Los Alamos
NATIONAL LABORATORY

Bloodborne Pathogens

Student Manual

Live #7292

November 2025

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Bloodborne Pathogens

STUDENT MANUAL

Introduction and Orientation

Course Overview

Bloodborne pathogens (BBPs) are pathogenic microorganisms present in human blood or other potentially infectious body material (OPIM) that can cause disease in humans. At Los Alamos National Laboratory (LANL), workers with jobs that put them at risk of exposure to BBPs are provided with resources to reduce the risk of exposure and the knowledge of what to do if an exposure occurs. This course, Bloodborne Pathogens Live (#7292), presents information you can use to protect yourself and other workers from exposure to BBPs as required by 29 Code of Federal Regulations (CFR) 1910.1030, Bloodborne Pathogens.

Course Purpose

The purpose of this course is to equip workers with the knowledge necessary to recognize and respond effectively to potential occupational exposure to bloodborne pathogens (BBPs) and other potentially infectious materials (OPIM).

Course Objectives

After completing this course, you will be able to recognize:

- signs, symptoms, and health effects of select BBPs in the workplace
- regulations and requirements that address BBPs in the workplace, including the LANL Bloodborne Pathogen Exposure Control Plan (BBP ECP), and how you can get a copy
- jobs and tasks with a risk of exposure to BBPs
- modes of transmission of BBPs
- controls to reduce your risk of exposure to BBPs
- appropriate procedures for cleaning and decontaminating areas contaminated with blood or other potentially infectious materials (OPIM)
- what to do if you are exposed to a BBP in the workplace

Target Audience

This course is designed for workers who perform tasks or activities that place them at a potential risk for occupational exposure to BBPs. These workers include custodians, medical personnel, researchers, and technicians who work with blood and other potentially infectious material (OPIM), first aid and cardiopulmonary resuscitation (CPR) providers, and waste disposal workers. A more complete list of job classifications is given in Tables 1 and 2 of the LANL Biosafety Manual—Los Alamos National Laboratory Bloodborne Pathogen Exposure Control Plan.

Program Owner

This course was developed under the direction and technical oversight of Occupational Safety and Health–Industrial Hygiene and Safety (OSH-ISH), the functional program owner for this training.

Training Requirements

BBP training requirements, as required by the Occupational Safety and Health Administration (OSHA), are as follows:

- **Initial training**—must be provided at the time of initial assignment to tasks where occupational exposure may take place. *Bloodborne Pathogens Live (#7*292) meets the initial training requirement.

- **Refresher training**—required at least annually, i.e., within 365 days following initial training. Either *Bloodborne Pathogens Live (#7292) or Bloodborne Pathogens Refresher Self-Study (#11776)* will meet the annual refresher training requirement. Anyone taking this self-study course must take it at any Lab location between the hours of 8:00 am and 12:00 pm or 1:00 pm and 5:00 pm so that an expert can be available to answer questions (call (505) 667-0059 and ask for the Bloodborne Pathogens course manager).

- **Revised/new task training**—required when new or revised/modified tasks or procedures could affect a worker's BBP occupational exposure.

Course Limitations

The following course limitations apply:

- This course does NOT address facility- or site-specific hazards and controls, nor does it address specific tasks or procedures.
- This course does NOT address all BBPs to which you could be exposed in the workplace.

P101-15, Biological Safety, requires that biological workers successfully complete LANL Principles of Biosafety (#31701) and LANL Principles of Biosafety On-Line Refresher (#37023) on an annual basis.

Registration and Attendance

Attendance is crucial in order to receive credit for this course. All participants must sign the attendance roster for each day of the course and attend and actively participate in the course.

Delivery Methods

Course delivery consists of lectures, group discussions, and participant activities.

Evaluation Strategy

The instructor will use oral questioning during the presentation of each module to assess participants' mastery of the material. Problem areas identified during questioning will be reviewed in further detail.

Participants will be evaluated with classroom discussion and a participant activity.

Administrative Details

The instructor will use this portion of the course for introductions and to familiarize participants with facility safety and convenience features, the location of the facility's designated break area(s), and any additional resources or equipment available.

Participants must adhere to all safety requirements during training sessions. They should see their instructor immediately if they have any questions or concerns about safety.

Acronyms

AIDS	acquired immune deficiency syndrome
BBP	bloodborne pathogen(s)
BBP ECP	bloodborne pathogen exposure control plan
BSC	biosafety cabinet
CDC	Centers for Disease Control and Prevention
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
ECP	exposure control plan
EO	Emergency Operations
EPA	Environmental Protection Agency
FDA	Food and Drug Administration
FSD	functional series document
HAV	hepatitis A virus
HBV	hepatitis B virus
HCV	hepatitis C virus
HIV	human immunodeficiency virus
IWD	integrated work document
LANL	Los Alamos National Laboratory
NMAC	New Mexico Administrative Code
OI	opportunistic infection
OPIM	other potentially infectious material
OSH-ISH	Occupational Safety and Health-Industrial Safety and Health
OH-DO	Occupational Health Division
OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
RLM	responsible line manager (Group Leader or above)
US	United States
WMC	waste management coordinator

Glossary

See LANL Definition of Terms

Term	Definition
Acquired Immunodeficiency Syndrome (AIDS)	Most severe stage of HIV (stage 3).
Administrative/Work Practice Controls	Controls that reduce the likelihood of occupational exposure by altering the manner in which a task is performed (e.g., prohibiting recapping of needles by a two-handed technique).
Biological Hazard or Biohazard	Infectious agents that present a risk of death, injury, or illness to workers.
Biological Worker	An individual who works in the laboratory handling biohazardous material in a technical (rather than purely administrative/work practice) capacity, including staff members, technicians, students, or visitors.
Blood	Human blood, human blood components, and products made from human blood. This definition includes plasma, platelets, and serosanguinous fluids (fluids from wounds). Also included are medications derived from blood, such as immune globulins (immunoglobulins), albumin, and factors 8 and 9 (i.e., factors associated with hemophilia, a blood disorder). Coverage under this definition also extends to blood and tissues of experimental animals infected with HIV or HBV.
Bloodborne Pathogens (BBPs)	Pathogenic microorganisms present in blood or OPIM that can cause disease in humans. These pathogens include, but are not limited to, HBV, HCV, and HIV.
Clinical Laboratory	A workplace where diagnostic or other screening procedures are performed on blood or OPIM.
Contaminated	The presence or the reasonably anticipated presence of blood or OPIM on an item or surface.

Decontamination	The use of physical or chemical means to remove, inactivate, or destroy BBPs on a surface or item to the point where it is no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.
Epidemiology	The study of how and why diseases and health conditions occur in groups of people, and how this knowledge can be used to prevent and control them.
Engineering Controls	Controls (e.g., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the BBP hazard from the workplace.
Exposed worker	A person who is exposed to blood or OPIM.
Exposure Determination	The process by which the potential for an occupational exposure to a BBP is determined by evaluating such exposure as a function of the work a person does or by his/her job classification.
Exposure Incident	A specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or OPIM that results from the performance of a worker's duties. In this definition, "non-intact skin" includes conditions such as dermatitis, hangnails, cuts, abrasions, chafing, and acne.
Handwashing Facilities	A facility providing an adequate supply of running potable water, soap, and single-use towels or air-drying machines.
Hepatitis	Inflammation of the liver.
Hierarchy of Controls	A means of determining feasible and effective control systems for a hazard. Consideration of controls starts with elimination of the hazard, followed by substitution with a less hazardous material, engineering controls, administrative/work practice controls, and finally, personal protective equipment (PPE).

Human Immunodeficiency Virus (HIV)	A BBP that can lead to the development of acquired immunodeficiency syndrome (AIDS). HIV attacks the body's immune system, making the body less able to fight infections and resist disease.
Infectious Waste	Municipal and residual waste which is generated in the diagnosis, treatment, immunization or autopsy of human beings or animals, in research pertaining thereto, in the preparation of human or animal remains for interment or cremation, or in the production or testing of biologicals, and which falls under one or more of the following categories: cultures and stocks, pathological wastes, blood and body fluid waste, or animal wastes.
Mucous Membranes	Just as skin protects the outside of the body, mucous membranes line and protect the inside of your body. You can find mucous membranes inside your nose, mouth, lungs, and many other parts of the body.
Needleless Systems	Systems that provide an alternative to needles for the specified procedures, thereby reducing the risk of percutaneous injury involving contaminated sharps. Examples of needleless systems include, but are not limited to, intravenous medication delivery systems that administer medication or fluids through a catheter port or connector site using a blunt cannula or other non-needle connection, and jet injection systems that deliver subcutaneous or intramuscular injections of liquid medication through the skin without use of a needle.
New Mexico Special Waste	A solid waste that has unique handling, transportation, or disposal requirements to assure protection of the environment and the public health, welfare, and safety. It includes infectious waste.
Occupational Exposure	Reasonably anticipated skin, eye, mucous membrane, or parenteral contact with blood or OPIM that may result from the performance of a worker's duties. The term "reasonably anticipated contact" includes the potential for contact as well as actual contact with blood or OPIM. "Reasonably anticipated contact" includes, among others, contact with blood or OPIM (including regulated

	waste) as well as incidents of needlesticks. Note: this definition does not cover "Good Samaritan" acts (i.e., voluntarily aiding someone in one's place of employment) that result in exposure to blood or OPIM from voluntarily assisting a fellow worker. These acts must be reported to Occupational Health Division (OH-DO), so that a licensed healthcare provider may offer follow-up procedures.
Opportunistic Infection (OI)	Illnesses that occur more frequently and are more severe in people with HIV. This is because they have damaged immune systems.
Other Potentially Infectious Material (OPIM)	Materials from the human body other than blood can contain BBPs and be an infection risk.
Parenteral	Piercing mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.
Pathogenic	Causing or capable of causing disease.
Personal Protective Equipment	Specialized clothing or equipment worn by a worker for protection against a hazard. Note: general work clothes (e.g., uniforms, pants, shirts, or blouses) not intended to function as protection against a hazard are not considered to be PPE.
Regulated Waste	Liquid or semiliquid blood or OPIM; contaminated items that release blood or OPIM in a liquid or semiliquid state if compressed; items that are caked with dried blood or OPIM and can release these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or OPIM. Note: these wastes, as well as contaminated animal carcasses and bedding, are regulated in the State of New Mexico as "infectious wastes," which is a subcategory of New Mexico Special Waste. See P409, *LANL Waste Management*, for storage and handling requirements.
Sharps	Objects that might produce a cut, gash, or puncture wound. Examples of sharps include needles, scalpels, glass slides, cover slips, pipettes, and broken glass.

Sharps with engineered sharps injury protection	A non-needle sharp or a needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident. This term encompasses a broad array of devices that make injury involving a contaminated sharp less likely. They include, but are not limited to: syringes with guards or sliding sheaths that shield the attached needle after use; needles that retract into a syringe after use; shielded or retracting catheters used to access the bloodstream for intravenous administration of medication or fluids; intravenous medication delivery systems that administer medication or fluids through a catheter port or connector site using a needle that is housed in a protective covering; blunt suture needles; and plastic (instead of glass) capillary tubes.
Source Individual	Any individual, living or dead, whose blood or OPIM may be a source of occupational exposure to the worker. Examples include, but are not limited to, hospital and clinic patients, clients in institutions for the developmentally disabled, trauma victims, clients of drug and alcohol treatment facilities, residents of hospices and nursing homes, human remains, and individuals who donate or sell blood or blood components.
Standard Precautions	Additional infection prevention elements to universal precautions in order to protect workers. Standard precaution includes hand hygiene, the use of certain types of PPE based on anticipated exposure, safe injection practices, and safe management of contaminated equipment and other items in the patient environment.
Universal Precautions	An approach that treats all human blood and OPIM as if they are contaminated with BBPs. In most cases, there is no way of knowing what materials are potentially infectious. *To minimize your risk of exposure, treat all blood and OPIM as if they are contaminated with BBPs.*

Module 1

Definitions and Diseases

Module Objectives

After completing this module, you will be able to recognize:

- definitions and diseases associated with BBPs
- signs, symptoms, health effects, and modes of transmission
- incidence rate of specific BBPs

Definitions

Bloodborne Pathogen (BBP)

BBPs are microorganisms that may be present in blood and that can cause disease in humans. BBPs can enter the body when infected blood or Other Potentially Infectious Material (OPIM) comes in contact with breaks in the skin (such as cuts or scrapes) or mucous membranes (such as splashes to eyes, nose, or mouth).

