

Section 3: PREVENTING HIV & HBV TRANSMISSION

Set an agenda.

Welcome learners and give an overview of the curriculum
Administer the pretest
Deliver the lecture
Discuss case studies
Administer the posttest
Evaluate the curriculum

Welcome the learners to the session.

If the learners do not know one another and the group is 25 people or less, have them introduce themselves.

Next, give the learners an overview of the curriculum by stating that they will learn about the viruses that cause AIDS and hepatitis B. This information will include:

1. How the viruses are transmitted
2. How to protect oneself against exposure to these viruses both in personal lifestyle choices and when performing job-related tasks.
3. Decontamination methods
4. Proper management if exposure occurs.

Administer the pretest (if you choose to use one)

Distribute pretest questionnaires and ask learners to complete them. (See Section 2, "Tips for Trainers," for a sample pretest questionnaire.)

Lecture Outline

The following is an outline with suggested overheads that you can use to underscore important points of your presentation. The outline covers four topics: a basic set of facts about HIV and HBV, protective equipment and procedures, decontamination, and management of exposure.

By presenting the information in the lecture outline first, you ensure that the participants have common knowledge of the subject. You may choose a case study (see Section 4) and discuss its relevant aspects following each topic presentation and discussion. This approach will vary the pace and variety of the lecture. Instructions on how to do this are in the instructions to the trainer throughout the lecture outline.

Throughout this curriculum, we have used "public-safety workers and emergency-response workers" to refer to the target audience. You should substitute the name of the group you are training: law enforcement or corrections officers, fire fighters, paramedics, emergency medical technicians.

DEFINITION AND TRANSMISSION OF HIV AND HBV

1. What is AIDS?

Overhead 1

- A-I-D-S stands for Acquired Immunodeficiency Sndrome.
- AIDS is caused by a virus called human immunodeficiency virus or HIV. This virus lives only in blood and certain other body fluids. It cannot live outside these environments.
- The outcome or manifestation of illness varies with individuals who are infected with the virus.
 - a. Some infected persons have no disease symptoms and may not show outward signs of the disease for many years.
 - b. Some infected persons suffer less severe symptoms than do those with diagnosed cases of AIDS. These lesser symptoms may include loss of appetite, weight loss, fever, night sweats, skin rashes, diarrhea, tiredness, lack of resistance to infection, and swollen lymph nodes.
 - c. AIDS is the result of the progressive destruction of a person's immune system, which is the body's defense against disease. This destruction allows diseases that the body can normally fight to threaten the person's health and life.
 1. A particularly dangerous type of pneumonia and certain other infections often invade a body weakened by HIV.
 2. HIV can also attack the nervous system and cause damage to the brain. This may take years to develop. The symptoms may include memory loss, indifference, loss of coordination, partial paralysis, or mental disorder.

2. How widespread is HIV infection?

Overhead 2

To the trainer: You may find it helpful to add state-specific data or data from your locality to the presentation at this point. These data are available from your state and local health departments and are published weekly in Morbidity and Mortality Weekly Report (published by CDC).

- As of January 1989, there were over 80,000 cases of AIDS reported in the United States. Over half of those cases have died of AIDS or AIDS-related causes. These cases have been reported from all states, the District of Columbia, Puerto Rico and the other territories.
- It is estimated that as many as 1.5 million Americans are infected with HIV. Most of these do not have symptoms of disease. We do not know how many of these will develop AIDS, but a study of a group of HIV-positive men in San Francisco showed that 48 percent developed AIDS over a 10-year period.

- Infected people represent all ages--including infants and elderly adults--all races, men and women, and all lifestyles.

Overhead 3

3. How is HIV not transmitted?

- You cannot "catch" HIV like a common cold or flu. HIV is not spread through the air like cold viruses.
- There is no medical evidence of HIV transmission by casual, everyday contact: sharing kitchens, bathrooms, laundries, eating utensils, beds, or living space with infected people.
- HIV is not transmitted in nonsexual social situations, such as at work or through sharing air, food, and water.
- There is no evidence of transmission through insects, such as mosquitoes.
- The risk of HIV infection through contact with feces, nasal secretions, saliva, sputum, sweat, tears, urine and vomitus is extremely low or nonexistent.

