

Bloodborne Pathogens

exposure to blood and other potentially infectious materials is a major concern to organizations and employees, particularly for those who respond to medical incidents.

When you complete this course, you will be able to

- describe bloodborne pathogens and how they are transmitted
- control your exposure to bloodborne pathogens
- apply appropriate procedures in the event of an exposure incident

The Federal Occupational Safety and Health Administration (OSHA) issued a 'Bloodborne Pathogens' standard in order to minimize the potential for workplace exposure to pathogens such as human immunodeficiency virus (HIV) and Hepatitis B virus (HBV). Some states, such as California, also specifically regulate Hepatitis C virus (HCV).

bloodborne pathogens are microorganisms present in human blood that can cause disease in humans. They can be transferred to a healthy person through direct contact with blood or other potentially infectious materials (OPIM). OPIM include semen, vaginal secretions, cerebrospinal fluid, synovial (joint) fluid, pleural (lung) fluid, amniotic fluid, and any body fluid that is visibly contaminated with blood. OPIM also include human cell lines or cell lines known to be infected with human bloodborne pathogens. Three key bloodborne pathogens are HIV, HBV, and HCV.

Human Immunodeficiency Virus (HIV)

Human immunodeficiency virus (HIV) causes the immune system to break down, resulting in acquired immunodeficiency syndrome, (AIDS). It is spread mainly through exposure to blood or other potentially infectious materials ([OPIM](#)) either by skin injection, from an infected mother to her unborn infant, or via sexual contact. Although theoretically possible, casual transmission by saliva or droplets from coughing or sneezing is extremely rare, if it occurs at all.

In some individuals, symptoms of HIV infection may include rapid weight loss, dry cough, recurring fever or profuse night sweats, profound fatigue and diarrhea, among others. Because these are common symptoms associated with a number of diseases, the only way to tell if you have HIV infection is to be tested. It is also possible to have an HIV infection and show no symptoms.

AIDS develops when the HIV has destroyed many of the immune cells that protect us from disease. According to the Centers for Disease Control, about half the people with HIV develop AIDS within ten years. Although there is no known cure for AIDS, prompt and conscientious treatment with anti-viral agents can significantly improve the quality and length of life of infected persons. Specific medical treatments can prevent or cure some of the diseases associated with AIDS.

HIV is very fragile and will not survive very long outside the human body. The Centers for Disease Control indicates that essentially zero HIV survives in dried blood or dried body fluids.

Hepatitis B Virus (HBV)

The term hepatitis refers to inflammation of the liver. Hepatitis B virus (HBV) can cause severe damage to or failure of the liver in some persons. You get HBV by direct contact with blood or body fluids of an infected person. For example, you can become infected by having sex or sharing needles with an infected person. A baby can get HBV from an infected

mother during childbirth.

Symptoms of HBV infection can include jaundice, fatigue, abdominal pain, loss of appetite, nausea, and vomiting. HBV can also cause lifelong infection, [cirrhosis](#) (scarring), and liver cancer. On the other hand, some people may carry the HBV infection without showing or developing any symptoms; these people can still infect other people.

There is no cure for HBV. However, there is an effective vaccine. Unlike [HIV](#), HBV is relatively robust and can survive in blood and body fluids outside the human body. HBV has been shown to survive in dried blood for up to seven days.

Hepatitis C Virus (HCV)

Infection with Hepatitis C (HCV) leads to long term liver infection in 85% of infected persons and chronic liver disease in 70% of infected persons. Infected persons may also develop [cirrhosis](#) over long periods of time and may die from long-term infection due to cirrhosis or liver cancer. Some people who have HCV infection may show no symptoms. HCV is a bloodborne disease and can be transmitted in the same manner as [HBV](#) or [HIV](#); some people received HCV infection through blood transfusions before better testing of donors began in 1992. HCV treatment with antiviral drugs shows only limited success and there is no vaccine available.

As the name suggests, bloodborne pathogens are present in the blood and other potentially infectious materials ([OPIM](#)) of an infected person. If infected blood enters another person's body, that person may also become infected and "catch" the disease. Pathogens, such as [HIV](#), [HBV](#), and [HCV](#) can enter the body in a number of ways.

Although there are many ways that bloodborne pathogens can enter the body, use of appropriate exposure controls reduces the possibility of them being transmitted from one person to another. Exposure controls include following safe work practices or using equipment that provides a barrier between you and the pathogens. The following sections describe some common exposure controls.