Universal Precautions

Universal precautions are an approach that treats all human blood and OPIM as if they are contaminated with BBPs. In most cases, there is no way of knowing what materials are potentially infectious. To minimize your risk of exposure, ***treat all blood and OPIM as if they are contaminated with BBPs***.

Other Potentially Infectious Material (OPIM)

Materials from the human body* other than blood can contain BBPs and be an infection risk.

*At LANL, universal precautions (i.e., treating body fluids as potentially infectious) are used where exposure to infected animal blood may occur, such as during activities in which experimentally or naturally infected animals are used or handled. For more information, see OSH-ISH-FSD-BM-007 (LANL Bloodborne Pathogen Exposure Control Plan (BBP ECP).

Considerations for BBPs

Persons who work with or perform research with infected animals, wildlife trapping, or pest control should refer to their Integrated Work Document (IWD) that governs their work. OSH-ISH-FSD-BM-007 (LANL BBP ECP) is also available for reference.

OTHER POTENTIALLY INFECTIOUS MATERIAL (OPIM)
semen, vaginal secretions, and saliva in dental procedures
cerebrospinal fluid (fluid found within the tissue that surrounds the brain and spinal cord of all vertebrates) **synovial fluid** (fluid in bone joints) **amniotic fluid** (fluid surrounding a fetus) **pericardial fluid** (fluid surrounding the heart) **peritoneal fluid** (fluid in the abdomen) **pleural fluid** (fluid in the chest cavity surrounding the lungs)
any body fluid visibly contaminated with blood, and all body fluids where it is difficult or impossible to differentiate between body fluids
any unfixed tissue (has not been preserved with a chemical) or organ (other than intact skin) from a living or dead human
HIV-containing cell or tissue cultures; organ cultures; HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues taken from experimental animals infected with HIV or HBV.

Note: *Fecal matter, nasal secretions, sputum, sweat, tears, urine, saliva, and vomit are not regarded as OPIM, unless blood is visibly present, or you cannot tell if blood is present.*

Diseases Associated with BBPs

Common diseases caused by BBP include, but are not limited to:

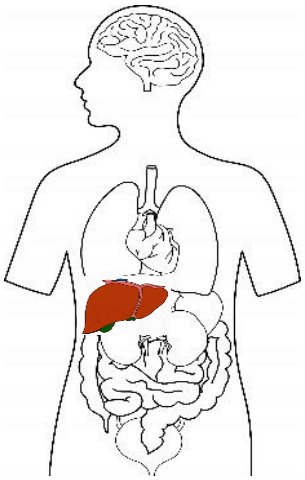
- Hepatitis B and C
- HIV/AIDS
- Syphilis
- Ebola
- West Nile, Malaria, Chikungunya, Zika Virus (vector-borne disease or BBP)



Diseases that are transmitted by vector instead of direct blood contact are called ***vector-borne diseases***, even though the pathogens are still in blood. Biting insects and ticks are examples of vectors that transmit a disease or parasite from one animal or plant to another. Examples of vector-borne diseases in New Mexico include West Nile virus, Rocky Mountain spotted fever, Colorado tick fever, Chikungunya virus, Zika virus, and plague. In most years, only a few cases occur. For example, four human cases of plague were documented in New Mexico in 2015, one of which resulted in death.

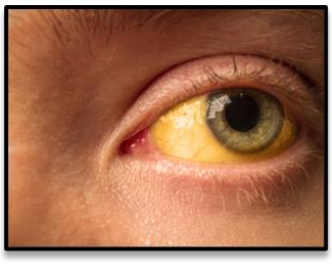
Bloodborne Hepatitis Viruses

Hepatitis is an inflammation of the liver. Because the liver removes toxins from the blood, diseases of the liver can be life threatening. The most common types of bloodborne hepatitis viruses are hepatitis B virus (HBV) and hepatitis C virus (HCV).



Signs and symptoms for hepatitis resemble the flu and include:

- fever
- fatigue (feeling tired)
- dark urine
- abdominal pain
- joint pain
- loss of appetite
- nausea
- vomiting
- jaundice (a yellowing of the skin and eyes)



Hepatitis B Virus (HBV)

HBV is a vaccine-preventable liver disease caused by the hepatitis B virus. HBV is transmitted when blood, semen, or another body fluid from a person infected with the virus enters the body of someone who is uninfected.

CDC ESTIMATES THAT ABOUT 640,000 ADULTS IN THE US HAVE CHRONIC (LONG-TERM) HEPATITIS B

Know the following about HBV:

- A vaccine exists for HBV. The HBV vaccine is safe and effective. You need to get all shots in the series to be fully protected.
- About half of all people with HBV do not know they are infected. Transmission of HBV in the workplace may occur from being stuck with a contaminated sharp or from contact between broken skin, wounds, or mucous membranes and HBV-infected blood or blood-contaminated body fluids.
- HBV can be short term (acute), occurring within the first 6 months of exposure, or long term (chronic), causing cirrhosis (scarring of the liver), liver cancer, or liver failure which can be fatal.
- Hepatitis B is a leading cause of liver cancer.
- HBV can survive at least 7 days in dried blood.

Hepatitis C Virus (HCV)

HCV is a liver infection caused by the hepatitis C virus. Hepatitis C is spread through contact with blood from an infected person.

CDC ESTIMATES THAT MORE THAN 2.4 MILLION PEOPLE AND AS MANY AS 4 MILLION PEOPLE IN THE US HAVE HEPATITIS C

Know the following about HCV:

- NO vaccine for HCV currently exists.
- Hepatitis C is curable in more than 95% of cases with proper treatment.
- Up to 75–85% diagnosed with HCV show no symptoms of the disease. Infected persons who show no symptoms may be carriers and infect others. Nearly one-third of people with HCV do not know they are infected.

- HCV is one of the most common and deadly infectious bloodborne diseases.
- More than half of people who become infected with HCV will develop chronic infection.
- HCV can be spread when blood from a person infected with the hepatitis C virus (even in microscopic amounts) enters the body of someone who is not infected.
- Transmission of HCV in the workplace may occur from being stuck with a contaminated sharp or from contact between broken skin, wounds, or mucous membranes and HCV-infected blood or blood-contaminated body fluids.
- HCV can survive outside the body for up to 6 weeks.

Prevalence and Incidence of Viral Hepatitis

Prevalence is the number of people living with an infection or disease at a given time.
Incidence is the number of new cases of infection or disease during a given period of time.

"Outbreaks" of Hepatitis Diseases

CDC received reports of 66 outbreaks of viral hepatitis related to health care from 2008-2019; of these, 62 (94%) occurred in non-hospital settings.

https://www.cdc.gov/hepatitis/outbreaks/

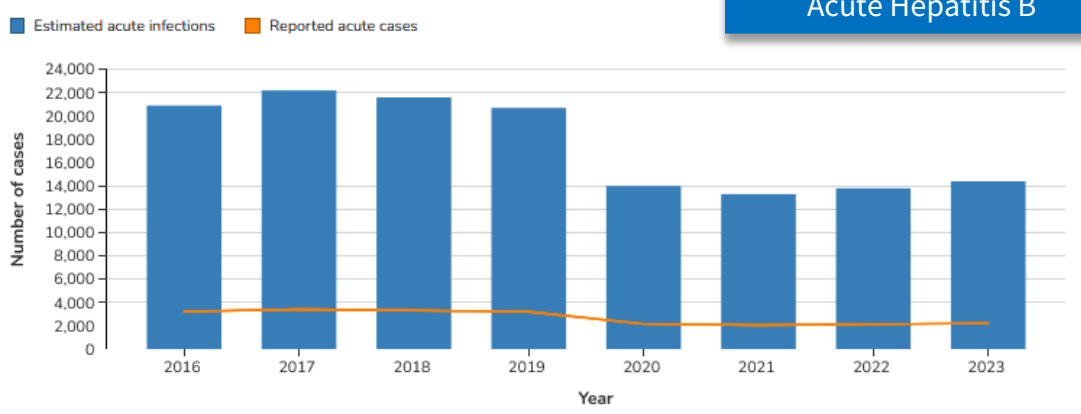
The CDC estimates that the actual number of cases is much greater than the reported number because many people do not know they are infected.

The following graphs show the incidence of acute HBV and HCV in the US from 2016-2023.

Source for Graphs: CDC

As reported from the CDC. Centers for Disease Control and Prevention. Viral Hepatitis Surveillance Report – United States, 2023. https://www.cdc.gov/hepatitis-surveillance-2023/about/index.html *Published April 2025 Accessed July 18, 2025.*

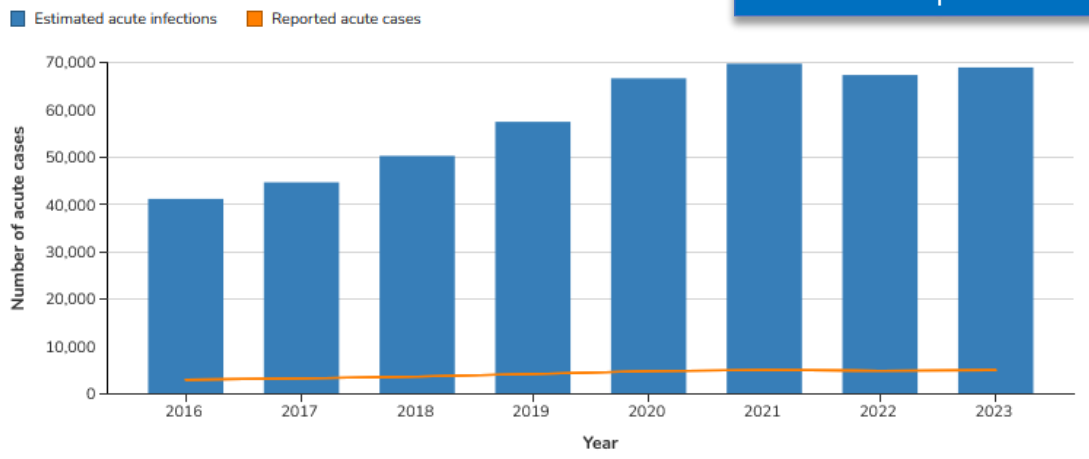
Acute Hepatitis B



Hepatitis B

	2016	2017	2018	2019	2020	2021	2022	2023
Estimated acute infections	20,900	22,200	21,600	20,700	14,000	13,300	13,800	14,400
Reported acute cases	3,218	3,409	3,322	3,192	2,157	2,045	2,126	2,214

Acute Hepatitis C

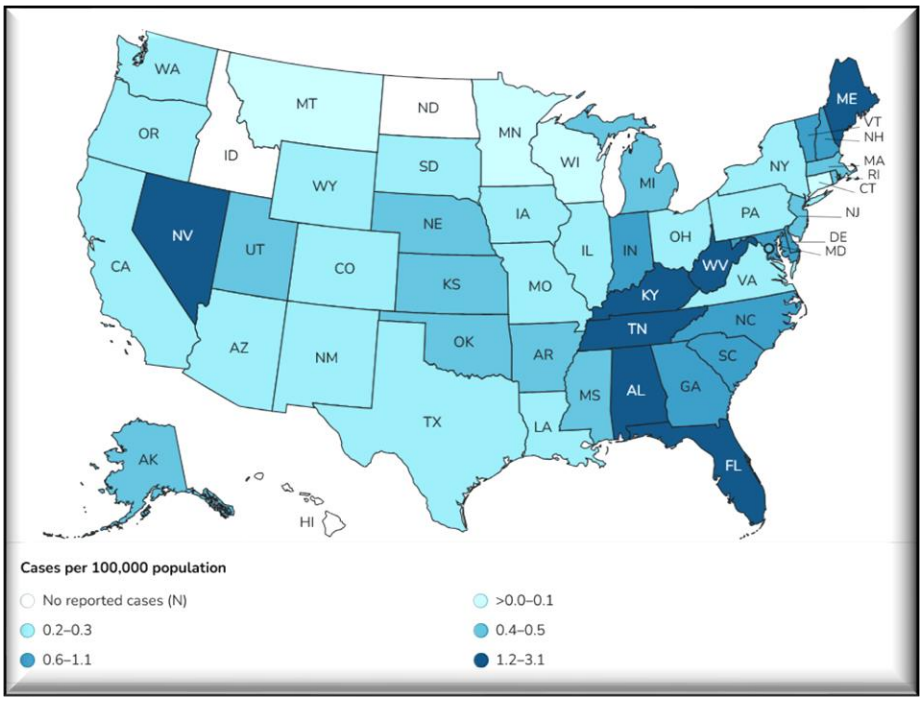


Data Table

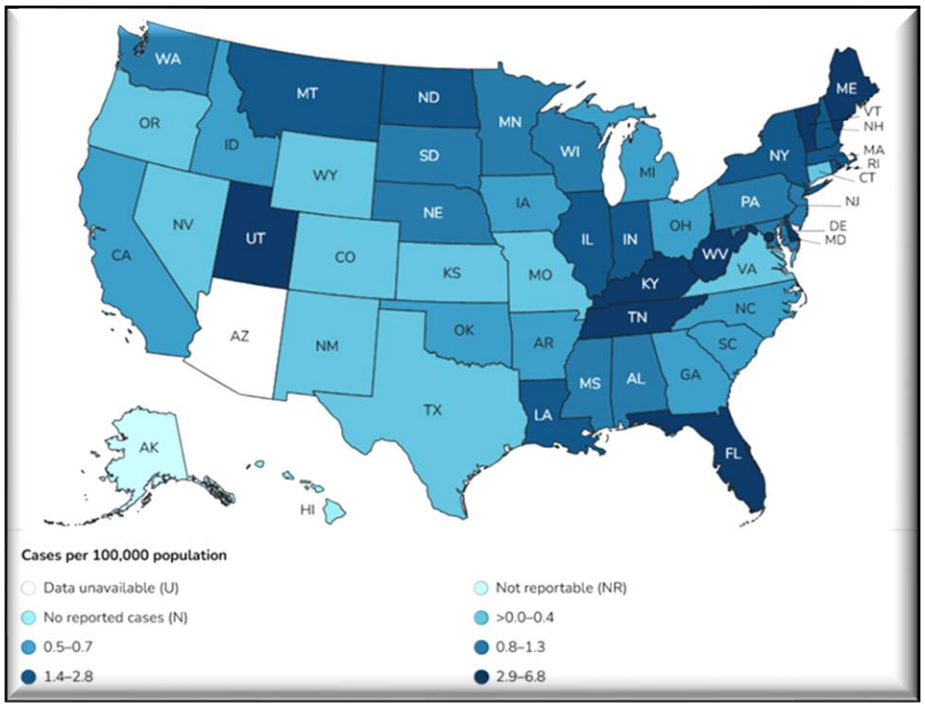
	2016	2017	2018	2019	2020	2021	2022	2023
Estimated acute infections	41,200	44,700	50,300	57,500	66,700	69,800	67,400	69,000
Reported acute cases	2,967	3,216	3,621	4,136	4,798	5,023	4,848	4,966

Rates* of Reported† Cases by State or Jurisdiction in the US, 2023

Acute Hepatitis B:



Acute Hepatitis C:



Source: CDC, National Notifiable Diseases Surveillance System.

* Rates per 100,000 population.
† Reported cases that met the classification criteria for a confirmed case.

Epidemiology is the study of how and why diseases and health conditions occur in groups of people, and how this knowledge can be used to prevent and control them.

***Note:** Hepatitis is a significant public health issue in the United States, but not all states are affected equally.*

Key Factors That Influence Hepatitis Incidence:
• Risk Behaviors & Exposure
• Healthcare Access
• Socioeconomic & Demographic Differences
• State-Level Surveillance & Reporting
• Vaccination Programs

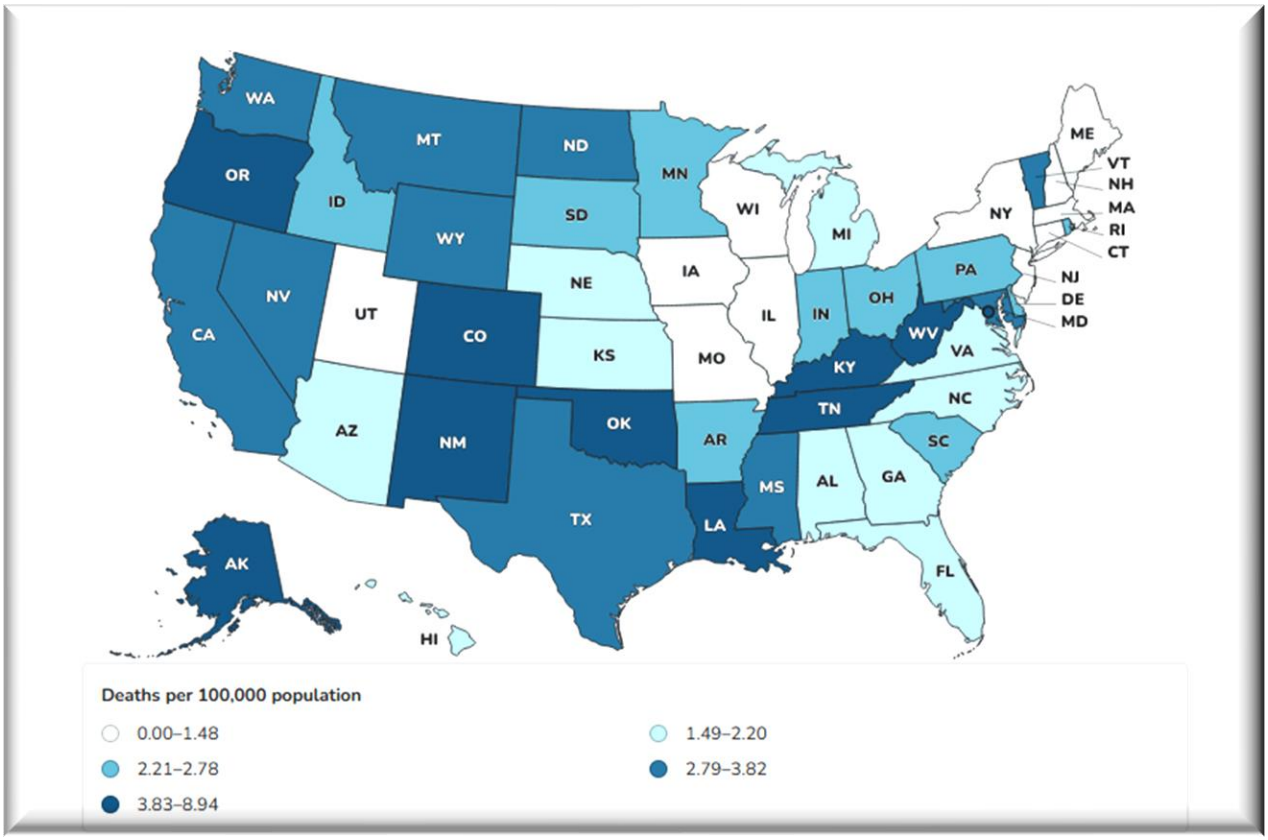
Death Rates from Viral Hepatitis

Chronic liver disease caused by viral hepatitis can lead to death. Deaths in the US from hepatitis during 2019–2023 are shown in the table below.

Deaths from Hepatitis* in the US		
YEAR	HBV	HCV
2019	1,662	14,242
2020	1,752	14,863
2021	1,748	13,895
2022	1,797	12,717
2023	1,769	11,194

*As listed on the death certificate per CDC.
https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-b/index.html
https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-c/index.html

Rates of deaths with Hepatitis C virus infection listed as a cause of death among residents, by state or jurisdiction — United States, 2023



HIV and AIDS

HIV Transmission, Signs, and Symptoms

Human immunodeficiency virus (HIV) is a BBP that can lead to the development of acquired immunodeficiency syndrome (AIDS). HIV attacks the body's immune system, making the body less able to fight infections and resist disease. Blood tests are available that can detect the HIV antibody, but no vaccine exists to prevent HIV.

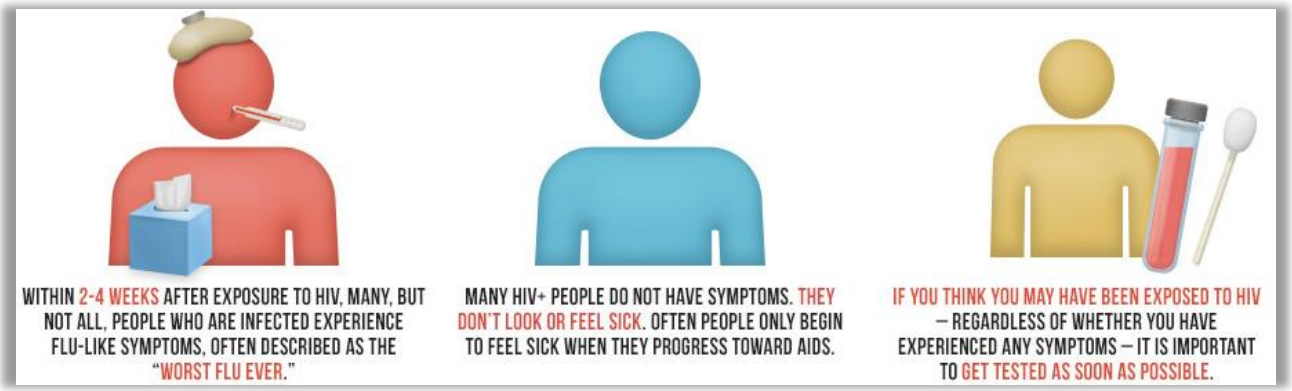
HIV is transmitted mainly through contaminated needles or syringes used in drug injections or by sexual contact. In the workplace, HIV may be spread through:

- *being stuck with an HIV-contaminated needle or other sharp object*
- *contact between broken skin, wounds, or mucous membranes and HIV-infected blood or blood-contaminated body fluids*

Signs and symptoms of HIV infection may occur shortly after being infected or may take several years.

- *Within 2 to 4 weeks of being infected, a person may develop a brief flu-like illness. Symptoms may include fever, headache, sore throat, swollen lymph glands, and rash.*
- *A person may be free of symptoms for years; however, as the virus multiplies and destroys immune cells, the person may develop chronic symptoms, such as swollen lymph nodes, diarrhea, weight loss, fever, or cough and shortness of breath.*

Note: *The survival rate of HIV outside the body (surfaces) is not long and cannot be reproduced outside of a human host.*



AIDS Signs and Symptoms

If left untreated, HIV often progresses to AIDS in approximately 10 years. AIDS is the most severe stage of HIV (Stage 3). Infections that would not normally be a problem to a healthy immune system may become life-threatening to a person with AIDS. Once the immune system has been damaged, people become susceptible to infections and have symptoms such as:

- *recurring fever or night sweats*
- *shaking chills or fever higher than 100ºF*
- *recurring illnesses*
- *unexplained fatigue or weakness*
- *swollen lymph glands in the armpits, groin, or neck*
- *diarrhea that lasts more than a week*
- *white spots or other blemishes on the tongue or in the mouth*
- *red, brown, pink, or purplish blotches on or under the skin*
- *memory loss, depression, and other nerve disorders*

People who develop AIDS have badly damaged immune systems and are more susceptible to opportunistic infections (OIs). People receive an AIDS diagnosis when they develop certain OIs or their CD4 cell count drops below 200 cells per milliliter of blood.

Note: *CD4 cells, also known as helper T cells or T cells, fight off infections and keep you from getting sick. Healthy individuals have approximately 500 to 1500 CD4 cells.*

OIs include, but are not limited to:

- *pneumonia*
- *candidiasis (fungal infections of the mouth and esophagus)*
- *Kaposi's sarcoma (a type of cancer that forms in the lining of blood vessels and lymph vessels)*

Kaposi's sarcoma (left) is a rare form of cancer that causes painless purple or brownish lesions that do not heal. Kaposi's sarcoma is somewhat common in people with AIDS and can be fatal.

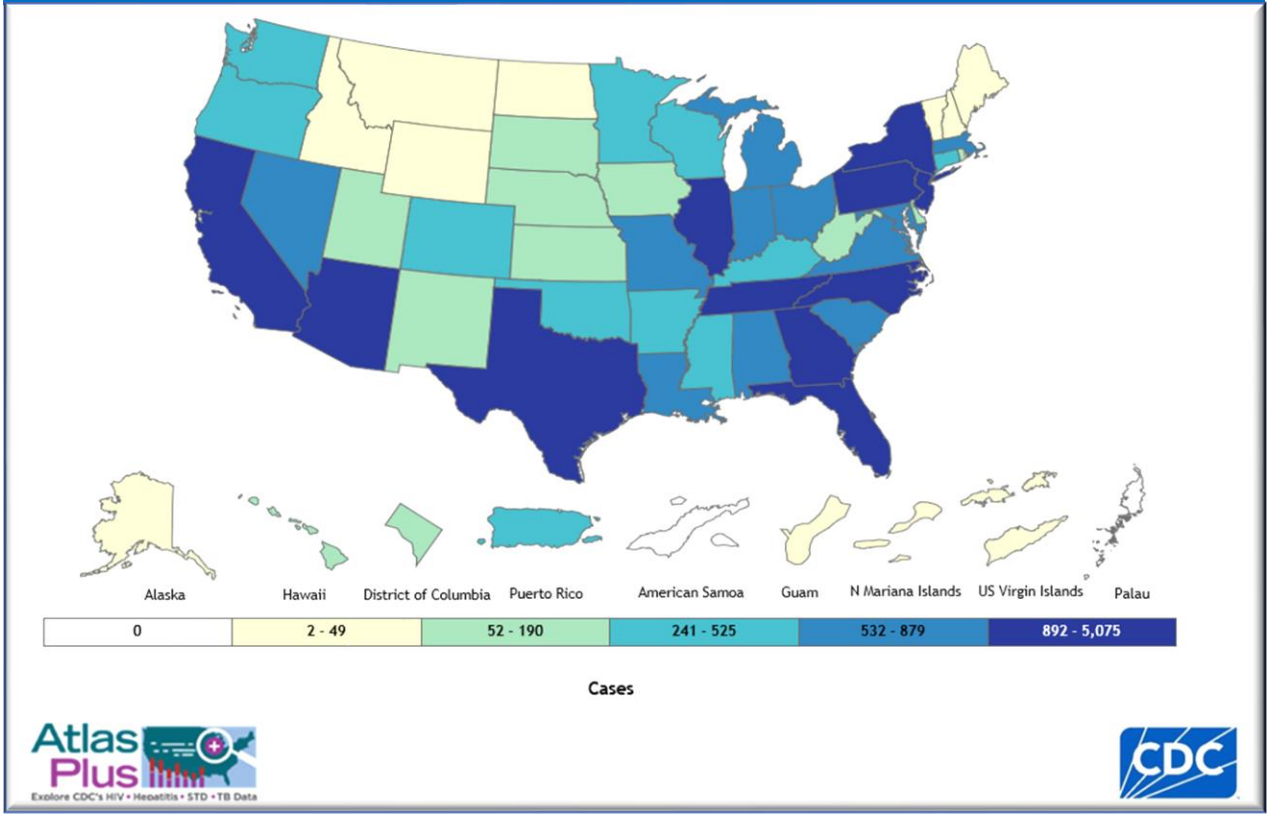
Note: *A person should not assume he or she is infected solely on the basis of any of these symptoms. Medical testing is the only way to determine if a person is infected.*

Prevalence and Incidence of HIV and AIDS

In the US, an estimated 1.2 million people in the United States had HIV at the end of 2024. Of those people, about 87% knew they had HIV. In 2024, about 35,000 people received an HIV diagnosis in the United States and dependent areas. The annual number of new diagnoses decreased 8.5% from 2017 to 2024.

HIV Diagnoses by State in 2023 | Ages 13 years and older | All races/ethnicities | Both Sexes

Numbers in legend show the number of people diagnosed with HIV.



Source: CDC – Image generated using NCHHSTP AtlasPlus app.

As reported from the CDC. https://www.cdc.gov

HIV Diagnoses, Deaths, and Prevalence. Last Reviewed: February 7, 2025. Accessed October 1, 2025.

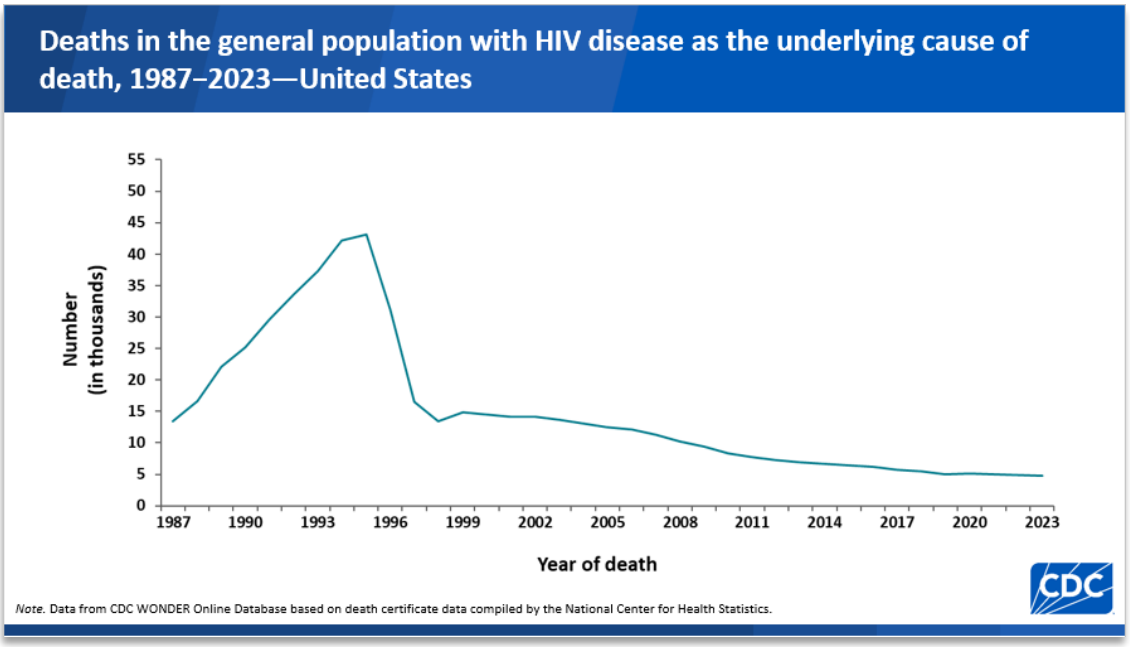
In 2024, about 35,000 people received a new HIV diagnosis in the United States and dependent areas.

In 2024, 138 people received a new HIV diagnosis in New Mexico.

Death from AIDS

Because of early identification and better treatment, the survival rate for HIV/AIDS has improved in recent years.

- *The CDC estimates that in 2021, there were 14,759 deaths (all causes, including COVID-19) among people with HIV infection ever classified as stage 3 (AIDS).*
- *The CDC estimates that in 2023, there were 18,789 deaths (all causes) among people with HIV infection ever classified as stage 3 (AIDS).*
- *The CDC estimates that in 2023, there were 4,748 deaths in the general population that were attributed to HIV.*
- *The cumulative number (1987–2023) of deaths attributable to HIV in the United States was 549,459.*



HIV and AIDS Prevention and Treatment

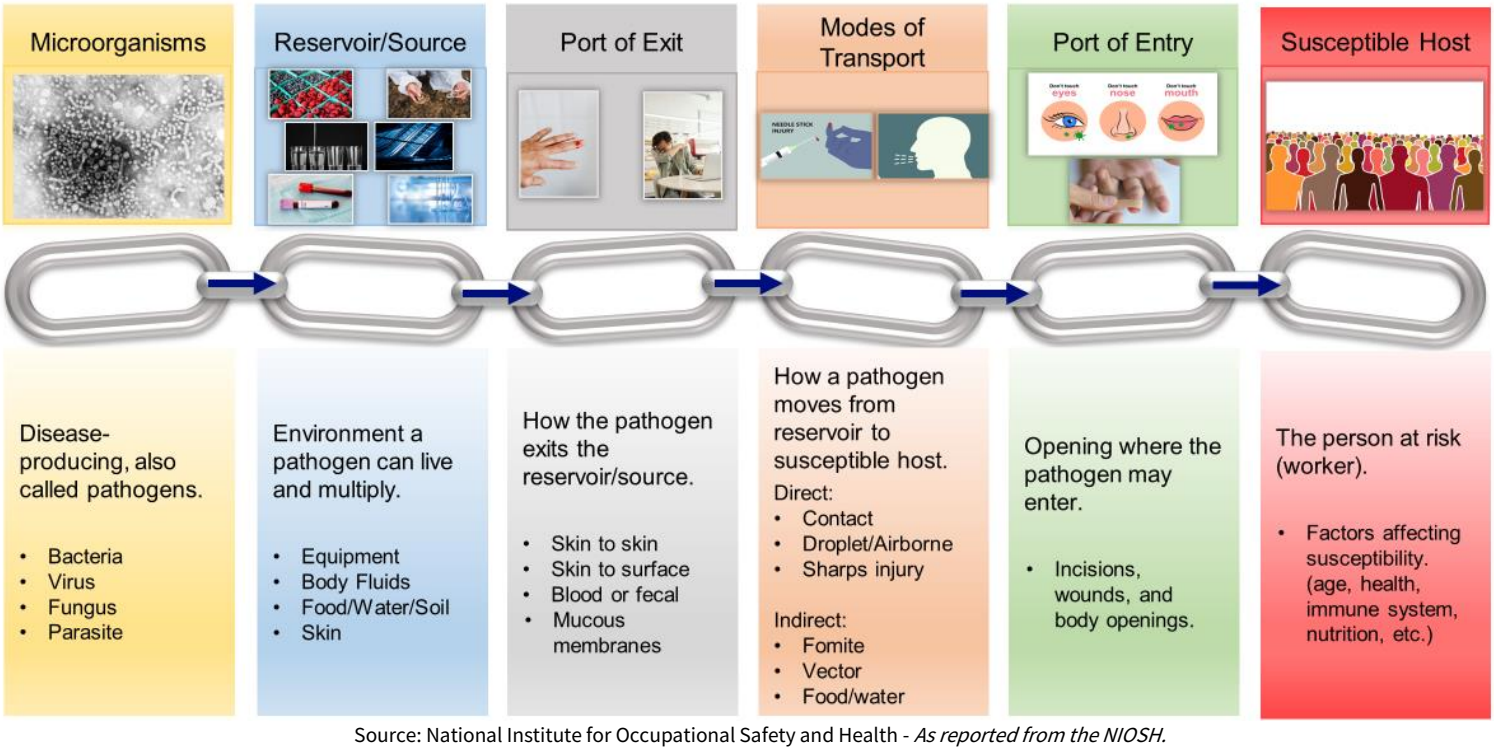
Currently, no vaccine exists to prevent HIV, nor does any cure for HIV or AIDS exist. Once people get HIV, they have it for life. The best control is to prevent exposure. However, early detection is important. Medical treatments can slow the rate at which HIV weakens the immune system or can address some of the AIDS-related illnesses. People with HIV who get effective HIV treatment can live long, healthy lives and protect their partners.

Key Factors That Influence HIV Incidence:
• Differences in Risk Behaviors
• Access to Prevention & Treatment
• Socioeconomic & Demographic Factors
• Geographic Trends
• Public Health Infrastructure
• Cultural and Behavioral Norms

Chain of Infection

The chain of infection has six components that describe how a pathogen moves.

- *Microorganisms*
- *Reservoir/Source*
- *Port of Exit*
- *Modes of Transport*
- *Port of Entry*
- *Susceptible Host*



Source: National Institute for Occupational Safety and Health - *As reported from the NIOSH.*
https://www.cdc.gov/niosh/learning/safetyculturehc/module-2/3.html
Last Reviewed: April 28, 2022. Accessed October 1, 2025.

Module 1 Self-Assessment

1. BBPs can cause all of the following diseases, EXCEPT
    a. hepatitis B
    b. tuberculosis
    c. hepatitis C
    d. HIV
2. Hepatitis viruses affect which organ?
    a. liver
    b. heart
    c. stomach
    d. kidneys
3. HIV slowly attacks and destroys the _____ system.
    a. nervous
    b. immune
    c. digestive
    d. respiratory
4. A sign of hepatitis is
    a. jaundice
    b. blurry vision
    c. hair loss
    d. foot sores
5. Which method is most likely to transmit HIV or hepatitis viruses?
    a. mosquito bites
    b. saliva-to-saliva contact
    c. shaking hands with strangers
    d. blood contact with an open sore
6. Other potentially infectious materials (OPIMs) include all of the following, EXCEPT
    a. semen
    b. bloody saliva
    c. tears
    d. amniotic fluid

Module 2

Regulations and LANL Requirements

Module Objectives

After completing this module, you will be able to recognize:

- regulations and requirements that address occupational exposure to BBPs
- the components of the LANL BBP ECP and how you can get a copy of the BBP ECP

Regulations and LANL Policies

Regulations and LANL policies that affect workers who are at risk for BBP exposure include:

- 29 Code of Federal Regulations (CFR) 1910.1030, Bloodborne Pathogens
- LANL Procedure P101-15, Biological Safety (Biosafety)
- IG-P409-0230, Management of New Mexico Special Waste
- LANL Procedure P409, LANL Waste Management
- Biosafety Manual, Los Alamos National Laboratory Bloodborne Pathogen Exposure Control Plan (OSH-ISH-FSD-BM-007)

29 CFR 1910.1030, Bloodborne Pathogens

The purpose of 29 CFR 1910.1030, *Bloodborne Pathogens*, is to "eliminate or minimize occupational exposure to hepatitis B virus (HBV), human immunodeficiency virus (HIV), and other BBPs."

The OSHA BBP regulations require employers to develop a written ECP, as discussed at the end of this module. The regulations also require personnel with potential occupational exposure to BBPs as part of their job to have access to the OSHA standard. Other items required by 29 CFR 1910.1030 are exposure determination; engineering and work practice controls; methods of compliance; personal protective equipment (PPE); and housekeeping.

The OSHA Bloodborne Pathogens regulations can be found online at https://www.osha.gov/laws-regs/regulations/standardnumber/1910/1910.1030

Note: *Used feminine hygiene products are not covered by 29 CFR 1910.1030. However, custodial workers should wear gloves that reduce their potential exposure to BBPs when cleaning restrooms.*

P101-15, Biological Safety, and IG-P409-0230, Management of New Mexico Special Waste

These two documents give requirements for protecting LANL employees, subcontractors, and visiting researchers and the environment against harm resulting from exposure to biological agents and biohazards such as BBPs.

P409, LANL Waste Management

This policy document describes the Laboratory's system for safely and compliantly characterizing, packaging, storing, treating, disposing, and transporting the various sanitary, hazardous, radioactive, and otherwise regulated wastes generated by LANL activities.

Note: *Also required is the LANL New Mexico Special Waste label (see page 43).*

LANL Bloodborne Pathogen Exposure Control Plan (BBP ECP)

The LANL BBP ECP is found in the LANL Biosafety Manual FSD—Los Alamos National Laboratory Bloodborne Pathogen Exposure Control Plan. (Updated 5/24/2023)
https://int.lanl.gov/org/ddops/aldbus/si/dcrm/dcrm-docs/OSH/OSH-ISH-FSD-BM-007.pdf

This BBP ECP is a key document to assist LANL in implementing and ensuring compliance with 29 CFR 1910.1030. The LANL BBP ECP includes:

- worker exposure determination
- methods of exposure control, including
    - *universal precautions*
    - *engineering controls*
    - *administrative/work practice controls*
    - *PPE*
- housekeeping requirements
- laundry requirements
- labeling requirements
- hepatitis B vaccination of covered workers
- post-exposure evaluation and follow-up
- procedures for evaluating circumstances surrounding exposure incidents
- training (communication of hazards to workers)

Note*: Facility or job-specific ECPs and/or integrated work documents (IWDs) may be used to support LANL BBP ECP requirements.*

Module 3

Image Created by AI

Jobs and Tasks with Potential Exposure

Module Objectives

After completing this module, you will be able to recognize:

- methods to identify tasks or activities with potential exposure to blood or OPIM
- jobs and tasks with potential exposure to blood or OPIM

Job Classifications with BBP Exposure Risk

The following table is a list of job classifications in which workers at LANL have possible occupational exposure to blood or OPIM. Included is a list of tasks and procedures, or groups of closely related tasks and procedures, in which occupational exposure may occur for these individuals.

Job Classification with Occupational Exposure to Blood or OPIM
Phlebotomists, Nurses, Medical Technicians, and Medical Providers (including physicians, physician's assistants, nurse practitioners)
First aid and CPR-qualified individuals designated to provide emergency first aid, e.g., Wellness Center Facility staff, Emergency Management Division Emergency Response (EMD-ER) Hazmat Team
Environmental Protection and Compliance - Waste Management Services (EPC-WMS) workers handling regulated waste, including Waste Management Coordinators (WMCs)
Research Laboratorians, Bioscience Division (B-Tek, B-Gen, B-IOME)
Logistics Heavy Equipment Roads and grounds pest control workers designated for blood or OPIM cleanup

Table 1: Information from LANL BBP ECP

Additional Job Classifications with the Potential for Occupational Exposure to Blood or OPIM	
Job Classification	Job Task
Indirect patient care/health care personnel	Indirect patient care health care
Investigation and remediation personnel at infectious waste sites	Air, soil, and water sampling, waste handling and removal operations, and other duties at sites where direct contact with infectious waste may occur
Research personnel	All research tasks in which anticipated or actual exposure to blood or OPIM could occur
Pipefitters and wastewater plant workers	Pipefitter and wastewater tasks (sitewide) in which personnel may come in contact with blood or OPIM
Custodial staff, workers/subcontractors, and other job classifications	All tasks in which anticipated or actual exposure to blood or OPIM could occur. If applicable, a specific exposure determination by job classification and task will be completed.

Table 2: Information from LANL BBP ECP

Recognizing Tasks with Potential BBP Exposure

Any task or activity that could result in a worker having a reasonably anticipated, job-related exposure to blood or OPIM should be looked at in terms of BBPs. If you are not sure whether a task could create exposure to BBPs:

- read the LANL BBP ECP requirements in the Biosafety Manual FSD—Los Alamos National Laboratory Bloodborne Pathogen Exposure Control Plan, (OSH-ISH-FSD-BM-007)
- read your IWD or site-specific ECP (if your group has one) that supplements the LANL BBP ECP
- contact your deployed health and safety person or the LANL BBP subject matter expert as given in the LANL Homepage>Safety>Industrial Hygiene and Safety>Biosafety>Contacts (Program Lead and Institutional Biological Safety Officer and Backup)

Module 4

Exposure Control for BBPs

Module Objectives

After completing this module, you will be able to recognize:

- methods of exposure control, such as engineering and administrative/work practice controls, including the *LANL Bloodborne Pathogen Exposure Control Plan*, used to prevent or reduce the risk of BBP exposure and the limitations of such controls
- activity-specific practices for tasks that may involve exposure to BBPs, including cleanup and decontamination of BBPs, first aid assistance, and laundry handling
- PPE used for BBPs and factors that affect the selection, inspection, use, location, removal, handling, decontamination, disposal, and limitations of PPE
- the benefits, effectiveness, and potential side effects of the HBV vaccine

Controls for Bloodborne Pathogens

Controls are used to minimize potential exposure to BBPs in the workplace. The hierarchy (preferred order) of controls is:

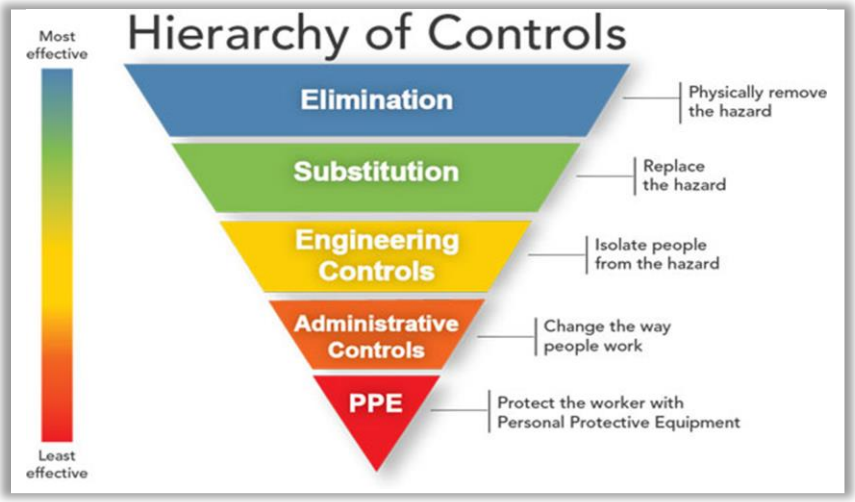


Image by NIOSH. Hierarchy of Controls. NIOSH; Washington, DC, USA: 2015.

***Note:** More detailed information about BBP controls may be found in the Principles of Biosafety course #37023.*

Engineering Controls

Engineering controls are mechanical or structural systems used to minimize hazards. For engineering controls to be effective, they must be accompanied by the use of administrative/work practice controls. Examples of engineering controls that can reduce the risk of exposure to BBPs are presented below.

- **Biosafety cabinets (BSCs)** are a primary means of containment used for working safely with infectious microorganisms, including BBPs. BSCs are equipped with high-efficiency particulate air (HEPA) filters and have a sash that acts as a splash guard.
- 

- **Ultraviolet (UV) Lamps** – can help reduce the risk of BBPs by disrupting the cells that make up a pathogen. However, the ability of a UV light to disinfect is limited by factors such as:

  - ***Penetration:*** *BBPs under dust particles or under the work.*
  - ***Relative Humidity:*** *The antimicrobial effects of UV light drop off considerably above 70% relative humidity.*
  - ***Temperature and Air Movement:*** *Less-than-optimal temperature reduces output of the antimicrobial wavelength. Moving air tends to cool the lamp and can also reduce output.*
  - ***Lamp Cleanliness:*** *Dust and dirt can block the antimicrobial effectiveness of UV lights. (UV lamps need periodic cleaning.)*
  - ***Lamp Age:*** *The intensity of UV light emitted from UV lamps decreases with age.*

Note: Cleaning/Disinfecting *– removes BBPs from laboratory glassware and other items. Engineering controls that assist with equipment cleaning include autoclaves and dishwashers.*

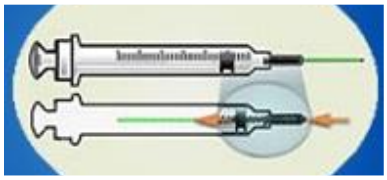
There are various levels of "clean." Sterilization techniques use temperature, chemicals, and/or pressure to kill or inactivate all living microbes, viruses, and their spores. Disinfection uses antimicrobial agents on non-living objects or surfaces to destroy or inactivate microbes. Disinfection lacks the margin of safety provided by sterilization.

