Bloodborne Pathogen Training
29 CFR 1910.1030
Learning Objectives

At the end of this presentation you should be able to:

– Understand the OSHA Bloodborne Pathogen Standard requirements
– Define and identify sources of bloodborne pathogens and OPIMs
– Understand how bloodborne pathogens can be transmitted
– Identify personnel and tasks that are considered “at risk” for exposure
– Perform good work place practices to reduce risk of exposure
– Identify and use appropriate Administrative and Engineering Controls including Personal Protective Equipment
– Respond appropriately in the event of an emergency or exposure
Scott & White Biosafety Staff

- Dr. Frank Novembre—Biosafety Officer  
  254-771-4804  
  fnovembre@sw.org

- Dr. Tom Kuehl—IBC Chair  
  254-724-2738  
  tkuehl@sw.org

- Lauren Ellis—IBC Compliance Officer  
  254-771-4813  
  lellis@sw.org
Training Topics

- Regulations
- Why is the Standard Needed?
- Most Common BBPs
- Control Measures
- Emergency Response
The Occupational Safety and Health Administration (OSHA) Developed the Bloodborne Pathogen (BBP) Standard to protect workers from human BBP exposures—it went into effect in 1991.

Covers all occupational exposures to blood or other potentially infectious materials (OPIM) and serves to provide methods to protect workers from exposure to BBPs.


OSHA Bloodborne Pathogen Standard

Requires Employers to:

– Establish an Exposure Control Plan
– Use engineering controls
– Enforce work practice controls
– Provide personal protective equipment (PPE)
– Use labels & signs
– Provide information & annual training to employees
– Make Hepatitis B vaccinations available at no cost if required for job duties
– Provide post-exposure follow-up & medical examination
– Maintain employee medical & training records
BBP Exposure Control Plan (ECP)

Employer’s ECP is required to:

– Be a written document that is updated & reviewed annually
– Identify potential occupationally exposed employees
– Outline procedures to protect them
– Document ongoing consideration of new engineering controls
Why is the Standard needed?

- Statistics
- Occupational Exposure
- Applicability
- Transmission
BBP Statistics

• Approximately 143 cases of HIV infection due to occupational exposure from 1981 – 2010 in the US - none since 1999; Globally it is estimated there are 200 – 5,000 cases per year

• About 40,000 are infected with Hepatitis B each year

• About 1 healthcare worker dies from Hepatitis B each DAY
Careers & Job Tasks at Risk of BBP Exposure

**Careers**

- Health Care Workers
- Research & Clinical Laboratory Personnel
- Maintenance Personnel in Healthcare & Laboratory Facilities
- Emergency Response Personnel

**Tasks**

- Patient Care & Diagnosis
- Working with tissue samples
- Extracting DNA
- Blood Draws
- Virus propagation
- Maintenance of research equipment
Applicability to the Research Lab

The BBP Standard applies to personnel working with...

- Human blood, tissue or OPIM
- Human cell lines
- Infectious agents that are bloodborne pathogens:
  - Hepatitis B Virus (HBV)
  - Hepatitis C Virus (HCV)
  - Human Immunodeficiency Virus (HIV)
- Viral vectors derived from bloodborne viruses
Modes of BBP Transmission

• Sexual contact

• Sharing needles

• From mothers to babies at/before birth

• Contact with broken skin or parenteral:
  – rashes, cuts, punctures, abrasions, acne, sores

• Contact with mucous membranes (splashes):
  – eyes, nose, mouth
Sources of BBP Transmission

• Human Blood
  – Whole Blood
  – Blood Components

• Products made from human blood
  – This includes plasma & products derived from plasma such as human serum albumin (HSA)

• This definition also includes human umbilical cord blood cells (hUCB)
Other Potentially Infectious Materials (OPIMs)

The following human fluids are considered OPIMs:

- Semen
- Vaginal Secretions
- Cerebrospinal Fluid
- Pericardial Fluid
- Amniotic Fluid
- Saliva in dental procedures
- Pleural Fluid
- Peritoneal Fluid

- Any body fluid visibly contaminated with blood
- All body fluids when it is difficult or impossible to differentiate between body fluids
Other Potentially Infectious Materials (OPIMs)

