

# STANDARD PRECAUTIONS AND HIV POSTEXPOSURE PROPHYLAXIS IN THE HEALTH CARE SETTING

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## OBJECTIVES

1. Define standard (universal) precautions recommended by the World Health Organization (WHO) for protection against the transmission of infectious pathogens.
2. Review infectious versus noninfectious types of body fluids.
3. Describe examples of protective barriers that can prevent exposure to human immunodeficiency virus (HIV).
4. Evaluate the management of HIV exposure in the health care setting.
5. Explore options for postexposure management.
6. Review recommendations for follow-up and monitoring after exposure to HIV.
8. Treatment to reduce the risk of contracting HIV from the exposure depends on the risk of exposure and information about the exposure source.
9. Seroconversion later than 6 months after exposure is rare.

## KEY POINTS

1. WHO standard precautions recommend that all individuals be treated as if they were infected with HIV or other infectious pathogens.
2. Exposures that place health care workers at risk of infection include injuries, such as needle sticks, and contact of infectious fluids with mucous membranes or nonintact (cut or abraded) skin.
3. The most effective infection control measure that health care workers can perform is handwashing with soap and water before and after patient contact.
4. Precautions should be taken to avoid having the skin, eyes, and mucous membranes come into contact with blood.
5. Needles should never be recapped, bent, or broken; they should be discarded into sealed, puncture-resistant containers.
6. Spills of blood or other infectious fluids should be cleaned while wearing gloves, using a solution of one part household bleach to 10 parts water.
7. When exposure occurs, the source patient and health care worker should be tested for HIV and for hepatitis B and C.

## OVERVIEW

All health care workers—defined by the U.S. Centers for Disease Control and Prevention as all persons (employees, students, contractors, attending clinicians, public safety workers, or volunteers) whose activities include contact with patients or blood or other body fluids from patients in a health care or laboratory setting—should be taught how to practice infection control in all health care settings. Health care workers must be educated about appropriate measures to be taken if an exposure to a potentially infectious substance occurs. All health care settings should have a written plan of action that conforms to national policy for infection control, including counseling and follow-up for exposures. All health care workers should be made aware of the plan. One option for ensuring that all health care workers are aware of infection control measures is to make annual review of infection control policies mandatory for all health care workers.

Occupational exposure can occur in other settings other than the health care setting. Other settings in which exposure could occur include waste disposal, law enforcement, fire fighting, and prostitution. Non-occupational exposure can occur via sexual assault, via sharing of needles, and via pregnant women to her fetuses. This chapter will focus on occupational exposure to the human immunodeficiency virus (HIV) in the health care setting and will address the importance of following standard precautions when caring for individuals with HIV/AIDS.

## STANDARD PRECAUTIONS

The Centers for Disease Control and Prevention developed Universal Blood and Body Fluid Precautions, or universal precautions, in 1996 and included fluids containing blood. These precautions have been revised and now include all potentially infectious pathogens. The precautions are now called standard precautions. The World Health Organization also recommends using these precautions. The guidelines consider certain body fluids as potential sources of infection, whereas others are not considered infectious (**Table 1**). In general, any body fluid that contains visible blood is potentially infectious, but body fluids that do not appear to contain blood also may be infectious. These fluids include vaginal secretions, semen, pericardial fluid, pleural fluid, cerebrospinal fluid, amniotic fluid, peritoneal fluid, and synovial fluid. Noninfectious body fluids include tears, feces, urine, saliva, nasal secretions, sputum, vomit, and sweat. Health care worker exposure to breast milk is not considered a threat for HIV transmission, but gloves should be worn when breast milk is handled for an extended period, such as in a milk bank.

Exposures that most often put a health care worker at risk of infection include percutaneous injuries, such as needle sticks, or contact of infectious fluids with mucous membranes or nonintact skin. The risk of HIV transmission from a percutaneous exposure is very low, approximately 0.3%. The risk after a mucous membrane exposure is about 0.09%. Transmission of HIV from exposure to intact skin has not been documented. Studies suggest that several factors affect the risk of HIV transmission through percutaneous exposure: the amount of blood to which the person was exposed and the patient's viral load and stage of disease. The risk of HIV transmission is higher if the health care worker is exposed

**Table 1. Infectious and Non-Infectious Body Fluids<sup>1</sup>**

Infectious Body Fluids	Non-Infectious Body Fluids
<ul style="list-style-type: none"> <li>● All body fluids containing visible blood</li> <li>● Vaginal secretions</li> <li>● Semen</li> <li>● Pericardial fluid</li> <li>● Pleural fluid</li> <li>● Cerebrospinal fluid</li> <li>● Amniotic fluid</li> <li>● Peritoneal fluid</li> <li>● Synovial fluid</li> </ul>	<ul style="list-style-type: none"> <li>● Tears</li> <li>● Feces</li> <li>● Urine</li> <li>● Saliva</li> <li>● Nasal secretions</li> <li>● Sputum</li> <li>● Vomit</li> <li>● Sweat</li> </ul>

Avoid exposure of skin and mucous membranes to blood and other body fluids.



**IF IN CONTACT**

Wear gloves if in contact with blood and other body fluids.



