers should be closed when 2/3 full and disposed according to University guidelines
- Consult EH&S Department concerning building specific procedures for sharps disposal
Moving Equipment From Labs

Equipment (freezers, incubators, centrifuges, dewars) being moved or disposed by University of Pittsburgh Movers **MUST** be decontaminated prior to removal from the laboratory.
Moving Equipment From Labs

- All research samples must be removed from the equipment.
- All internal and external surfaces must be decontaminated.
- Once decontaminated, the Laboratory Equipment Decontamination Certificate must be affixed to the equipment.
Moving Equipment From Labs

University of Pittsburgh

Efficiency Health and Safety

Guidelines for Moving Equipment from Biological Laboratories

Effective Date: 06/30/17

Page 1 of 1

Laboratory Equipment Decontamination Certificate

The following is the procedure for decontaminating equipment prior to University of Pittsburgh Movers removing equipment from a laboratory at the University of Pittsburgh. If equipment is not decontaminated prior to removal, University Movers may return the equipment to the laboratory and the laboratory may be subject to a decontamination fee.

After submitting the request for Surplus Property, all equipment used to handle or store biological agents or equipment located in a biological laboratory (e.g., fume hoods, incubators, centrifuges, etc.) must be decontaminated. All internal and external surfaces must be decontaminated.

Consult EHS & EHS (412)-624-9665 or the following website for information concerning EIA-registered disinfectants:
http://www.epa.gov/oppsrod/cheeregisters.htm

- Put on appropriate personal protective equipment. At a minimum, gloves and safety glasses should be worn. Consult with EHS if necessary.
- Spray an EPA-registered disinfectant on the equipment. In most cases, a 1:10 bleach solution should be used to disinfect the equipment.
- Allow disinfectant to remain on the equipment for the appropriate contact time (15-30 minutes).
- Completely remove (by wiping with a cloth) the disinfectant from the equipment.
- Print out a "Decontamination Certification" form, sign, date, and affix the form to the equipment.
- Surplus Property should be contacted following the decontamination to remove the equipment.

One form is required for each piece of equipment.

PLEASE NOTE: It is the responsibility of the Principal Investigator or designated contact to sign the form and affix the equipment.

EHS is NOT required to log equipment that has been used or stored in a laboratory after laboratory personnel have performed the above stated decontamination and certification steps.

Instructions:

Name: ____________________________ Office / Lab Location: ____________________________ Phone Number: ____________________________

Location of Equipment: ____________________________ Description of Equipment: ____________________________ Final Destination of Equipment: ____________________________

Is the equipment currently in working order? (Check one only) Yes _____ No _____

I certify that the above listed equipment was decontaminated on the listed date prior to moving / removal by the University of Pittsburgh Movers. I certify that the equipment was not used following the decontamination procedure and posting of this certification form.

Signature: ____________________________ Date: ____________________________
Blood-Borne Pathogen Accident Treatment and Reporting

Injury Involving BBP

- Puncture or Cut
  - Wash Affected Area with Soap and Water for 15 Minutes

- Splash to Eye, Nose or Mouth
  - Flush Affected Area in Eyewash for 15 Minutes

Remove Contaminated PPE

Report to Student Health
Nordenberg Hall
412-383-1800
Mon, Wed, Thurs
0:30 AM – 7 PM
Tue & Fri 8:30 AM – 5 PM
Sat 10 AM – 3 PM

Report to Employee Health Services
(MyHealth@Work)
5th Floor, Medical Arts Building
(412) 647-4949

Report Immediately for Treatment

If Available Notify Supervisor or PI

After Work Hours or Weekend

Report Injury to University Worker’s Compensation within 24 Hours
1-800-633-1197

Sharps Involved? Recombinant or Synthetic Nucleic Acids Involved?

Fill out Sharps Injury Report
www.ehs.pitt.edu

Fill out IBC Incident Report
www.ibc.pitt.edu

More detailed exposure treatment and reporting guidelines apply for BSL-3 and ABSL-3 areas. Please contact the Biosafety Officer (412-624.8910) for specific information for high containment laboratories.
1: Remove and properly dispose of any potentially contaminated personal protective equipment (gloves, lab coat, etc.)
2A: Wash puncture wound, needlestick, or cut with soap and water for 15 minutes

OR

2B: Flush eyes, nose or mouth with eyewash for 15 minutes
Blood-Borne Pathogen Accident Treatment and Reporting