Personal Protective Equipment

Personal protective equipment (PPE) provides a barrier between you and the potentially infectious materials. PPE is considered effective only if it stops blood or [OPIM](#) from passing through to your clothes or undergarments. PPE must also protect the skin, eyes, mouth, or other mucous membranes under normal use for the duration in which it will be used. **Roll your mouse over each of the body parts in the diagram on this page to view the most common types of PPE. Then, click through each one of them for more information.**

Eye Protection

Appropriate eye protection should always be worn as the eyes are especially susceptible to transmission of communicable diseases should contact with blood or blood products occur. Safety glasses with side shields are the minimum eye protection required for response actions. Goggles and/or a face shield are required when there is potential of splashing to the face. And remember, contact lenses do not provide any protection against splashes of biological materials.

Face Protection

asks or mouth coverings are worn in combination with eye protection devices whenever there is a potential for blood or other infectious material to be splashed, sprayed, spattered, or aerosolized.

Body Protection

Body protection, such as gowns or lab coats, protects the skin and clothing from direct contact with pathogens. Protective clothing is always worn when there is a potential for blood or other infectious material to be splashed, sprayed, spattered, or aerosolized. All exposed skin, as well as clothing, should be covered.

Hand Protection

Disposable gloves provide a barrier between your hands and potentially infectious materials and should be worn at all times when handling blood and body fluids. Gloves are selected based on their composition (depending on chemicals or specimens handled), physical hazard resistance, dexterity afforded, and availability of sizes.

Double gloves should be worn when it can be reasonably anticipated that there may be contact with non-intact skin and blood, tissues, or other potentially infectious materials.

Disposable gloves such as surgical or examination gloves need to be replaced as soon as practical when they are contaminated, or as soon as feasible when they are torn, punctured, or when their ability to function as a barrier is compromised.

Note that hypoallergenic gloves, glove liners, powderless gloves, or other similar alternatives must be available for employees with latex allergy or sensitivity.

Sharps

Even with the appropriate use of PPE, there is increased risk of exposure to bloodborne pathogens when handling "sharps." The term sharps refers to any object that can penetrate the skin. Careful handling of sharps can prevent injury and minimize the likelihood of infection with bloodborne pathogens. The use of sharps should be minimized as much as possible and used sharps must be disposed of in puncture-resistant containers.

Typical sharps include

- Needles
- Scalpels
- Razor blades
- Scissors
- Syringes
- Glass pipettes

Disposal of Sharps

Used sharps must be disposed of in puncture-resistant containers. The specific features of sharps containers include:

- Completely enclose all contents
- Prevent leakage of fluids during handling and storage
- Sealed lid (to prevent sharps from falling out of the container and to prevent people from putting their hands in)

- Red in color
- Labeled with biohazard symbol

REMEMBER - Recapping needles is never acceptable. Immediately dispose of needles in the sharps container.

Hepatitis B Vaccine

The risk of exposure to Hepatitis B can be reduced through the use of a vaccine. Hepatitis B vaccines are to be offered to all employees who may be exposed to bloodborne pathogens as part of their job duties. Employees are not required to participate in an antibody prescreening program to receive the Hepatitis B vaccination. However, any employee who declines to receive the Hepatitis B vaccination program must complete and sign a declination statement.

Declination Statement

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring the hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with the hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with the hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Employee Signature

Date

Universal Precautions

Because you have no way of knowing whether a person is infected with a bloodborne pathogen, it is prudent to use "Universal Precautions" if you may be exposed to blood or body fluids. Universal Precautions reduce exposure in the workplace by either removing the hazard or isolating the worker from exposure through workplace design.

Because it is difficult to differentiate between infectious and non-infectious biological materials, all blood and body fluids should be treated as potentially infectious, regardless of the perceived risk level of an exposure situation.

Other universal precautions may include having adequate sinks for handwashing and containers for disposal of sharp objects and waste.

The exposure controls you just covered can be found in a plan that is specific to your work site. The written Exposure Control Plan is designed to eliminate or minimize employee exposure to bloodborne pathogens. The Exposure Control Plan covers any employee who can reasonably be expected to come in contact with blood or [OPIM](#) in the course of his or her normal work duties. The Exposure Control Plan includes the following sections:

- Exposure determination - list of job classifications with occupational exposure, list of tasks and procedures performed in these classifications
- Method of compliance - universal precautions, engineering, and work practice controls

- Hepatitis B vaccination information
- Post-exposure evaluation and follow up
- Training information
- Exposure incident investigation procedures

The contents of the Exposure Control Plan must be specific to your work site. Your employer should review this plan with you before you have any job-related exposure to bloodborne pathogens.