- Any unfixed tissue or organ (other than skin) from a human (living or dead)
- HIV-containing cell or tissue cultures, organ cultures
- HIV-or HBV-containing culture medium or other solutions
- Blood, organs or other tissues from experimental animals (especially nonhuman primates and immunodeficient rodents) infected with HIV or HBV
Other Potentially Infectious Material (OPIM)

The following are **not** expected to be infectious unless visibly contaminated with blood:

- Urine
- Feces
- Vomit
- Nasal Secretions
- Sweat
- Sputum
- Tears
Most Common BBPs

Definition

- Hepatitis B Virus
- Hepatitis C Virus
- Human Immunodeficiency Virus
Bloodborne Pathogens

Bloodborne pathogens are microorganisms that are present in human blood & can cause disease in humans. Examples include but are not limited to:

- Hepatitis B Virus (HBV)
- Hepatitis C Virus (HCV)
- Human Immunodeficiency Virus (HIV)
Hepatitis B Virus - HBV

Statistics

• Hepatitis means inflammation of the liver

• 38,000 people in the US became infected with HBV in 2009 (down from 60,000 in 2004)

• Accounts for approximately 3,000 deaths/year

• Carriers (individuals chronically infected with HBV) may pass HBV to others

• Highly effective vaccine available: series of 3 immunizations followed by a titer determination
Hepatitis B Virus - HBV

Major Occupational Hazard because:

- Survives in dried blood for long periods (weeks)
- Is the most frequently occurring laboratory-associated infection
- Is stable on environmental surfaces for up to 7 days
- 1mL of infected blood may contain $10^2$ to $10^9$ HBV particles
# HBV - Clinical Features

| Incubation Period | Average 90 days  
| Range 60 – 150 days |
|-------------------|-----------------|
| No sign or symptoms | 30%             |
| Acute illness (jaundice) | 30 – 50% (≥ 5 years of age) |
| Chronic infection (carrier) | >90% infants  
| 6 – 10% of infected adults |
| Premature death from chronic liver disease | 15 – 25% of chronically infected |
| Immunity – provided to individuals that have received the vaccine | Protected from future infection  
| (for at least 25 years) |
HBV- Risk of Infection

The risk of HBV infection is related to:

- The degree of contact the worker has with human blood & body fluids in the workplace
- The Hepatitis B status of the source individual

The risk of transmission from a single needlestick is 6% - 30%
HBV – Exposure Response (Occupational)

- Wash area thoroughly for 15 minutes with warm water and soap
- Report the incident to your supervisor and report to Employee/Occupational Health for medical evaluation
- Initiation of hepatitis B vaccine regimen (3 shots at 0, 1 and 6 months; followed by an antibody titer) within 24 hours if not previously immunized
- Initiation of hepatitis B immune globulin therapy based upon evaluation of hepatitis B surface antigen status of source and vaccine response status of the exposed person

Source: MMWR 50:1-42, 2001
Hepatitis C Virus - HCV

Statistics

• Average numbers have declined: 16,000 new cases in 2009 down from 240,000 new cases/year 1980s
• ~12,000 deaths per year due to HCV in the US
• Healthcare infections in 2009: 56
• Most infections are due to illegal drug use
• ~4.1 M Americans are chronically infected
• The risk of transmission from a single needle stick is 1.8%
• No vaccine for HCV
### HCV-Clinical Features

| Incubation Period                  | Average 4 – 12 weeks  
<table>
<thead>
<tr>
<th></th>
<th>Range 2 – 24 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>No sign or symptoms</td>
<td>70 – 80%</td>
</tr>
<tr>
<td>Clearing of infection</td>
<td>15 – 25%</td>
</tr>
<tr>
<td>Acute illness (jaundice)</td>
<td>20 – 30%</td>
</tr>
<tr>
<td>Chronic infection (carrier)</td>
<td>75 – 85% of infected persons</td>
</tr>
<tr>
<td>Premature death from chronic liver disease</td>
<td>1 - 5% of infected persons</td>
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</tbody>
</table>
HCV- Symptoms

Persons with newly acquired HCV infection usually are asymptomatic or have mild symptoms that are unlikely to prompt a visit to a health care professional. When symptoms occur, they can include:

- Fever
- Dark urine
- Abdominal pain
- Nausea
- Joint pain

- Fatigue
- Clay-colored stool
- Loss of appetite
- Vomiting
- Jaundice
HCV- Adverse Health Effect