Injury Involving BBP

Puncture or Cut

Wash Affected Area with Soap and Water for 15 Minutes

Remove Contaminated PPE

Splash to Eye, Nose or Mouth

Flush Affected Area in Eyewash for 15 Minutes

Report to Student Health
Nordenberg Hall
412-383-1800
Mon, Wed, Thurs
8:30 AM – 7 PM
Tue & Fri 8:30 AM – 5 PM
Sat 10 AM – 3 PM

Students

Report Immediately for Treatment

If Available Notify Supervisor or PI

After Work Hours or Weekend

Report to Employee Health Services
(MyHealth@Work)
5th Floor, Medical Arts Building
(412) 647-4949

Employees

3A

3B

Report to Presbyterian University Hospital Emergency Room
(412) 647-3333
Environmental Health and Safety

Accident Treatment and Reporting

Faculty and Staff - Report for Treatment For Bloodborne Pathogen Injuries:

• Employee Health Clinic
  MyHealth@Work
  (5th Floor, Medical Arts Building)
  – Normal work hours 7:00AM-3:30PM M – F
  – Phone – (412) 647-4949

• Presbyterian University Hospital Emergency Room
  – After work hours or on weekends for medical emergencies
  – Phone – (412) 647-3333
Accident Treatment and Reporting

Students - Report for Treatment For Bloodborne Pathogen Injuries:

- Student Health Clinic (Nordenberg Hall)
  - Monday, Wednesday, & Thursday 8:30 AM – 7 PM
  - Tuesday & Friday 8:30 AM – 5 PM
  - Saturday 10 AM – 3 PM
  - Phone – (412) 383-1800

- Presbyterian University Hospital Emergency Room
  - After work hours or on weekends for medical emergencies
  - Phone – (412) 647-3333
4: If your supervisor or PI is immediately available notify him or her of your injury. 
Do not wait until your supervisor or PI is available before you seek medical attention!
Blood-Borne Pathogen Accident Treatment and Reporting

Injury Involving BBP

- Puncture or Cut
  - Remove Contaminated PPE
  - Wash Affected Area with Soap and Water for 15 Minutes
  - Report to Student Health
    - Nordenberg Hall
    - Mon, Wed, Thurs 8:30 AM – 7 PM
    - Tue & Fri 8:30 AM – 5 PM
    - Sat 10 AM – 3 PM
    - Students
  - Report to Employee Health Services
    - (412) 647-4949
    - (MyHealth@Work)
    - 5th Floor, Medical Arts Building

- Splash to Eye, Nose or Mouth
  - Flush Affected Area in Eyewash for 15 Minutes
  - Report to Presbyterian
    - University Hospital Emergency Room
    - (412) 647-3333

- After Work Hours or Weekend
  - Employees
  - If Available Notify Supervisor or PI

- Report Injury to University Worker's Compensation within 24 Hours
  - 1-800-633-1197

More detailed exposure treatment and reporting guidelines apply for BSL-3 and ABSL-3 areas. Please contact the Biosafety Officer (412-624-8919) for specific information for high containment laboratories.
Accident Treatment and Reporting

- Call UPMC Work Partners at 1-800-633-1197 (24 hours/day, 7 days/week)
- Notify Supervisor
- If accident involves a “Sharp” such as a needle or scalpel, must also complete “Sharps Injury Report”
  - Available at www.ehs.pitt.edu
Accident Treatment and Reporting

Emergency Situations

• Contact University of Pittsburgh Police
  – (412) 624-2121
Post-Exposure Evaluation and Follow-up Procedure

Confidential Medical Evaluation and Follow-up must be made available following an exposure incident

**Must Include:**
- Documentation of exposure and how the incident occurred;
- Identification and testing of source individual if available;
- Collection and testing of the employee’s blood for HBV and HIV (employee consent required)
- Counseling and evaluation of reported illness
Post-Exposure Evaluation and Follow-up

Healthcare Professional’s Written Opinion

- Provided within 15 days of completion of evaluation
- Informs employee if they are indicated for, or have received Hepatitis B vaccine
- Limited to information of results of evaluation
- Informs employee of any medical conditions resulting from exposure requiring medical attention
- Findings and results are confidential
Reducing BBP Risks

- Understand the risks associated with your job or function
- Recognize potential exposure situations
- Assure lab equipment is in good condition
- Keep laboratory bench and work areas clean
- Follow established work procedures
- Use personal protective equipment
- Follow universal precautions
- Do not over-schedule yourself