Even with preventative measures in place, there are risks. You may need to clean up potentially infectious materials after an incident. Surfaces and equipment should be immediately cleaned and decontaminated with appropriate disinfectants. Any employee who is exposed to bloodborne pathogens, along with his or her employer, has the responsibility to follow the regulatory recommendations for post-exposure follow-up. We'll discuss both clean up and follow up procedures in the pages that follow.

Site Clean Up

If first responder teams should have a basic biological spill kit and know how to use it. The following list contains what should be found in a biological spill kit.

Site Clean Up cont.

When a spill occurs, you should clean it up quickly and safely. Make sure you are wearing personal protective equipment (PPE) appropriate for the job. Appropriate PPE typically includes eye protection, gloves, and a lab coat.

The following are general guidelines for cleaning up a spill of blood or body fluids:

1. Prevent spill from migrating to any floor or sink drains by placing a barrier in front of the spill to contain it or covering the drain opening.
2. Prepare disinfectant (e.g., dilute bleach to a 1:10 solution).
3. Place paper towels over the spill.
4. Pour bleach on the paper towels, starting from the periphery of the spill and moving towards the center, being careful to minimize aerosolization .
5. Let bleach soak for approximately 10 - 20 minutes.
6. Wipe up the spill with disposable paper towels, starting from the periphery of the spill and moving towards the center.
7. Wipe equipment with equipment-compatible disinfectant (e.g., non-corrosive). Rinse with water if necessary.
8. Wipe adjacent bench areas and floors.
9. Pick up broken glass or sharps only with a remote means such as tongs, forceps, or brush and dustpan.
10. Dispose of sharps in sharps container.
11. Dispose of paper towels, any other spill materials, and personal protective equipment in a biohazard bag. Seal the bag tightly and store the biohazard bag with the spill material in a rigid, impervious, leak proof container.
12. Place contaminated reusable items in biohazard bags or other suitable containers and autoclave.

REMEMBER - Wash your hands after removing your gloves.

Disinfection

Once a site has been properly cleaned and materials disposed of, a thorough disinfection of the site must occur. Disinfection refers to the reduction of microorganisms to an acceptable level through the use of sterilants or disinfectants.

Sterilants are used to eliminate microorganisms. For example, medical waste must be sterilized, typically using an autoclave or by sending the waste to an incinerator.

Disinfectants are used to reduce microorganism levels below the level necessary to cause disease. For example, laboratory work surfaces are disinfected in order to control any potential microorganism contamination. A fresh 10% bleach solution works well for bloodborne pathogens such as [HIV](#) and [HBV](#), although other liquid disinfectant solutions can also be effective.

Disinfection cont.

The use of liquid chemicals is the most common means of disinfection. However, the appropriate liquid disinfectant should be chosen only after carefully assessing the compatibility between the biohazardous agent and the type of material to be disinfected. Liquid disinfectants vary greatly in their efficiency, depending on the chemical constituents and the agents involved. Consider the following variables when selecting liquid disinfectants.

Disinfection cont.

All use of disinfectants should be conducted wearing gloves and safety glasses in well-ventilated areas. Face shields may also be used to provide additional face protection. Disinfectants are especially hazardous when dispersed from aerosol cans because the disinfectant can be easily inhaled through the nose and mouth. Refer to the material safety data sheet (MSDS) for specific health hazards associated with disinfectant ingredients as the most effective disinfectants are often very corrosive and toxic.

REMEMBER - All chemical disinfectants are considered pesticides. Skin contact and vapors can be irritating and corrosive to the respiratory system and skin.