Overhead 4

4. What personal behaviors or practices put you at risk for infection with HIV?

- You can become infected by having homosexual or heterosexual contact--oral, anal, or vaginal--with someone who is infected with HIV.
- You can become infected by sharing drug needles and syringes with an infected person.
- An infected woman can spread HIV to her baby before it is born or during birth.
- Transfusion recipients and hemophiliacs have been infected by the blood or plasma of infected donors. However, because the blood supply has been screened for HIV since April 1985, the chance of becoming infected through transfusions now is extremely small. There is no risk of becoming infected by donating blood.

Overhead 5

5. How can you prevent HIV transmission in your personal life?

You can prevent HIV transmission by refraining from:

- anal sex, with or without a condom
- vaginal or oral sex with someone who uses intravenous drugs or engages in anal sex
- sex with someone you do not know well or with someone you know has several sex partners
- unprotected sex (without a condom) with an infected person
- sharing intravenous drug needles.

If you engage in high-risk behavior that puts you in contact with an infected individual, you can become infected with HIV. Many people think that only certain "high-risk groups" of people are infected by HIV. This is untrue. Who you are has nothing to do with whether you are in danger of being infected with HIV. What matters is what you do, and whether you practice high-risk behavior.

Overhead 6

To the trainer: On page 3 of the "Guidelines for Prevention of Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-Care and Public Safety Workers," (Section 7) you will find a discussion of all reported cases of AIDS among health care workers and public safety workers. You may want to be familiar with these data if there are specific questions asked in the training session.

6. Is there a problem of occupationally acquired HIV infection among public safety workers and emergency medical technicians?

There are few data on HIV infection among fire fighters, police, law enforcement and corrections officers. There are a small number of health-care workers who have become infected with HIV while performing work-related tasks that are similar to those performed by public safety workers in the delivery of emergency health care.

7. How can workers protect themselves against HIV transmission while performing their duties?

Because HIV is a virus that lives in blood, you must protect yourself against coming into contact with **blood or body fluids that contain blood**. In addition, certain body fluids present some risk of infection.

- a. Semen and vaginal secretions can contain HIV, but occupational transmission through these fluids from an infected person to a person providing emergency treatment has not been documented.

Overhead 7

- b. Because the risk of HIV and HBV infection in this group of body fluids is **unknown**, persons providing emergency care should take precautions when coming in contact with fluids that are contained in the spine, chest cavity and abdomen, and in the uterus or womb surrounding an unborn child.
- c. The risk of HIV infection through contact with feces, nasal secretions, saliva, sputum, sweat, tears, urine and vomitus is extremely low or nonexistent. However, these body fluids may carry other organisms that cause disease. Common sense dictates that you should take precautions to protect yourself.

In emergency settings, if you cannot determine whether a body fluid contains blood--or even what type of fluid it is--treat all body fluids as potentially infectious.

8. What does it mean to "come into contact"?

Overhead 8

Because the virus **must** live in blood or certain body fluids, it has to enter a body quickly and then enter the bloodstream. For public-safety workers and emergency-response workers, this can happen in several ways.

- a. The most effective way for HIV to enter the body is through a needlestick injury if that needle has been used by someone with HIV infection.
- b. If infected fluids touch the skin, intact or unbroken skin will protect against infection. However, if there is an open wound, a cut, or the skin is otherwise not intact--which means chapped, abraded, weeping, or having rashes or eruptions--the infected fluid can enter the body.
- c. If infected fluids touch the mucous membranes of the eye, nose or mouth, these surfaces can absorb the fluid and transmit the virus.

To the trainer: You may find it helpful to review information about exposures in the Guidelines (Section 7) or in the April 22, 1988 and June 15, 1988 issues of Morbidity and Mortality Weekly Report.