**RISK OF SPLASHING**

Wear goggles, mask, or gown when there is a risk of splashing.



**ALWAYS WASH HANDS**

Wash hands before and after patient contact and after removing gloves.

**Figure 1. Standard Precautions<sup>3</sup>** Adapted from World Health Organization, Regional Office for the Western Pacific, Manila. HIV/AIDS Reference Library for Nurses: Infection Control. (1993);3,14.

to more blood through injury from a needle that has been in a vein or artery, or through a deep injury, or through a device that is visibly contaminated with blood. Exposure to the bodily fluid of a patient who has end-stage AIDS carries a higher risk of transmission because the patient will most likely have a high viral load. However, the presence of a low viral load cannot guarantee that transmission will not occur. HIV is fragile and will survive for only a short time outside the human body. According to studies, HIV can live for up to 1 day outside the body, but these studies used a large amount of virus. Thus, the survival time of the virus outside the human body seems to depend on the viral load of the person. Other factors that affect the viability of the virus outside the human body include conditions in the environment, such as temperature and chemicals.

## HOW TO PREVENT EXPOSURE

Exposure can be prevented through the use of standard precautions supplemented by simple infection control measures (**Figure 1**). The most effective infection control measure that health care workers can take is handwashing with soap and water or alcohol-based disinfectant products before and after all patient contact. For effective cleaning, the hands and forearms should be wet, and soap should be applied over all surfaces by using friction; they should then be rinsed completely of soap by using running water and dried with a paper towel. If paper towels are not available, a cloth towel that is laundered after each use can be used. Communal towels should never be used. If paper towels and cloth towels are not available, allow the hands and forearms to air-dry. Wet hands should not be dried on clothes. Soap bars can be used but should be cut into small pieces and put into soap dishes that allow water drainage. When running water is not available, hands can be washed using soap and a clean bowl of water and then rinsed using a clean water source that is poured from a cup or bucket over the arms and forearms. The water in the bowl should be discarded after each use, and the bowl should be washed. An alcohol-based hand rub can be prepared by combining 2 mL of glycerin, propylene glycol, or sorbitol and 100 mL of 60%-90% alcohol. To use this hand rub, pour 3-5 mL into the palm of one hand and vigorously rub it into all parts of both hands until dry.

### *Protective Barriers*

Examples of protective barriers include gloves, gowns, goggles, and masks. Using all these barriers in all situations is impractical; one should use judgment as to when they are needed. A procedure in which the eyes could be splashed (such as removing a chest tube or preparing a body for embalming) calls for gloves, gown, and eye protection. Gloves should be changed and hands should be washed between patients. Gloves should never be washed, because washing can cause breakdown of the gloves. If barriers such as gloves and gowns are not available, other items may be used as a barrier. For example, a clean, thick cloth can be used to put pressure on a bleeding wound. Precautions should always be taken to avoid contact of blood with the skin, eyes, and mucous membranes. Hands should be washed with soap and water after all direct patient contacts.

If a phlebotomy is to be performed, using gloves is the only necessary barrier. Remember that gloves protect a

health care worker only from getting blood on the skin or in cuts. They do not protect against percutaneous injuries. Percutaneous injuries most often occur when the phlebotomist is inexperienced, in a hurry, or tired, or when the patient is uncooperative.

### *Handling Potentially Infectious Items*

Contaminated waste, such as disposable needles, disposable syringes, and bloody bandages, should be discarded appropriately. Needles should be discarded into sealed puncture-resistant containers. Needles should not be removed from the syringe and should never be recapped, bent, or broken. If possible, needles with a safety device should be used (retractable, self-blunting, or shielded needles). Puncture-resistant containers should be kept within easy access of medical procedure areas, thereby decreasing the handling of needles and sharps and reducing the risk of accidental injury.

Reusable needles and syringes should be disinfected after each use. The needles and syringes should be washed as quickly as possible after use to prevent the formation of clots, which can be difficult to remove. Two methods exist for cleaning used needles and syringes. For the first method, take the needle and syringe apart and clean them with soap and water, paying special attention to the area around the fittings. Put the needle and syringe back together. Fill the syringe with water through the needle, shake it, and expel the water through the needle; repeat these steps until the water that is expelled looks clear. For the second method, fill a clean cup with undiluted bleach. Fill the syringe with the bleach through the needle, and let the syringe and needle sit in the bleach-filled cup for 30 seconds. After the 30 seconds has elapsed, expel the bleach from the syringe through the needle, and rinse the syringe with water at least three times to remove all bleach. The bleach in the cup should be discarded and not reused.

Bloody bandages should be discarded according to local guidelines. All trash should be discarded into leakproof plastic bags. Heavily contaminated trash containing wet, bloody bandages or other infectious fluids should be put into a separate plastic bag before being put into a general trash container. Soiled linens and clothes do not need to be separated from other linen or laundry before washing. Laundry workers should always wear gloves when handling dirty laundry. Spills of blood or other infectious fluids should be cleaned while wearing gloves, using a solution

of one part household bleach to 10 parts water. If gloves are not available, use some type of barrier between the hands and the spill, such as paper towels. