

UNIVERSITY OF ARKANSAS

BLOODBORNE PATHOGENS TRAINING

June 2, 2005

Bloodborne Diseases

Bloodborne pathogens are microorganisms such as viruses or bacteria that are carried in blood and can cause disease in people. Bloodborne pathogens include the organisms that cause malaria, syphilis, and brucellosis, among others, but Hepatitis B (HBV) and the Human Immunodeficiency Virus (HIV) are the two diseases specifically addressed by the OSHA Bloodborne Pathogen Standard.

Although not addressed by the OSHA Bloodborne Pathogen Standard, the Center for Disease Control and Prevention (CDC) has also become concerned about **Hepatitis C**. Hepatitis C is a liver disease caused by the hepatitis C virus (HCV), which is found in the blood of persons who have the disease. HCV is spread by contact with the blood of an infected person. Although this training is focused primarily on HBV and HIV, the same Universal Precautions should be taken for the prevention of Hepatitis C. Additional information about [Hepatitis C](http://www.cdc.gov/) and other bloodborne pathogens can be found on the CDC website at <http://www.cdc.gov/>.

Hepatitis B (HBV)

In the United States, approximately 300,000 people are infected with HBV annually. Of these cases, a small percentage are fatal.

"Hepatitis" simply means "inflammation of the liver," and, as its name implies, HBV is a virus that infects the liver. Although there are several different types of hepatitis, HBV is transmitted primarily through "blood to blood" contact. Infection by HBV initially causes inflammation of the liver, but it can lead to more serious conditions such as cirrhosis and liver cancer.

There is no "cure" or specific treatment for HBV, but many people who contract the disease will develop antibodies, which help them get over the infection and protect them from getting it again. It is important to note, however, that there are different kinds of hepatitis, so infection with HBV will not prevent infection by another type.

The Hepatitis B virus can persist and remain infectious in dried blood for up to seven days. Therefore, this virus is a particular concern for housekeepers, custodians, laundry personnel and other employees who may come in contact with blood or potentially infectious materials in a non-health care situation.

Symptoms: Symptoms of HBV resemble a mild case of the "flu". Initially there is a sense of fatigue, possible stomach pain, loss of appetite, and even nausea. As the disease progresses, jaundice (a distinct yellowing of the skin and eyes) may develop, and there may be a darkening of the urine. However, many people who are infected with HBV may show no symptoms for some time. The time between exposure and the manifestation of symptoms can be as long as 1-9 months. Some symptoms may be intermittent. For example, there may be loss of appetite and stomach pain within 1-3 months, but these symptoms can occur as soon as 2 weeks or as long as 6-9 months after infection.

Human Immunodeficiency Virus (HIV)

Acquired Immune Deficiency Syndrome (AIDS) is caused by the human immunodeficiency virus (HIV). Actual development of the disease may occur many years after initial infection. HIV attacks the body's immune system,

weakening it so that it cannot respond to infection by other diseases. Although there is no cure and AIDS is still considered to be a fatal disease, treatment options are improving.

According to the Centers for Disease Control and Prevention (CDC), an estimated 850,000--950,000 persons in the United States are living with human immunodeficiency virus (HIV), including 180,000--280,000 who do not know they are infected.

The HIV virus is relatively fragile in the environment and does not survive for long periods outside body. It is primarily of concern to employees providing first aid or medical care in situations involving fresh blood or other potentially infectious materials. It is estimated that the chances of contracting HIV in a workplace environment are only 0.4%. However, because it is such a devastating disease, all precautions must be taken to avoid exposure.

Following the initial infection, an individual may manifest few or no signs of illness for many years. The first indication of infection may be swollen lymph glands or noticeable susceptibility to other infections, due to the weakened immune system. In the final stages of the disease, the immune system becomes disabled to the point that the infected person becomes completely unable to fight off life-threatening infections.