• Lifelong infection
• Cirrhosis
• Liver Cancer
• Liver failure
• Death

Treatment is not always necessary, but can include combination antiviral therapy or liver transplant, if disease has progressed significantly
Human Immunodeficiency Virus - HIV

Statistics

- ~47,989 new HIV infections in 2012 in the US
- The average **risk of infection** after percutaneous exposure to HIV- infected blood is approximately 0.3% & **risk of infection** after mucous membrane exposure is 0.09%
- HIV is not able to survive outside of host. Therefore, there is a low risk of transmission via contact with environmental surfaces.
- **No vaccine for HIV**
HIV – Symptoms

50% - 90% of patients acutely infected with HIV experience at least some symptoms of the acute retroviral syndrome including:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>&gt;80 to 90</td>
</tr>
<tr>
<td>Fatigue</td>
<td>&gt;70 to 90</td>
</tr>
<tr>
<td>Rash</td>
<td>&gt;40 to 80</td>
</tr>
<tr>
<td>Headache</td>
<td>32 to 70</td>
</tr>
<tr>
<td>Lymphadenopathy</td>
<td>40 to 70</td>
</tr>
<tr>
<td>Pharyngitis</td>
<td>50 to 70</td>
</tr>
<tr>
<td>Myalgia or arthralgia</td>
<td>50 to 70</td>
</tr>
<tr>
<td>Nausea, vomiting or diarrhea</td>
<td>30 to 60</td>
</tr>
<tr>
<td>Night sweats</td>
<td>50</td>
</tr>
</tbody>
</table>
HIV-Control

• Anti-retroviral therapy can control infection levels, but cannot “cure”
• Anti-retroviral therapy can be used successfully as post-exposure prophylaxis
• Anti-retroviral therapy can be used as pre-exposure prophylaxis
Exposure Control Measures

- Biological Safety
- Universal Precautions
- Work Practices
- Controls
- Personal Protective Equipment
- Sharps Safety
Biological Safety

Biological Safety is the consistent application of safety measures to minimize or prevent exposure to:

- the person handling the agent
- the lab and building occupants
- the community
- the environment

This is accomplished through:

Good Work Practices (SOPs)               Engineering Controls
Administrative Controls                 Personal Protective Equipment
Universal Precautions

One way to prevent exposure to BBPs is by practicing universal precautions:

An approach to infection control in which all human blood and certain human body fluids are treated as if known to be potentially infectious for HIV, HBV, or other bloodborne pathogens.
Recognize Exposure Potential

To evaluate the effectiveness of controls, work practices and PPE, you need to assess the risk of the task being performed.

- Is there a potential for needle stick?
  Ex. injections of tumor cells into rodents

- Is there a potential for splashes?
  Ex. vortexing human cell lines
Work Practices

Exposure control measures that are controlled and performed by all personnel. This includes, but is not limited to:

- No food, beverages, gum or applying cosmetics in the lab
- Washing hands frequently & immediately after contact with blood or body fluids.
- Carefully handling and disposing of sharps or contaminated equipment
- Handling human cell cultures in a BSC
- Minimizing splashes and generation of aerosols
- Cleaning all work surfaces regularly
Where do we miss during hand washing?

Areas most frequently missed during hand washing
Less frequently missed
Not missed

(Adapted from Taylor L (1978), An evaluation of hand washing techniques - I, Nursing Times, 12 January, pp 54-55)
Work Practices – Hand Washing

Hands should be washed immediately after removing gloves & after any exposure incident. When washing hands be sure to:

- use warm water that is a comfortable temperature
- use a generous amount of liquid soap
- rub hands together for at least 40-60 seconds (remember backs of hands, in between fingers and under fingernails)
- rinse hands downward and dry with paper towels
- when possible use a paper towel to turn off faucet and open the door
Work Practices- Alcohol Sanitizers

• Hand sanitizers may be used if hand washing facilities are not available, but hands should be washed with water and soap as soon as possible afterwards.

• Must be at least 60% alcohol to be effective.

• Do not use if there is visible blood or grime (Sanitizers will not penetrate).

• Allow hands to air dry after use.

• Sanitizers do not eliminate all types of germs.
Engineering Controls

The equipment and procedures that are used to minimize or eliminate employee exposure to bloodborne pathogens.

Ex: eyewash, emergency showers, hand washing facilities, biosafety cabinets, sharps containers, autoclaves for waste decontamination, centrifuge cups, needles safe devices
Engineering Controls

Emergency Showers and Eyewashes are used for emergency response and may be located in the following areas:

• Showers in hallways of research building or labs
• Eyewashes in most labs, hallways adjacent to labs
  – Eyewashes in labs are tested weekly by lab personnel
Engineering Controls-Biosafety Cabinets

HEPA filtered Laminar Air flow protects person, product, environment.

- All BSCs must be certified at least **annually**.

- Should not be used to work with toxic or volatile chemicals.

- Do not use Bunsen burners or open flames inside BSC. Substitute a microincinterator or use sterile disposable tools.
Biosafety Cabinets: What NOT to do

- Not working from clean to dirty
- Overcrowded work surface
- Blocking front grill with supplies
- Blocking back grill with supplies
- Improper waste disposal
Administrative Controls

Policies, rules or programs that are developed by the institution to protect the health of all laboratory and research personnel. Some examples include:

- Protocol Approval (required prior to hazard work)
- Immunizations (HBV)
- Standard Microbiological Practices
- Signage
- Training
Standard Microbiological Practices for Research Labs

- Controlled access to the laboratory
- Good hygiene must be practiced
- Use of mechanical pipeting device — **no mouth pipeting**
- No eating, drinking, smoking in the lab — no food stored in the lab
- Policies must be implemented for the safe handling of sharps
- Minimize splashes and aerosols
- Appropriate decontamination should be performed
- Appropriate signage should be used on the entry door and in the laboratory
Administrative Controls – Waste Disposal

• Solid biohazardous waste is placed into red biohazard bags, double-bagged, tied loosely, and then placed into rigid containers for pickup by contractor

• Alternatively, solid biohazard waste can be placed in autoclave safe bag (with biohazard symbol), autoclaved and disposed of in regular trash

• Liquid waste is decontaminated with 10% bleach (final concentration; at least 30 minutes treatment) for disposal in sanitary sewer

• Glassware—broken glassware is disposed of in glass-safe boxes; contaminated glassware is disposed of in sharps containers

• Contaminated sharps are put in sharps containers and either autoclaved or picked up by Medsharps
Administrative Controls – Waste Disposal

What is wrong in these pictures?

- Always discard into proper waste streams
- Inappropriate disposal can injure others
Administrative Controls - Training

**Bloodborne Pathogen** training must be completed on an **annual** basis by all employees with the potential for occupational exposure to blood or OPIM.
Shipping Training

Infectious Substances Shipping training is required every 2 years for anyone who ships or transports infectious agents, biological material and/or dry ice.

No person shall handle, offer for transport, or transport Dangerous Goods unless they are trained.
Personal Protective Equipment (PPE)

All employees should have access to PPE that is task appropriate & the correct size. It may include but is not limited to:

- Gloves
- Gowns
- Lab coats
- Face shields
- Goggles

Employee training on PPE should include:

- Location
- Proper Use
- Proper Disposal
- Decontamination for reuse
- Selection of proper PPE
# Personal Protective Equipment (PPE)

<table>
<thead>
<tr>
<th>PPE</th>
<th>Picture</th>
<th>When to Wear</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eye Protection</strong></td>
<td><img src="image1.png" alt="Eye Protection" /></td>
<td>Worn when there is a potential for splashes/splatters of liquid.</td>
<td>Safety Glasses, Goggles, Goggles, Face shields</td>
</tr>
<tr>
<td><strong>Gloves</strong></td>
<td><img src="image2.png" alt="Gloves" /></td>
<td>Worn to protect hands. May be single use or reusable.</td>
<td>Vinyl, Latex, Nitrile</td>
</tr>
<tr>
<td><strong>Protective Clothing</strong></td>
<td><img src="image3.png" alt="Protective Clothing" /></td>
<td>Worn to protect skin &amp; clothing from hazards.</td>
<td>Lab coat, Lab apron</td>
</tr>
<tr>
<td><strong>Respiratory Protection</strong></td>
<td><img src="image4.png" alt="Respiratory Protection" /></td>
<td>Worn to prevent inhalation of airborne microorganisms, dust, &amp; fumes.</td>
<td>N95, PAPR</td>
</tr>
</tbody>
</table>

*Prior to wearing employees must obtain medical clearance & training, then fit test annually.*
Facts about Sharps Injuries

Sharps Devices Associated with Injuries
- Disposable syringes
- Suture needles
- Winged steel needles
- Scalpel blades
- Intravenous (IV) catheter stylets
- Phlebotomy needles

Work Practices Associated with injuries
- Needle recapping
- Improper disposal of used needles and in appropriate containers
- Overfilling sharps containers
- Mishandling of sharps

Statistics
- 600K to 800K needle stick injuries occur annually
- About half of needlestick injuries go unreported
- 38% of needlesticks occur during use
- 42% of needlesticks occur after use and during disposal
Puncture Wounds and Injections

- Injections are another way infectious materials can be introduced into the body

- The proper handling of needles, razor blades, etc can greatly reduce these potential hazards.
Protection Against Sharps

Follow these procedures when working with needles to minimize the chances of an accidental needle stick:

– Limit use
– Do not recap needles
– Do not remove needles from syringe
– Do not break, bend, or manipulate syringes
– Use needle-safe devices when available

Examples of needle-safe devices
Protection Against Sharps- Disposal

Sharps Containers

• Dispose of needles, razor blades and other sharps in approved puncture-proof containers

• Containers must be available at the point of use

• Do not fill more than ¾ full
Types of Sharps Containers

Sharps Containers with Safety Flaps
- Provide a safety mechanism to keep sharps inside the container in case it tips over
- These may remain open when not in use

Sharps Containers without Safety Flaps
- These must remain closed when not in use
Emergency Response

Contaminated Laundry/PPE
Eye Splash
Needlestick
Spill Response
Medical Evaluation
Contaminated Laundry Recommendations

- Reusable lab coats should **never** be taken home to be laundered.

- Lab coats contaminated or worn during the manipulation of blood or OPIM should be bagged and appropriately labeled with the universal biohazard symbol prior to pick-up or drop-off for laundry service.

- Limit contact with contaminated laundry by placing bagged laundry in a low-traffic area.

- Any PPE that is torn or contaminated should be immediately replaced or sent to be laundered.
Immediate care: Provide first aid and care per Emergency Response Plan* (Eyewash, shower, soap and water, incident protocol)

Reporting: Report incident to your supervisor

Medical Attention: Employee Health OR Emergency Room

Reporting: File an incident report with the Biosafety Office

Follow-up: healthcare professional’s written opinion, testing

* Each laboratory should have a specific Emergency Response Plan
Emergency Response - Eyewash

If blood or body fluid splashes in the eye, immediately go to the eyewash.

Hold or have someone hold open both your eyelids.

Wash eyes for at least 15 minutes.

Notify supervisor.

Seek medical attention for evaluation of exposure.

Complete incident report.
Emergency Response - Needlestick

1. Remove any contaminated or torn PPE
2. Wash area and hands for 15 minutes with soap and warm water
3. Notify supervisor
4. Seek medical attention
5. Complete an incident report
6. Follow-up with healthcare provider
Spill Clean Up

1. Notify others of the spill and let aerosols settle for 15 minutes.
2. Discard contaminated PPE and put on new PPE.
3. Prevent/Control spreading with absorbent material.
4. Apply disinfectant and allow to work; then collect residues.
5. Decontaminate area and equipment.
6. Complete an incident report.

Call the Biosafety Officer for large spills, or if you feel uncomfortable cleaning up the spill.
Medical Evaluation

- If you have an exposure, and you are a S&W employee, proceed to the Employee Health Office, located inside the hospital (black circle).
- If you are a TAMHSC employee, you should proceed to the Occupational Medicine Clinic within the Scott & White Hospital (black circle).
- VA employees should proceed to their Employee Health Center.

*After Hours Report to the Emergency Room*
Incident Report

An incident report should be completed in the event of any exposures, spills, or adverse events. You can find the incident report at:


Be sure to send an electronic copy to fnovembre@sw.org
Questions or Comments? Contact us!

Frank Novembre, PhD RBP — Biosafety Officer
254-771-4804
fnovembre@sw.org
Quiz

• You must submit the quiz and score at least 70% to complete this course.

• Be sure your email address is correct. We will email your certificate to you.

• Let us know how we are doing! Please complete the survey on the training.

• Link for Quiz:
  https://www.surveymonkey.com/s/H996TMJ