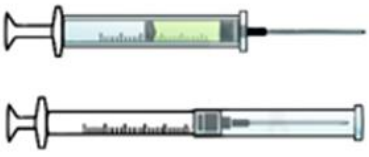
- **Autoclaves** provide an effective method for sterilizing equipment, waste, and materials that may be contaminated with bloodborne pathogens (BBPs). They use pressurized steam at high temperatures to destroy microorganisms, including spores, ensuring that potentially infectious materials are rendered safe for handling or disposal.

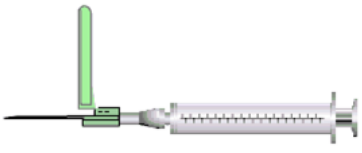
- **Sharps containers** are designed to hold contaminated sharps. They are leakproof on the sides and bottom and are closable, rigid walled, puncture resistant, and labeled with a biohazard symbol and/or color coded (red). Openings to these containers must be kept closed when the container is not in use. Maintain upright during use and inspect routinely. Replace whenever necessary to prevent overfilling. Never open, empty, or clean in any manner that would expose workers to the risk of injury.

  To move contaminated sharps properly, close container immediately before removal or replacement to prevent spillage or protrusion of contents. Place container in a secondary container if leakage or puncture is possible or contamination outside the primary container occurs.

- **Sharps with engineered sharps injury protection** – a non-needle sharp or needle device used for withdrawing body fluids, accessing a vein or artery, or administering medications or other fluids, with a built-in safety feature or mechanism that effectively reduces the risk of an exposure incident. This term encompasses a broad array of devices that make injury involving a contaminated sharp less likely. These devices include, but are not limited to:
  - syringes with guards or sheaths that shield the attached needle after use
  - needles that retract into a syringe after use
  - blunt needles
  - plastic (instead of glass) capillary tubes
  - handles for razor blades


Self-retracting needle.


Self-sheathing needle.


Needle with hinged shield.

Administrative Controls

Administrative/work practice controls are changes in work procedures intended to reduce the likelihood of an exposure to hazardous materials or situations.

- Access control can be used to limit the number of workers with access to an area with potential exposures to BBPs. At LANL, this control may be a laboratory with a badge access reader that allows entry only to certain persons.
- Hand-washing facilities having tepid [i.e., 16°C–38°C (60°F–100°F)], potable water must be provided at each site. If the provision of facilities is not feasible, antiseptic hand cleansers or towelettes must be used immediately after potential exposure, followed by soap and running water as soon as possible. If showers are provided, they must be equipped with hot and cold water feeding a common discharge line.
    - Workers must wash hands with nonabrasive soap immediately or as soon as possible after removing gloves, or after coming in contact with blood or OPIM.

- Workers must not eat, drink, smoke, chew gum or tobacco, apply cosmetics, or handle contact lenses in areas of potential exposure. Food or drink must not be kept where blood or OPIM is present.

- Universal precautions, which treat all human and certain human body fluids as if they were known to be infectious for HIV, HBV, and other BBPs, must be used to prevent direct physical contact. These precautions include the use of barriers, isolation, PPE, and first aid supplies.
- Workers must not bend, recap, or remove contaminated disposable needles. Reusable sharps must be contained in a manner that eliminates or minimizes the hazard until they are reprocessed (i.e., autoclaved or incinerated offsite).
- Equipment that may have been contaminated with blood or OPIM will be decontaminated, if feasible. If equipment cannot be decontaminated, it will be labeled as a biohazard. Information regarding the biohazard will be communicated to all handling, shipping, and service personnel.
- Contaminated work surfaces are to be decontaminated with an appropriate disinfectant. Appropriate disinfectants include a diluted bleach solution, e.g., 1:10 dilution, EPA-registered Tuberculocides (List B), EPA-registered sterilant (List A), products registered against HIV/HBV (List D), or sterilant/high level disinfectants cleared by the FDA. Information about selected EPA-registered disinfectants is available at https://www.epa.gov/pesticide-registration/selected-epa-registered-disinfectants. The sterilants and high-level disinfectants cleared by the FDA can be found at https://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/ReprocessingofReusableMedicalDevices/ucm437347.htm. Any of the above products are considered effective when used according to the manufacturer's instructions, provided the surfaces have not become contaminated with agents for volumes (or concentrations) of agents which higher level disinfection is recommended.

***Note**: The EPA lists (https://www.epa.gov) contain the primary registrants' products only. The same formulation is frequently repackaged, renamed, and distributed by other companies. These renamed products will not appear on the list, but their EPA registration number must appear on the label. Products cleared solely by the FDA will not have an EPA number.*

- Each organization performing work where the potential for occupational exposure to blood or OPIM exists will solicit worker input from non-managerial workers in the identification, selection, and evaluation of effective engineering and administrative/work practice controls and will document the solicitation using the *Bloodborne Pathogens Worker Input for Needlestick Protection Device* Form (Attachment 1 of the BBP ECP).
- All procedures involving blood or OPIM must be performed to minimize splashing, spraying, or aerosolization of droplets.
- Mouth pipetting of blood or OPIM is prohibited.

Use and Obey Biohazard Signs and Labels

Signs and labels with the biohazard symbol are used to indicate the presence of biohazards, including BBPs.

A fluorescent red/orange biohazard label must be used to label the following BBP-related materials at LANL: specimens, contaminated laundry, research samples, sharps containers, regulated waste, incubators, freezers, refrigerators, or other contaminated items. All regulated and infectious waste containers will be labeled with the "Biohazard" legend, in accordance with IG-P409-0230, *Management of New Mexico Special Waste.*

Responsible Line Managers (RLMs) are responsible for ensuring that warning labels are affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal. Workers are to notify their Waste Management Coordinator (WMC) if they discover regulated waste containers, refrigerators containing blood or OPIM, or contaminated equipment without proper labels.

All regulated waste containers must be labeled with a biohazard label and sealed before moving. Labels required for contaminated equipment shall be in accordance with CFR 1910.1030(g)(1) and shall also state which portions of the equipment remain contaminated.

Containers of infectious waste (as defined by New Mexico Solid Waste regulations) must also have a LANL New Mexico Special Waste label. Your WMC can assist you with proper labeling.

A New Mexico Special Waste label shall be used for containers containing infectious waste.

Exempt Items

Regulated waste that has been decontaminated **need not** be labeled or color-coded.

Containers of blood, blood components, or blood products that are labeled as to their contents and have been released for transfusion or other clinical use are **exempted** from the labeling requirements.

Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment, or disposal are **exempted** from the labeling requirement.

Training

Bloodborne pathogens training is another type of administrative/work practice control. BBP training requirements are addressed in the introduction of this manual.

Job/Activity-Specific Practices

Job/activity-specific practices are meant to keep the worker safe when a specific job, task, or activity may have a potential exposure to hazardous materials or dangers. Review your administrative/work practice controls in your IWD.

Cleanup and Decontamination of BBP



Actions to take in the cleanup and decontamination of areas contaminated with blood or OPIM depend on the location of the contamination and the training and authorization of the persons involved.

- In a nonradiological area, contact the facility manager or Emergency Operations Support Center at (505) 667-2400.
- In a radiological area, contact the area radiological control technician (RCT) or Emergency Operations Support Center (505) 667-2400.
- For workers who are trained and authorized to clean up and decontaminate areas where contact with human blood, animal blood, or OPIM may occur, report the spill to your RLM and follow your IWD.

Note: Verify that you are trained and authorized to perform such work.

If you are not trained and authorized for such work, stop and call (505) 667-2400 [Emergency Operations Support Center (EOSC)].

Clean Up

- *Restrict access to the area.*
- *Wear PPE that will prevent blood and OPIM from contacting your skin, eyes, mouth, mucous membranes, work clothes, or street clothes.*
- *Don impermeable gloves before starting cleanup. If needed, use cut-, puncture-, and stab-resistant gloves.*
- *During cleanup, DO NOT pick up sharps directly with your gloves. Instead, use tools such as forceps, tongs, dust pans, or shovels.*
- *Broken glass or sharps should be disposed of in a sharps container to prevent injury.*
- *DO NOT reach your hands into any containers or piles that may contain infectious waste.*
- *Use 6-mil bags for infectious waste and keep infectious waste separate from regular garbage or trash.*
- *Working from the outside of the spill inwards, surround and cover the entire spill area with paper towels until liquid is fully absorbed.*
- *Discard contaminated paper towels in the appropriate biohazard bag or follow your IWD if using autoclave biological trash stream for sterilization.*

Decontaminate

- *Change gloves.*
- *Cover the entire area with paper towels and carefully pour the disinfectant solution, such as a 1:10 dilution of bleach (10ml bleach into 90ml water) onto the paper towels to soak them thoroughly. Be certain that the product you use is EPA registered and suitable for use on blood and OPIM spills. For more information, see the safety data sheet (SDS).*
- *Leave the disinfectant solution on the surface for at least 30 minutes; long enough to destroy the BBPs. If object contains spores, allow 60 minutes contact time. If unsure, refer to the relevant safety data sheet (SDS) and OSH-ISH-FSD-BM-009, Table 1 to determine the appropriate disinfectant.*
- Remove and replace as soon as possible any removable, temporary surfaces (e.g., sorbent paper material) that could absorb potentially infectious blood or other body fluids. Dispose of the sorbent paper as infectious waste.

- Decontaminate all potentially contaminated reusable containers and tools, such as pails or bins.
- Ensure that reusable equipment (such as wet/dry vacuums) used for cleaning BBP/OPIM spills on absorbent surfaces is decontaminated or properly labeled.
- Report the spill to your RLM.

Carry objects such as waste bags away from your body to reduce the chances of contact with a sharp.

Image displayed above demonstrates worker throwing out a red biohazard bag. Please note that some sites at LANL may have different biohazard processes and bags.

Contact your WMC to dispose of all blood-contaminated materials and contaminated PPE as infectious waste. Use biohazard bags and attach a New Mexico Special Waste label.

Activity - Accidental Exposure to a Needlestick

Read the event and answer the questions.

In August 1994, a custodial worker hoisting a trash bag into a dumpster felt a sharp object stick him in the shoulder. At the time, the worker did not report the incident to his supervisor or to Occupational Medicine.

In October 1994, the worker reported to Occupational Medicine for a medical evaluation. Investigation of the event revealed that the needle of an insulin syringe had stuck the worker. The worker underwent testing for HIV to determine his infection status.

- What factors and/or actions contributed to this event?
- What lessons can be learned from this event?

Laundering Requirements

When used with BBPs, contaminated laundry is laundry that has been soiled with blood or OPIM or may contain sharps. Contaminated articles generated at OH-DO/TA-3, Building 1411 will be laundered there.

The following laundering requirements must be met:

- Dispose of all contaminated laundry as regulated waste or send it to a laundry facility where personnel are experienced in handling infectious waste. Complete information regarding the nature of the waste and potential hazards must be disclosed to the laundry facility.
- Handle contaminated laundry as little as possible, with minimal agitation.
- Place wet, contaminated laundry in leakproof, labeled, or color-coded containers before transporting it. Use biohazard bags for this purpose.
- Wear nitrile gloves and a lab coat or scrubs when handling and/or sorting contaminated laundry.
- Clean and decontaminate all equipment and environmental surfaces after contact with blood or OPIM.
- Place all regulated waste in containers that have lids that can be tightly closed and that are constructed to prevent leaks.

Limitations of BBP Engineering and Administrative Controls

Engineering and administrative controls reduce, but do not eliminate bloodborne pathogen risks. Their effectiveness depends on proper use, consistent compliance, and ongoing maintenance.

Because of the limitations of engineering and administrative controls (and the limitations of PPE), workers should always try to use the appropriate controls in combination to create a "defense in depth." That way, if a control is not used or is used incorrectly, another control will be there to prevent worker exposure to BBPs.

Limitations of Engineering Controls

There are often few engineering controls that can be used where the potential for BBP exposure may occur unexpectedly. In such cases, administrative controls and PPE are often used as the primary controls for BBPs.