Contaminated Laundry

All laundry which becomes contaminated with biohazardous materials should be handled and stored for transport as outlined below:

- Contaminated laundry should be handled as little as possible with a minimum of agitation. Use proper PPE, such as latex gloves or an apron, when handling contaminated laundry.
- Contaminated laundry should be bagged or containerized at the location where it was used and not sorted or rinsed.
- Whenever contaminated laundry is wet and presents a reasonable likelihood of soaking through or of leakage from the bag or container, it should be placed and transported in bags or containers that prevent soak-through. These bags or containers must be clearly labeled as biohazardous

Follow-up

If you think you have been exposed to potentially infectious materials, immediately wash the affected area with water and mild soap. For contact with skin or mucous membranes,

remember to rinse the affected area for at least 15 minutes. You should report to your company's health provider as soon as possible during your work shift. Prompt treatment (i.e., within hours) is essential for [HIV](#) exposures. Your company's health provider will discuss treatment options with you and ensure that you are offered the best treatment protocol for your situation.

Review the procedures listed on this page regarding specific responsibilities that you and your employer have following an incident involving bloodborne pathogens:

If you are exposed to blood or body fluids, your employer must offer you a confidential medical evaluation and follow-up including:

- Documentation of the route(s) of exposure and the circumstances of the incident
- Identification and documentation of the source individual
- Collection and testing of blood for HBV and HIV infection status
- Post-exposure vaccines or medical treatment
- Counseling
- Evaluation of reported illnesses

In addition to the post-exposure evaluation and medical follow-up, if you had previously declined the HBV vaccination series, you must be offered a post-exposure vaccination or vaccine series within 24 hours of the incident.

Quiz:

1. Which of the following applies to HBV but is untrue about HIV?

- ☐ can be transferred through sexual contact
- ☐ can cause an incurable infection
- ☐ does not survive well outside the body
- ☐ may be present in dried blood for up to a week

2. What is a good disinfectant for bloodborne pathogens?

- ☐ 1% bleach
- ☐ 10% bleach
- ☐ 50% bleach
- ☐ 100% bleach

3. You declined the HBV vaccination at your company but you have since changed your mind and wish to receive the vaccine. What should be your concern?

- ☐ vaccine cost

- ☐ whether your employer will allow you to have the vaccine at this time
- ☐ whether you will get hepatitis from the vaccine
- ☐ none of the above

4. When cleaning up a spill of blood or body fluids, you cover the spill with paper towels and pour disinfectant directly onto the paper towels. How would you pour the disinfectant?

- ☐ Start from the center of the spill and pour towards the edges.
- ☐ Start from the edges of the spill and pour towards the center.
- ☐ Pour disinfectant in a zigzag pattern.
- ☐ Pour disinfectant so that the entire spill is covered at the same time.

5. You are cleaning a dried blood spill at work and tear your gloves. You have been vaccinated against HBV. What action should you take?

- ☐ Do not report the incident since you have already been vaccinated.
- ☐ Report the incident and get a medical exam.
- ☐ Report the incident and watch for unusual symptoms.
- ☐ Get revaccinated.

6. Select the ways in which bloodborne pathogens can enter the body.

- ☐ eyes, mucous membranes, broken skin, and injections
- ☐ eyes, mucous membranes, sweat glands, and broken skin
- ☐ sweat glands, mucous membranes, broken skin, and injections
- ☐ sweat glands, eyes, broken skin, and injections

7. You have been asked to assemble the spill kit for your workplace. What should you include?

- ☐ material data safety sheets, biohazard bags, PPE, and forceps
- ☐ bleach, biohazard bags, and material data safety sheets
- ☐ material data safety sheets, bleach, PPE, and biohazard bags
- ☐ bleach, biohazard bags, PPE, and forceps

8. Which of the following is NOT considered an OPIM (Other Potentially Infectious Materials)?

semen ☒ human hair ☐ human cell lines ☐ amniotic fluid

9. An employee dropped a jar of spaghetti sauce on the counter in the break room and cut his hand on the broken glass. You are asked to clean up the counter. Any blood from the cut has mixed with the spaghetti sauce. What should you do?

- ☐ Look for blood. If you don't see any, wipe the mess into a garbage can using sponge from the sink.

☐ Put on disposable gloves and safety glasses and brush the mess into the garbage can with a sponge.

☐ Put on gloves and safety glasses, use tongs to pick up the chunks of glass and put them in a sharps container. Decontaminate the spill and dispose of it in a biohazard waste container.

☐ Carefully pick out pieces of glass wearing two pairs of gloves.

10. Which list is true of the characteristics of a proper sharps container?

☐ puncture resistant, leak-proof, and red

☐ red, reusable, and puncture resistant

☐ leak-proof, puncture resistant, and reusable

☐ reusable, red, and puncture resistant