Symptoms: Symptoms of HIV infection may vary, but often include weakness, fever, sore throat, nausea, headaches, diarrhea, a white coating on the tongue, weight loss, and swollen lymph glands.

If you believe you have been exposed to HBV or HIV, especially if you have experienced any of the signs or symptoms of these diseases, you should consult your physician or doctor as soon as possible.

Modes of Transmission

Bloodborne pathogens such as HBV and HIV can be transmitted through contact with infected human blood and other potentially infectious body fluids such as:

- Semen
- Vaginal secretions
- Cerebrospinal fluid
- Synovial fluid
- Pleural fluid
- Peritoneal fluid
- Amniotic fluid
- Saliva (in dental procedures), and
- Any body fluid that is visibly contaminated with blood.

It is important to know the ways exposure and transmission are most likely to occur in a particular situation, be it providing first aid to an injured student or coworker, handling blood samples in the laboratory, or cleaning up blood from a hallway.

HBV and HIV are most commonly transmitted through:

- Sexual Contact
- Sharing of hypodermic needles
- From mothers to their babies at/before birth

Accidental puncture from contaminated needles, broken glass, or other sharps
Contact between broken or damaged skin and infected body fluids
Contact between mucous membranes and infected body fluids



Accidental puncture from contaminated needles and other sharps can result in transmission of bloodborne pathogens.

In most work or laboratory situations, transmission is most likely to occur because of accidental puncture from contaminated needles, broken glass, or other sharps; contact between broken or damaged skin and infected body fluids; or contact between mucous membranes and infected body fluids. For example, if an individual infected with HBV cut his or her finger on a piece of glass, and then another person suffered a cut from the same piece of contaminated glass, it is possible the disease could be transmitted. Anytime there is blood-to-blood contact with infected blood or body fluids, there is a slight potential for transmission.

Unbroken skin forms an impervious barrier against bloodborne pathogens. However, infected blood can enter the body through:

- Open sores
- Cuts
- Abrasions
- Acne
- Any sort of damaged or broken skin such as sunburn or blisters

Bloodborne pathogens may also be transmitted through the mucous membranes of the

- Eyes
- Nose
- Mouth

For example, a splash of contaminated blood to the eye, nose, or mouth could result in transmission.

PPE, Work Practices & Engineering Controls

"Universal Precautions" is the term used to describe a prevention strategy in which all blood and potentially infectious materials are treated as if they are, in fact, infectious, regardless of the perceived status of the source individual. In other words, whether or it is believed that the blood/body fluid is from an individual infected with bloodborne pathogens, it is treated as if it were. This approach is used in all situations where exposure to blood or potentially infectious materials is possible. This also means that certain engineering and work practice controls must **always** be utilized in situations where exposure may occur.

Personal Protective Equipment

It is essential to maintain a barrier between the worker and potentially infectious materials. In any situation where there is potential exposure to bloodborne pathogens, workers should use appropriate personal protective equipment (PPE). For example, emergency medical personnel, doctors, nurses, dentists, dental assistants, and other health care professionals always wear latex or other protective gloves and some form of eye protection (e.g., safety glasses, face shields, or goggles) to prevent blood or other potentially infectious body fluids from coming in contact with skin or eyes. PPE is the first line of defense against infection, provided it is available, appropriate, and, most importantly, **used.**

Rules to follow:

- Always wear personal protective equipment in exposure situations.
- Remove PPE that is torn or punctured, or has lost its ability to function as a barrier to bloodborne pathogens.
- Replace PPE that is torn or punctured.
- Remove PPE before leaving the work area.

The necessary PPE should be readily accessible to individuals who work in an area with routine exposure to blood or potentially infectious materials. Contaminated gloves, clothing, PPE, or other materials should be placed in appropriately labeled bags or containers for disposal, laundering, or other decontamination. Workers should be advised of the location of such bags or containers before beginning work.