Engineering controls:

- *do not eliminate the hazard completely — only reduce exposure risk.*
- *require consistent maintenance and inspection to remain effective.*
- *can be costly to implement (e.g., safety syringes, needleless systems).*
- *may not cover every exposure scenario (e.g., unexpected splashes, human error).*
- *effectiveness depends on proper use by employees.*

Limitations of Administrative Controls

For administrative controls to be effective, they must be recognized by workers and used by workers.

Administrative Controls:

- *rely heavily on human compliance and behavior, which can be inconsistent.*
- *are difficult to monitor and enforce consistently in all workplace settings.*
- *training effectiveness may fade over time without reinforcement.*

Personal Protective Equipment

PPE for BBP is provided to workers at no cost. Training in the use of the appropriate PPE for specific tasks or procedures is provided by the person in charge (PIC).

The types of PPE available to workers include but are not limited to:

- nitrile gloves
- safety glasses/goggles with side shields
- laboratory coats or scrubs
- face shields

Note: *PPE is available in research laboratories, the clinical laboratory at TA-03, Building 1411, custodial closets, and HAZMAT vehicles. Additional PPE may be obtained through the RLM. RLMs must ensure that PPE is available.*

All workers using PPE must observe the following precautions:

- Wash hands immediately or as soon as feasible after removing gloves or other PPE.
- Reusable PPE must be laundered, decontaminated (face shields, safety glasses with side shields), autoclaved, or disposed of as regulated waste.
- Remove any garment contaminated by blood or OPIM immediately, or as soon as feasible, in such a way as to avoid contact with the contaminated surface.
- Workers must use PPE that does not permit blood or OPIM to reach their clothes or bodies under normal conditions and for the duration of use.

- PPE must be provided, maintained, and properly disposed of at each work site where potential exposure exists. PPE must be accessible at each work site and will include hypoallergenic gloves or alternatives as necessary.
- Workers must remove potentially contaminated PPE before exiting the work area and place it in a regulated container for disposal.
- Wear appropriate face and eye protection when splashes, sprays, spatters, or droplets of blood or OPIM pose a hazard to the eye, nose, or mouth.

***Note**: Where blood or OPIM cleanup is anticipated, consider staging a BBP spill kit with items such as gloves, eye/face protection, gown, shoe covers, fluid solidifier, biohazard bags, absorbent paper towels, and antiseptic wipes.*

Specific glove requirements include the following:

- Wear nitrile gloves when it is reasonably anticipated that there may be hand contact with blood or OPIM and when handling or touching contaminated items or surfaces.
- Review your IWD and Safety Data Sheet (SDS) to determine the type of glove required for the work to be done. If chemicals are also being cleaned up, neoprene gloves may be required.
- Replace gloves that are torn, punctured, contaminated, or if their ability to function as a barrier is compromised.
- Reusable gloves may be decontaminated for reuse if their integrity is not compromised; discard reusable gloves if their ability to function as a barrier is compromised or if they show signs of cracking, peeling, tearing, puncturing, or other signs of deterioration.
- Never wash or decontaminate disposable gloves for reuse.

***Note:** Latex allergy is a reaction to certain proteins in latex rubber that may cause symptoms within minutes or hours of exposure that can vary from mild skin, eye, nose, and throat reactions to severe, life-threatening reactions.*

PPE Selection

When selecting PPE, follow these practices:

- Review your IWD to find out what PPE is required for your work.
- Consider the potential source(s) and situations of exposure. Will you be exposed to blood streaming from a wound? Will you be standing in potentially contaminated water? Will you be handling potentially contaminated waste?
- Consider the potential routes of entry through which you could be exposed. Also consider the expected amount of exposure time. Use appropriate eye and face protection, such as goggles or a face shield, when the spurting, splashing, or

splattering of blood or OPIM is possible. In extreme situations, consider the use of surgical caps, shoe coverings, and/or fluid-resistant clothing.

- Consider the job you will be performing and the need for dexterity, protection against sharps, etc.
- Consider other hazards from which your PPE must protect you, such as chemical, physical, or radiological hazards. Also consider hazards that may be caused or made worse by PPE, such as heat stress.
- Always select gloves that are impermeable to blood and OPIM.

PPE Inspection

Inspect all PPE to ensure that it is in good condition. Focus on places where wear and damage are most likely to occur, such as at seams and stress points. Discard the PPE or turn it in for repair or disposal if you think it is damaged.

P101-6, *Personal Protective Equipment*, requires that all gloves worn as PPE be visually inspected for damage before being used. Inspect your gloves before each use for defects such as:

- pinholes, scratches, or tears
- imperfect seams
- discoloration
- cracks or stiffness

One way to check gloves for pinholes is to roll them from the cuff and listen/look for leaks.

Note: *Discoloration caused by exposure to ultraviolet radiation (such as from sunlight) increases the risk of glove failure.*

PPE Use

When used improperly, PPE might not give the protection it is designed for and could give the wearer a false sense of security. To help ensure proper use, consider the following precautions before and during the use of PPE:

- Follow the manufacturer's recommendations for tasks and conditions in which the PPE can be properly used, as well as the limitations of the PPE.
- Remove any rings, watches, or bracelets that might cut or tear your gloves.

- Do not touch your face or adjust your PPE with contaminated gloves and try not to touch environmental surfaces except as needed.
- Make sure the PPE fits properly.
- NEVER inflate new gloves by mouth.
- Replace single-use gloves as soon as possible when contaminated, torn, punctured, or otherwise not fully protective.

Note: *For more information about PPE, take the online course Personal Protective Equipment Introduction Self-Study (#28886).*

Location and Handling

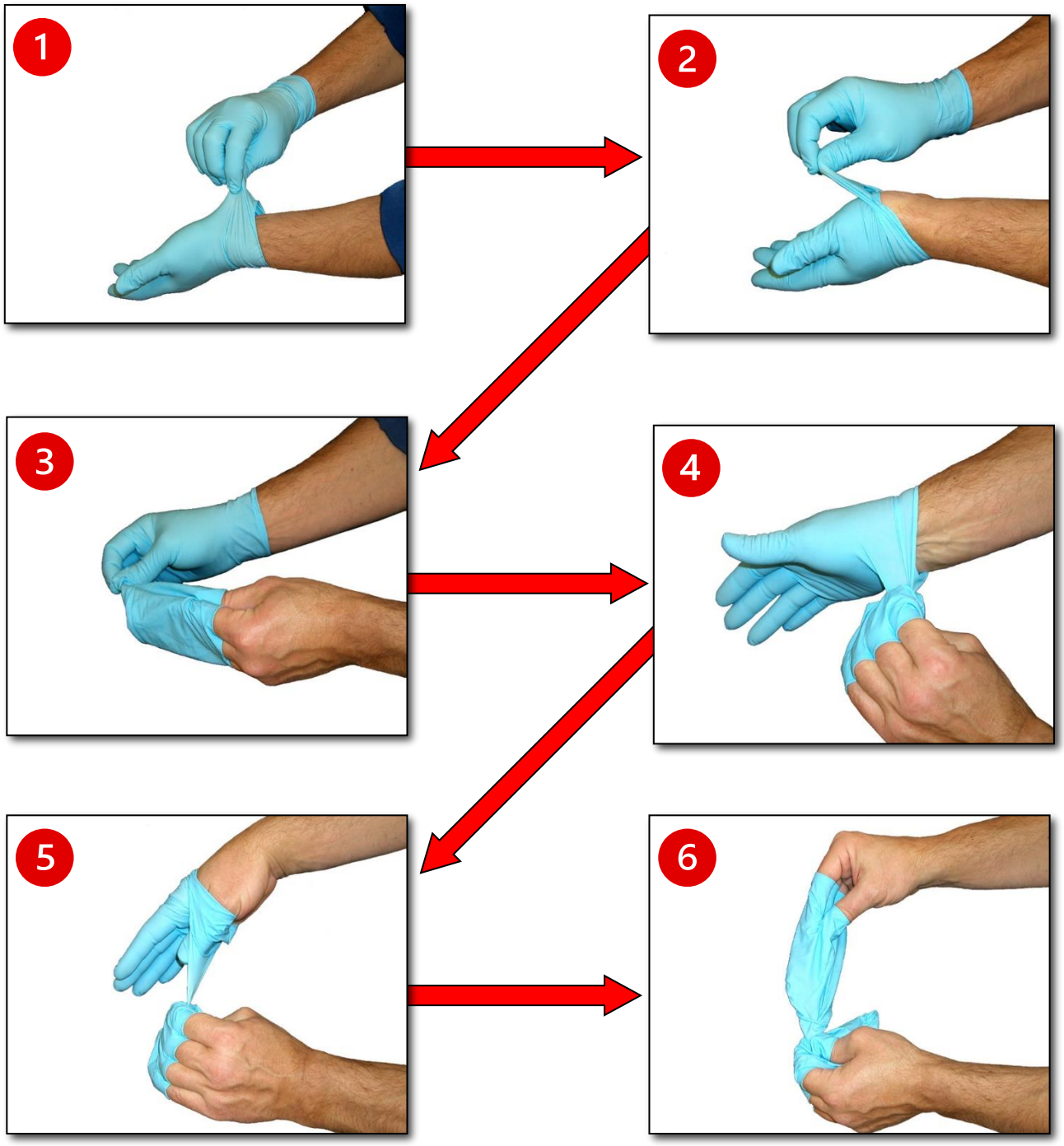
PPE required by the job should be located as close to the work area as the job will allow and be accessible at each work site. Whenever possible, minimize the handling of potentially contaminated PPE.

Decontamination or Disposal

PPE must be placed in properly labeled containers for decontamination or disposal. **NEVER reuse disposable PPE!** When you are removing contaminated PPE, try to confine the contaminated material to a small and easily managed area and be careful not to make contact with yourself, your clothing, or others with contaminants.

Doffing Potentially Contaminated Gloves

A method of removing potentially contaminated gloves without spreading the contamination to your skin during removal is shown below.



Limitations of PPE to Consider

PPE is not a substitute for higher-level controls. OSHA and LANL require that higher-level controls, such as engineering controls, be considered before PPE. Although in some cases PPE will be the primary method of control, always try to use PPE together with other, more effective methods of control.

No single piece of PPE is effective against every hazard. Every type of PPE has limitations that may render it less effective or ineffective against certain hazards or in certain situations. For example, nitrile gloves protect against liquids but not against sharps. Cut-resistant gloves protect against many types of sharps but might not provide protection from needlesticks or liquids.

The use of PPE may create additional hazards. Hazards that may be created by the use of PPE must be considered before beginning work. For example, gloves can reduce the ability to grasp and hold items; goggles or face shields can fog up, restricting vision; and protective clothing can increase the risk of heat stress.

PPE has a limited shelf life. Over time, plastics, fabrics, and leather will degrade. At some point they will no longer provide the level of protection they were designed to provide, even though they may look the same. If your PPE has expired, do not use it! If you are unsure whether your PPE is still good, ask your supervisor or deployed ESH professional.

PPE won't protect you if you don't wear it!

Whether you are wearing PPE for BBPs or for any other hazard, you must know:

- how to properly don, doff, adjust, and wear the PPE
- what PPE is necessary
- when PPE is necessary
- proper care, maintenance, useful life, and disposal of the PPE
- the limitation(s) of the PPE

Activity – Worker Cuts Hand on a Sharp

Read the scenario and answer the questions.

You and a coworker are emptying trash in a research laboratory. Your coworker smashes the trash down with their hands, gets cut by an unseen sharp, and begins to bleed severely.

- Do you immediately apply direct pressure to the injury?
- What do you say to other coworkers who want to enter the research laboratory?
- How would you prevent this scenario from occurring?

Providing First Aid

If you provide first aid or CPR, ***always protect yourself first and treat the patient second.*** Practice universal precautions in every action you take to reduce your risk of exposure. When providing first aid or CPR, consider the following:

- Wear nitrile gloves. If no gloves are available, try to have patients self-administer first aid, and allow patients to do as much as possible for themselves.
- Don additional PPE as needed.
- If blood gets on you, wash or flush the areas as soon as possible. If water is not available, wipe the area with paper or cloth.
- Remove contaminated clothing with care and treat all contaminated materials as potentially infectious.
- After the event, ensure that all exposed surfaces are decontaminated using approved cleanup procedures.

Note: *The LANL BBP ECP requires that all first aid incidents involving the presence of blood or OPIM be reported to the RLM and OccMed.*

Hepatitis B Virus (HBV) Vaccine

HBV Vaccine Benefits and Effectiveness

The HBV vaccine produces HBV antibodies (meaning that the person becomes immunized). The vaccine is effective in preventing hepatitis B in more than 90% of healthy infants, children, and young adults receiving the HBV vaccine*.

The HBV vaccine does not contain a live virus and therefore cannot cause hepatitis B infection. It provides long-lasting protection, with immunity often lasting for decades—and in many cases, for life. The HBV vaccine has an excellent safety record and has been used safely and effectively worldwide for more than 30 years.

* https://www.who.int/news-room/fact-sheets/detail/hepatitis-b

Learn more about HBV vaccine at https://www.cdc.gov/hepatitis-b/vaccination/

HBV Vaccine Free to At-Risk Workers

The HBV vaccine series is available at no cost after initial worker training and within 10 days of initial assignment to all workers identified in the Worker Exposure Determination, section 5.1 of the LANL Bloodborne Pathogen Exposure Control Plan.

HBV Vaccine Side Effects

The risk of side effects from the HBV vaccine is quite low. Many people who receive the HBV vaccine have no side effects at all. The most common side effects can include:

- pain, soreness, redness, or swelling in the arm where the shot was given
- headache
- fever
- fatigue

Who Should NOT Get the HBV Vaccine

You should NOT get the HBV vaccine if you:

- are already immune to the disease.
- have completed an HBV vaccination series.
- are aware of contraindicating medical reasons.

Deciding Not to Receive the HBV Vaccination

If your job puts you at risk of exposure to BBPs and you choose not to have the HBV vaccine, LANL will ask you to sign a form (Attachment 2 of the BBP ECP) to document your decision. If you change your mind later, the HBV vaccine will be made available to you at no charge.

Module 4 Self-Assessment

1. The approach that all blood and body fluids are assumed to contain BBPs unless known otherwise is called
    a. remote handling of blood.
    b. decontamination procedures.
    c. biohazardous waste.
    d. universal precautions.

2. A vaccine is available for which virus/disease?
    a. AIDS
    b. HIV
    c. HBV
    d. HCV

3. The vaccine referred to in Question 2 produces antibodies in healthy adults ____ of the time.
    a. 50%
    b. 75%
    c. 87%
    d. more than 90%

4. Workers who provide emergency medical aid must
    a. treat the patient first, then protect themselves.
    b. clean contaminated clothing at home.
    c. wear PPE only if it is convenient.
    d. protect themselves first, then treat the patient.

5. Proper decontamination procedures include all of the following EXCEPT
    a. use water only for the decontamination cleanup.
    b. leaving the disinfectant on the surface for 30 minutes or more.
    c. wearing appropriate PPE.
    d. putting contaminated materials in a biohazard bag.

Module 5

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Post-Exposure Evaluation and Follow-Up

Module Objectives

After completing this module, you will be able to recognize:

- what to do if an exposure incident or an emergency involving blood or OPIM occurs
- requirements for a post-exposure evaluation and follow-up if a BBP exposure incident occurs
- medical follow-up and treatment options available to workers after an exposure incident

If an Exposure Incident Occurs…

An eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with human blood or OPIM resulting from the performance of your job duties is called an ***exposure incident.***

Steps to take if you are exposed to blood or OPIM fluids that are not your own.

- First, immediately wash all exposed skin with nonabrasive soap and water, and/or flush exposed mucous membranes or eyes with water.
- If possible, get the name, Z number, and phone number of the source individual.
- Gather incident information including:
  - names of all first aid providers who rendered assistance
  - PPE used, if any
  - description of the incident including date, time, and location
- Report to **OH-MS at (505) 667-0660** before the end of the work shift during which the incident occurred. **(mandatory)**

Note: *Subcontractors will contact their own Occupational Med provider as of 10/2025.*

- Call **EOSC at (505) 667-2400**. Tell them what happened so that reporting can be initiated.
- Report to your responsible line manager (RLM) or subcontractor technical representative (STR) for subcontractors.
- If you have questions regarding infectious waste disposal, call **Waste Management – Waste Generator Services at (505) 667-3869.**

Post-Exposure Evaluation and Follow-Up

OH-MS providers offer workers hepatitis B vaccinations, post-exposure evaluations, and follow-up. Workers are also provided with a copy of 29 CFR 1910.1030. Medical providers will perform a medical evaluation and complete Form 5, Worker Evaluation of Bloodborne

Pathogens Engineering and Administrative/Work Practive Controls (Attachment 4) with input from the worker.

The RLM, with input from the worker, will complete Form 6, Bloodborne Pathogen Exposure Incident Investigation (Attachment 5).

Testing the Source Individual

After a potential exposure incident has occurred, OH-MS personnel will ask the source individual to provide blood samples. If the source individual provides blood samples, OH-MS will send the samples to an outside laboratory for hepatitis and HIV antibody testing.

Upon receiving the results, OH-MS personnel will decide what testing and treatment you need.

OH-MS will receive and maintain the following:

- *if possible, results of the source individual's blood test*
- *relevant worker medical records, including vaccination status*

Testing the Exposed Individual

If a hepatitis virus or HIV infects you, your body will create antibodies to the viruses that can be detected in blood tests. If an exposure occurs, OH-MS will test your blood as soon as possible to see if you have been infected.

The first test is used to establish a baseline against which later tests can be compared. If later blood tests detect antibodies for one of the viruses, that virus has infected you. If antibodies for one of the viruses are not detected, that virus has not infected you.

Note: *OH-MS provides the worker with a written opinion within 15 days after completion of the evaluation.*

OH-MS Tasks

Following a workplace exposure to blood or OPIM, OH-MS personnel will:

- *document the incident*
- *conduct medical testing*
- *if necessary, treat the exposed individual*

Medical Treatment

Once OH-MS personnel complete the initial blood testing, they decide on continued testing and treatment for you. They base their decisions on

- *the hepatitis/HIV status of the source individual,*
- *the hepatitis/HIV status of the exposed individual, and*
- *whether the exposed individual has completed the HBV vaccination series.*

For hepatitis infections, treatment may involve the HBV vaccine or a hepatitis B immunoglobulin injection within 24 hours of exposure.

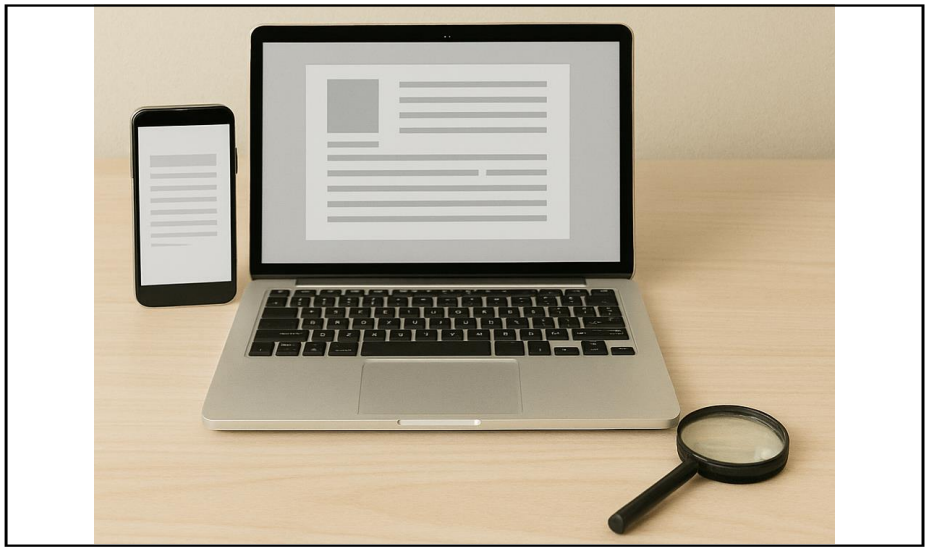
Because no vaccination exists to prevent HIV, a worker with a possible occupationally caused HIV infection is treated based on the HIV status of the source individual. Treatment may include taking a post-exposure prophylaxis (PEP) to prevent HIV after a possible exposure. PEP should be used only in emergency situations and must be started within 72 hours after a recent possible exposure to HIV.

OSHA Documentation Requirements

To comply with OSHA requirements, OH-MS personnel must collect the following information after an exposure incident:

- *route(s) of exposure*
- *circumstances of the exposure*
- *determine HIV and hepatitis status, if known, of the source individual*
- *data from blood tests performed to determine the HBV, HCV, and HIV antibody status of the exposed individual*
- *post-exposure treatments, when medically indicated*
- *counseling notes*
- *evaluations of reported illnesses*

Module 6



Resources

Module Objective

After completing this module, you will be able to identify and access resources that provide information and support related to bloodborne pathogens (BBPs).

LANL BBP Resources

Group	Responsibilities	Contact
Occupational Health (OH-MS)	• Administers vaccines to at-risk workers. • Counsels workers about vaccines, BBP test results, and risks following an exposure. • Provides post-exposure evaluation and follow-up. • Maintains medical records.	(505) 667-0660
Occupational Safety & Health – Industrial Safety and Hygiene (OSH-ISH)	• Assists in developing and reviewing ECPs. • Assists with BBP exposure control investigations. • Assesses work sites for biosafety regulations and policies.	biosafety@lanl.gov
Emergency Operations Support Center (EOSC)	• Completes a duty injury report. • Receives accident/incident calls and coordinates appropriate response.	(505) 667-2400
Environment, Safety, Health, and Quality – Program Office (ESHQ-PO)	• Develops, updates, and presents LANL-wide BBP training. • Maintains training records for this course (#7292) and BBP Self-Study (#11776).	(505) 667-0059 or (505) 531-7125
Waste Management – Waste Generator Services	• Coordinates infectious waste management. • Provides infectious waste pickup and disposal. • Answers questions about infectious waste disposal.	(505) 667-3869
LANL Biosafety Officer	• LANL Bloodborne Pathogens SME.	(505) 665-7839

External BBP Resources

The CDC hepatitis website is http://www.cdc.gov/hepatitis.

The CDC HIV/AIDS website is http://www.cdc.gov/hiv/.

Centers for Disease Control and Prevention: Phone is **1-800-CDC-INFO.**

Appendix

A

Answers to Self-Assessments and Activities

Answers to Module Self-Assessments	
Module 1	*Module 4*
1. b 2. a 3. b 4. a 5. d 6. c	1. d 2. c 3. d 4. d 5. a

Answers to Activity—Accidental Exposure to a Needlestick – page 47

1. Factors and/or actions that contributed to the event:
    - *Improper disposal of an insulin syringe. (It was later found that the syringe user had capped the syringe but had discarded it in regular trash, and the cap was later dislodged in the trash container.)*
    - *The custodial worker increased his risk of exposure when he brought the bag in contact with his body.*
2. Lessons Learned:
    - *NEVER dispose of sharps in regular trash. Use sharps containers for the disposal of sharps.*
    - *Workers who routinely handle waste should follow safe waste handling practices. Do not put your hands into trash, and do not carry or rest trash bags next to your body.*
    - *Immediately report injuries or suspected injuries to your RLM and OH-MS as soon as possible and no longer than 24 hours after a BBP injury.*

Answers to Activity—Worker Cuts Hand on Sharp– page 55.

1. *Only if you are wearing the appropriate gloves. If you are not wearing appropriate gloves, have your coworker apply direct pressure to their injury. Once you have gloves, you can apply pressure yourself.*
2. *Limit access. Warn coworkers who must enter the area that there has been an injury and tell them to avoid any spilled blood. Ask coworkers to contact emergency response/supervisory personnel.*
3. *Provide sharps containers; ensure that workers dispose of sharps correctly; and instruct workers not to push down trash with their hands and use puncture/cut-resistant gloves, along with impermeable gloves if there is a concern about wounds caused by sharps.*

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