9. What are the relative risks of these means of infection?

Overhead 9

These entry ways of infected fluid into the body represent different risks. The needlestick entry has the most potential for transmitting HIV. Studies indicate that the risk of developing HIV infection is about 0.5% following a needlestick from a known HIV-infected person. The risk associated with mucous membrane or chapped or broken skin exposure is likely to be far lower than that associated with needlestick injuries.

Overhead 10

10. Are there ways to test blood to determine if a person is infected with HIV?

Antibodies against HIV in an infected individual's blood can be detected by a series of tests.

- Tests that show the presence of antibodies are said to be "positive."
- Persons usually develop antibody against the virus within 6-12 weeks after becoming infected.

Overhead 11

11. Are there ways to protect yourself?

- There are protective procedures and equipment that we will discuss in detail that you can use to protect yourself.
- At present, there is no vaccination against HIV.

Overhead 12

12. What is hepatitis B?

- Hepatitis B is caused by hepatitis B virus (HBV).
- Hepatitis B is a disease that causes liver damage, the severity of which can range from mild or even inapparent to severe or fatal.
 - a. Approximately 25% of infected individuals develop acute hepatitis.
 - b. Of infected individuals, 6% to 10% will become HBV carriers. Carriers are at risk of developing chronic liver disease, including active hepatitis, cirrhosis, and primary liver cancer, and are infectious to others.

Overhead 13

13. How widespread is HBV?

- In 1987, CDC estimated the total number of new HBV infections in the United States to be 300,000 per year.
- CDC estimates that 12,000 health care workers whose job-related duties involve exposure to blood become infected with HBV each year.
 - a. 500-600 health-care workers are hospitalized each year.
 - b. 200-300 infected health-care workers die each year from diseases associated with chronic or acute hepatitis caused by hepatitis B.

Overhead 14

14. What personal behaviors put you at risk for infection with HBV?

- As with the risks for HIV, you can become infected with HBV through sexual contact (anal or vaginal) with someone who is infected with HBV.
- You can become infected by sharing drug needles and syringes with an infected person.
- Since blood is screened for HBV, the chance of being infected through transfusion is extremely small.

Overhead 15

15. What situations put a public safety worker or emergency medical technician at risk?

- The same situations that cause a worker to encounter blood or other possibly infectious fluids with HIV--that is, by needlestick or contact with an open wound or broken, nonintact skin, or mucous membranes of the eyes, nose or mouth--have the potential for infection with HBV also.
- One additional body fluid has the potential for transmission of HBV. Saliva of an HBV-infected person injected into another person through a bite can transmit HBV.

Overhead 16

16. How can public safety workers or emergency medical technicians protect themselves against HBV?

The same protective equipment and procedures that will be discussed for HIV in the rest of this training session will protect the worker against HBV.

Overhead 17

17. Are there ways to test blood to determine if a person is infected with HBV?

Blood tests are available that detect antibodies for HBV in an infected person.

Overhead 18

18. Is there a vaccine against HBV?

- Available vaccines provide protection against HBV infection and provide over 90% protection against hepatitis B for 7 or more years.
- The vaccines are also 70% to 88% effective when given within one week after HBV exposure.
- Hepatitis B immune globulin (HBIG) provides some temporary protection following exposure to HBV. After exposure to the virus, a combination of the vaccine with HBIG is over 90% effective in preventing hepatitis B.

Overhead 19

19. How are HBV and HIV similar? different?

To the trainer: When reviewing the risk of infection after needlestick exposure, explain that the different rates for HIV and HBV can probably be attributed to a much lower concentration of HIV in the blood than HBV. In other words, HBV normally exists in much greater concentration than HIV does in the same amount of blood.

	<u>HBV</u>	<u>HIV</u>
Mode of transmission:		
Blood	yes	yes
Semen	yes	yes
Vaginal secretion	yes	yes
Saliva (from a bite)	yes	no
Target in the body	liver	immune system
Risk of infection after needlestick exposure to infected blood	6-30%	0.5%
High number of viruses in blood	yes	no
Vaccine available	yes	no

PRECAUTIONARY MEASURES AND PROTECTIVE EQUIPMENT

1. What is standard personal protective equipment?

Overhead 20

To the trainer: It would be helpful to have the equipment in class with you so that the learners know exactly what you are talking about. You should also make sure that everyone knows how to use the equipment. You should demonstrate, for example, how to properly take the gloves off so that blood or other material that is on the glove does not contaminate other surfaces.

- **Gloves** are standard equipment. Disposable gloves should be put on before beginning any tasks involving exposure to blood or body fluids that are associated with HIV and HBV infection or those that you cannot identify because of circumstances in an emergency setting. Heavy gloves offer protection against sharp surfaces.
 - a. No one type of glove is appropriate for all situations. The worker must use judgement concerning the advantages of the type of glove or the combination of gloves to use that gives a balance of protection against fluids and sharp objects, yet allowing dexterity.
 - b. In situations involving broken glass or sharp edges, gloves that meet OSHA requirements should be worn. Each situation will require your personal judgement concerning the use of disposable gloves under heavy gloves meant for protection against sharp edges.
 - c. Change gloves if they are torn or soiled, and always remove them before leaving the scene. While wearing the gloves, avoid touching personal items, such as a comb. Also avoid touching your face, eyes, etc.
 - d. Change gloves between handling of different people (for example, change gloves when finishing with one victim of a crash before touching another victim).
- **Masks, eyewear, and gowns** should be present on all emergency response vehicles that respond to medical emergencies or victim rescues. How and when you use masks, eyewear, and gowns depends on the situation.
 - a. Management of the person who is not bleeding, and who has no bloody fluids present, should not routinely require use of masks, eyewear, or gowns.
 - b. Masks and eyewear should be worn together, or a faceshield should be used if splashes of blood or potentially contaminated body fluids are likely to occur. Surgical masks offer adequate protection for mucous membranes of the mouth and nose.
 - c. Gowns or aprons that do not allow fluids to pass through should be worn if necessary to avoid soaking of clothes.

Overhead 21

- **Resuscitation equipment** should be available on all emergency response vehicles even though no transmission of HIV or HBV infection during mouth-to-mouth resuscitation has been documented. Again, other diseases can be transmitted during this emergency procedure, and common sense dictates that you should protect yourself against possible infection.
 - a. Mechanical respiratory devices (for example, bag-valve masks, oxygen demand valve resuscitators) should be available on all emergency response vehicles and to all emergency response personnel who may respond to medical emergencies or victim rescues.
 - b. Pocket mouth-to-mouth resuscitation masks should be provided to all personnel who may provide emergency treatment.

Overhead 22

2. How can you protect yourself against infection with HIV and HBV?

- All personnel who perform tasks that put them in direct contact with blood or potentially infectious body fluids, either routinely or in emergency situations, should be vaccinated against HBV.
- Wear disposable gloves in all situations where there is blood or bodily fluids that have the potential of HIV contamination. You should also wear disposable gloves if you cannot, in an emergency situation, determine if the fluids are potentially infectious.
- Put on the appropriate personal protective equipment before beginning a procedure if the chance of exposure to blood is high (for example, IV insertion, trauma, delivering babies).
- Personal protective equipment should be available on emergency response vehicles for emergency situations. Equipment should also be available in facilities and in IV drug kits at all times.

3. Procedures for Specific Situations and Incidents

At this point in the training you should instruct the learners about procedures specific to your jurisdiction. You may want to refer to pages 17-27 in the "Guidelines" for information concerning CDC recommendations that pertain to fire and emergency medical personnel, and law enforcement and correctional facility officers.

CASE STUDIES

To the trainer: At this time, you may choose to have the group work on one of the case studies. (See Section 4 for case studies appropriate for firefighters/emergency medical technicians, law enforcement officers and corrections officers.) You should only discuss issues related to protective equipment and procedures. The advantage of using case studies at this point is the immediate reinforcement of information just presented and the placing of theoretical information into a "real" situation.

DISINFECTION, DECONTAMINATION, AND DISPOSAL

To the trainer: Some workers have expressed concern about how long HIV and HBV can live in the environment, especially once the medium (blood or body fluid) that it lives in dries. You may wish to discuss this by presenting this information.

Overhead 23

Viability of HIV and HBV in the Environment

1. Studies at CDC have shown that drying causes a 90%-99% reduction of HIV concentration within several hours.
2. HBV can live in a dry environment for a longer period than can HIV (for at least 7 days and perhaps much longer).
3. Once the virus is no longer active in dry material, it cannot be "reconstituted" by adding water. A dead virus is a dead virus. Some manufacturers claim to have special products that are necessary to kill HIV on environmental surfaces. These are not necessary. The cleaning agents needed to kill the viruses will be explained in detail in this section.
4. One extensive study* of this subject which is often quoted in publications found that HIV lived 1-3 days after drying in greatly concentrated HIV samples (10 million infectious doses per milliliter). This concentration is at least 100,000 times greater than that typically found in the blood of patients with HIV infection. This study does not in any way represent a "natural" situation.

* Resnik L, Veren K, Salahudden SZ, Tondreau S., Markham PD. Stability and inactivation of HTLV-III/LAV under clinical and laboratory environments. JAMA 1986;255:1887-91.

1. Needles and sharps disposal

- Needles should not be recapped, purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand. Avoid allowing the tip of the used needle to touch any part of your body.
- After use, disposable blades and other sharp items should be placed in puncture-resistant containers for disposal.
- Puncture-resistant containers should be located as close as practical to the use area. If sharps are carried from the emergency response vehicle to the scene of victim assistance, a puncture-resistant container should be carried to the scene, also.
- Reusable needles should be placed in a puncture-resistant container for transport to the reprocessing area.

Overhead 24

Overhead 25

2. Handwashing: Hands must be washed immediately after each contact with a potentially contaminated person or articles. Use ordinary soaps. There is no need to use soaps with antimicrobial agents.

- a. Use a utility or restroom sink for handwashing. Food preparation areas should not be used for decontamination or handwashing.
- b. When proper facilities are available, wash hands with soap and water.
- c. Waterless antiseptic hand cleanser should be available on response vehicles. When using waterless cleanser, follow the manufacturer's recommendations for use.

Overhead 26

3. Cleaning, disinfecting, and sterilizing: Current recommendations for standard cleaning, sterilization, and disinfection procedures for patient-care equipment are adequate for instruments, devices, or other items contaminated with blood or other infectious material from persons infected with HIV or HBV.

Carefully read the labels and package inserts with germicidal products and follow instructions for use and safety.

Sterilization: destroys all forms of microbial life.

Use for instruments or devices that penetrate the skin or contact normally sterile parts of the body (for example, scalpels and needles). Often, arrangements can be made with a health-care facility for processing of reusable invasive instruments.

Methods:

- steam under pressure (autoclave)
- gas (ethylene oxide)
- dry heat
- immersion in EPA-approved chemical sterilant for prolonged period (6-10 hours or according to manufacturer's instructions). These chemicals should be used **only** if it is impossible to sterilize or disinfect an instrument with a heat process.

High-level Disinfection: destroys all forms of microbial life except high numbers of bacterial spores.

Use for reusable instruments that come into contact with mucous membranes (laryngoscope blades, endotracheal tubes, etc.)

Methods:

- hot water pasteurization (80-100 degrees C for 30 minutes)
- exposure to an EPA-registered chemical sterilant as above, except for a short contact time (for 10-45 minutes or as directed by the manufacturer).

Intermediate-level Disinfectant: destroys *mycobacterium tuberculosis*, most viruses, vegetative bacteria, and most fungi, but not bacterial spores.

Use for surfaces that come into contact with intact skin (stethoscopes, blood pressure cuffs, splints, etc.) and that have been visibly contaminated with blood or body fluids. Surfaces must be precleaned of visible material before disinfection.

Methods:

- use of EPA-registered "hospital disinfectant" chemical germicides that claim to be tuberculocidal on the label.
- hard-surface germicides as indicated above or solutions containing at least 500 ppm free available chlorine (1:100 dilution of common household bleach--approximately 1/4 cup bleach per gallon of water).

Low-level Disinfection: destroys some viruses, most bacteria, some fungi, but not *mycobacterium tuberculosis* or bacterial spores.

Use for routine housekeeping or removal of soiling when there is no visible blood.

Method:

- use of EPA-registered "hospital disinfectants" (no claim on label for tuberculocidal activity).

Environmental Disinfection: Surfaces in the environment such as floors, ambulance seats, countertops, woodwork, etc. that have become soiled should be cleaned and disinfected with cleaners or disinfectant agents intended for environmental use.

4. Cleaning and decontaminating spills of blood

Overhead 27

- First, put on disposable gloves and remove visible material by cleaning with disposable towels or another means that will ensure against direct skin contact with blood. Place soiled towelling in a plastic bag to prevent contamination with other surfaces.
- Wear appropriate face and eye protection if you anticipate splashing.
- If the amount of blood in the area is great, wear shoe coverings that will not allow blood and fluids to seep through.
- After removal of visible material, decontaminate with appropriate germicide or a 1:100 solution of household bleach. Use clean towels with germicide to wipe area. Let the area air dry.
- After decontamination of the area, remove contaminated items, shoe coverings, and gloves and place in plastic bag for disposal or decontamination. Remove gloves last.
- Wash hands after removing gloves.

Overhead 28

5. Laundry: Although soiled clothing or linen may contain organisms that cause disease, the risk of actual disease transmission is negligible. Therefore, simple hygienic measures for handling and washing linens are recommended.

- Handle soiled linens as little as possible to prevent contamination of the air and of persons handling the linen.
- Bag all soiled linen at the location where it was used. Place linens soiled with blood in bags that prevent leakage.
- Wash linens in normal laundry cycles according to the recommendations or instructions of the washing machine and detergent manufacturers.

Overhead 29

6. Decontamination and laundering of protective clothing:

- Transport clothing in bags or containers that prevent leakage.
- Wear gloves when bagging and placing contaminated clothing into the washer.
- Station and work uniforms should be washed and dried according to the instructions on their labels.

7. Infective waste: Identifying wastes that require special precaution in disposal is largely a matter of judgement about the risk that the waste represents. **In all cases, follow local regulations carefully concerning disposal procedures.**

CASE STUDIES

To the trainer: Return to the case study discussion. At this time, discuss decontamination issues that are relevant to that case. If you chose a case study that does not present any decontamination issues, choose a new case study that does.

MANAGEMENT OF EXPOSURES

Overhead 30

1. What is an "exposure"?

Contact with blood or potentially infectious body fluids through the following methods:

- Needlesticks (HIV and HBV)
- Contact of blood or blood-contaminated body fluids with chapped or nonintact skin, open wounds or mucous membranes (HIV and HBV)
- Saliva in a human bite (HBV)

An exposed worker is one who is exposed while performing normal job duties.

2. Does it matter if we know or not that the source of blood or body fluids was infected with HIV or HBV?

The persons who are the source of blood or potentially infectious body fluids that the worker was exposed to may be known carriers of HIV or HBV. Or their status may be unknown. In either case, this is an exposure. The follow-up procedures in both cases vary as we will explain in the information that is to follow.

3. How should an exposure be handled?

- Workers who have been exposed in the ways already described should immediately wash the affected area. If the area is mucous membranes, flush the area with water. If the exposed area is skin, wash with soap and water.
- The exposed worker should be referred to the proper medical authority for assessment, counseling, and preventive treatment as is appropriate. Some types of exposure, for example, from a human bite, require attention to prevent other types of infection.

4. Procedures for Reporting Exposures

Introduce standard operating procedures used in your jurisdiction for the reporting of possible exposures and any other issues relating to this area that are relative.

CASE STUDIES

Return to the case study discussion. At this time, discuss reporting issues that are relevant to that case. If you chose a case study that does not present any reporting issues, choose a new case study that does.

Administer the posttest and evaluation

After the lecture outline and case studies are done, make sure no one has any additional questions.

Then distribute the posttest and ask learners to complete the questionnaire. If you intend to ask learners to complete an evaluation form, have them do so now before closing the training session.