Gloves



Gloves should be made of latex, nitrile, rubber, or other water impervious materials. If glove material is thin or flimsy, double gloving can provide an additional layer of protection. Persons having cuts or sores should cover them with a bandage or similar protection as an additional precaution before donning gloves. Gloves should be inspected for tears or punctures before use. If a glove is damaged, it should not be used. Contaminated gloves should be removed carefully, without touching the outside of the glove with bare hands, and should be placed in a proper container for disposal.

Goggles



Anytime there is a risk of splashing or aerosolization of contaminated fluids, goggles and/or other eye protection should be used. Splashing could occur while cleaning up a spill, during laboratory procedures, or while providing first aid or medical assistance.

Face Shields



Face shields may be worn in addition to goggles to provide additional face protection. A face shield will protect against splashes to the nose and mouth.

Aprons



Aprons may be worn to protect clothing and to keep blood or other contaminated fluids from soaking through to the skin.

Normal clothing that becomes contaminated with blood should be removed as soon as possible before fluids seep through to contact skin. Contaminated laundry should be handled as little as possible, and should be placed in an appropriately labeled bag or container until it is decontaminated, disposed of, or laundered.

Use universal precautions and treat all blood or potentially infectious body fluids as if contaminated. Avoid contact whenever possible. If contact is unavoidable, wear appropriate PPE. In situations where standard PPE is unavailable, a towel, plastic bag, or some other barrier can be improvised to help minimize direct contact with contaminated materials.

Hygiene Practices



Handwashing is one of the most important (and easiest) practices used to prevent transmission of bloodborne pathogens. Hands or other exposed skin should be thoroughly washed as soon as possible following an exposure incident. Use soft, antibacterial soap, if possible. Avoid harsh, abrasive soaps, as these may open fragile scabs or other sores.

Hands should also be washed immediately (or as soon as feasible) after removal of gloves or other personal protective equipment.

Because handwashing is so important, workers should familiarize themselves with the location of the nearest handwashing facilities. Laboratory sinks, public restrooms, custodial closets, etc, may be used for handwashing if they are normally supplied with soap. Workers in an area without access to such facilities, may use an antiseptic cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. If these alternative methods are used, hands should be washed with soap and running water as soon as possible. **Use of these materials is not a substitute for handwashing.**

Workers in an area where there is reasonable likelihood of exposure, should never:

- Eat
- Drink
- Smoke
- Apply cosmetics or lip balm
- Handle contact lenses

No food or drink should be kept in refrigerators, freezers, shelves, cabinets, or on counter tops where blood or potentially infectious materials are present.



When performing any procedure involving the handling of potentially infectious materials, every attempt should be made- to minimize the amount of splashing, spraying, splattering, and generation of droplets. **NEVER, under any circumstances, pipette these or other materials by mouth.**

Decontamination and Sterilization

All surfaces, tools, equipment and other objects that come in contact with blood or potentially infectious materials must be decontaminated and sterilized as soon as possible. Equipment and tools must be cleaned and decontaminated before servicing or being put back in service.

Decontamination should be accomplished by using

A solution of 5.25% sodium hypochlorite (household chlorine bleach) diluted between 1:10 and 1:100 with water. The standard recommendation is to use at least a quarter cup of bleach per one gallon of water. Lysol or some other EPA-registered disinfectant. (Check the label of all disinfectants to make sure they meet this requirement.)

Note: alcohol is *not* an appropriate disinfectant, as it may evaporate before there is sufficient contact time to accomplish disinfection. To ensure effective disinfection, chlorine bleach solution should be made fresh daily, as chlorine dissipates from the solution in a few hours.

When cleaning up a blood spill, carefully cover the spill with paper towels or rags, then gently pour the 10% solution of bleach over the towels or rags, and leave it for at least 10 minutes to ensure that any bloodborne pathogens are killed before beginning cleaning or wiping. Covering the spill with paper towels or rags decreases the chances of causing a splash when pouring the bleach.

When chemically decontaminating equipment or other items (e.g., scalpels, microscope slides, broken glass, saw blades, tweezers, mechanical equipment upon which someone has been cut) leave the disinfectant in place for at least 10 minutes before continuing the cleaning process

Materials used to clean up a spill of blood or potentially infectious materials (mops, sponges, pails, etc.) must also be decontaminated.

Sharps

Frequently, housekeepers, custodians and others are punctured or cut by improperly disposed needles and broken glass, potentially exposing them to any infectious material that may have been on the glass or needle. For this reason, it is especially important to handle and dispose of all sharps carefully.

**Needles must be disposed of in sharps containers.
Improper disposal of needles can result in injury to housekeepers, custodians, and others.**



Needles

- Needles should never be recapped.
- Needles should be picked up using tools such as forceps or pliers, or by using a broom and dustpan.
- Never break or shear needles.
- Needles shall be disposed of in labeled sharps containers only.
Sharps containers shall be closable, puncture-resistant, leak-proof on sides and bottom, and must be labeled or color-coded.
When sharps containers are being moved from the area of use, the containers should be closed immediately before removal or replacement to prevent spillage or protrusion of contents during handling or transport.

Broken Glassware

- Broken glassware that has been visibly contaminated with blood must be sterilized with an approved disinfectant solution before it is disturbed or cleaned up.
Glassware that has been decontaminated may be disposed of in an appropriate sharps container: i.e., closable, puncture-resistant, leak-proof on sides and bottom, with appropriate labels. (Labels may be obtained from University of Arkansas EHS.)
- Broken glassware should not be picked up directly with the hands. Sweep or brush the material into a dustpan.
Uncontaminated broken glassware may be disposed of in a closable, puncture resistant container such as a cardboard box or coffee can.

Signs, Labels & Color Coding

Warning labels must be affixed to containers of regulated waste; to refrigerators and freezers containing blood or other potentially infectious material; and to containers used to store, transport, or ship blood or other potentially infectious materials. These labels are fluorescent orange, red, or orange-red, and they are available from EHS. Bags used to dispose of regulated waste must be red or orange red, and must prominently display the universal biohazard symbol. Regulated waste should be double-bagged to guard against the possibility of leakage if the first bag is punctured.



Labels should display this universal biohazard symbol.

Regulated waste

- Any liquid or semi-liquid blood or other potentially infectious material
- Contaminated items that would release blood or other potentially infectious materials in a liquid or semi-liquid state if compressed
- Items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling
- Contaminated sharps
- Pathological and microbiological wastes containing blood or other potentially infectious materials

All regulated waste must be placed in properly labeled containers or red biohazard bags for disposal at an approved facility. Such waste is picked up for disposal by EH&S. To request waste pickup, follow the directions on the EH&S web site. For emergency pick up, call 575-5448.

Non-regulated waste (i.e., does not fit the definition of regulated waste provided above) that is not generated by a medical facility or medical research laboratory may be disposed in regular plastic trash **bags if it has been decontaminated or autoclaved prior to disposal.**

However, all bags containing such materials must be labeled, signed, and dated, verifying that the materials inside have been decontaminated according to acceptable procedures and pose no health threat. Pre-printed labels designed for this purpose are available from EHS, and they must be placed on the bag so that they are readily visible.

Custodians and housekeepers will not remove bags containing any form of blood (human or animal), vials containing blood, bloody towels, rags, biohazardous waste, etc. from laboratories unless the bag is marked with such a label. They have been given very strict instructions not to handle any non-regulated waste unless it has been properly marked and labeled (including signature).

Custodians will not handle regulated waste.

For more information on waste disposal as it pertains to laboratories, please see the University of Arkansas Biological Safety Manual on the EH&S web site or call 575-5448.

Emergency Procedures

In an emergency situation involving blood or potentially infectious materials, always use Universal Precautions and try to minimize exposure by wearing gloves, splash goggles, pocket mouth-to-mouth resuscitation masks, and other barrier devices.

In the event an occupational exposure occurs, the exposed worker should:

1. Wash the exposed area thoroughly with soap and running water. Use non-abrasive, antibacterial soap if possible.

If blood is splashed in the eye or mucous membrane, flush the affected area with running water for at least 15 minutes.

2. Report the exposure to his or her supervisor as soon as possible.
3. Fill out an exposure report. This report will be kept in the employee's personnel file for 40 years so that workplace exposure to hazardous substances can be documented.
4. For post exposure treatment, time can be critical. Go to the **nearest** health care facility, (on campus, the Pat Walker Health Center). The worker may request blood testing or the Hepatitis B vaccination if he or she has not already received it.

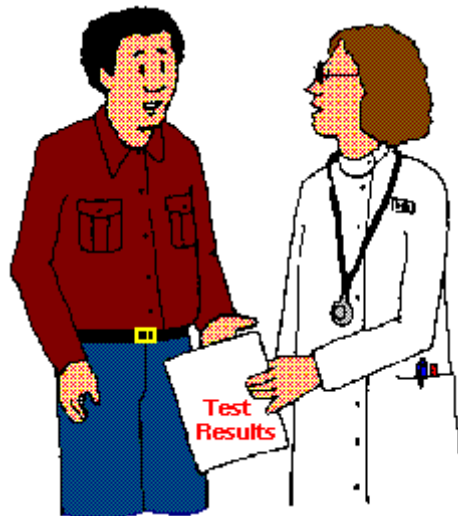
Health facilities have a specific set of procedures for all post-exposure cases. Generally these consist of:

Documenting the route(s) of exposure and the circumstances under which the exposure incident occurred.

Identifying and documenting the source individual unless such documentation is impossible or prohibited by law.

Testing the source individual's blood for HBV and HIV as soon as possible after consent is obtained. If the source individual is *known* to be seropositive for HBV or HIV, testing for that virus need not be done.

Collect the exposed individual's blood as soon feasible, and test it after obtaining consent.



(If consent to baseline blood collection is given, but consent is not given at that time for HIV serological testing, the blood sample will be kept for at least 90 days. If, within 90 days of the incident, consent is given to have the baseline sample tested, such testing shall be done as soon as possible, and at no cost to the worker.)

Administer post exposure prophylaxes, when medically indicated, as recommended by the US Public Health Service.

Provide counseling.

Evaluate reported illnesses.

Apart from the circumstances surrounding the exposure itself, all other findings or diagnosis by the health care professional(s) will remain entirely confidential.

Hepatitis B Vaccinations

Employees who have routine exposure to bloodborne pathogens (such as doctors, nurses, first aid responders, etc) shall be offered the Hepatitis B vaccine series at no cost to themselves unless:

- They have previously received the vaccine series
- Antibody testing has revealed they are immune
- The vaccine is contraindicated for medical reasons

In these cases they need not be offered the series.

Although the University as an employer must offer the vaccine, individuals do not have to accept that offer. They may opt to decline the vaccination series, in which case they will be asked to sign a declination form. **Even if they decline the initial offer, they may choose to receive the series at anytime during their employment thereafter**, for example, if they are exposed on the job at a later date.

As stated above, workers exposed to blood or potentially infectious materials on the job may request a Hepatitis B vaccination at that time. If the vaccine is administered immediately after exposure, it is extremely effective at preventing the disease.

The Hepatitis B vaccination is given in a series of three shots. The second shot is given one month after the first, and the third shot follows five months after the second. This series gradually builds up the body's immunity to the Hepatitis B virus.

The vaccine itself is made from yeast cultures; there is no danger of contracting the disease from getting the shots, and, once vaccinated, an individual does not need to receive the series again. At this time, boosters are not routinely given.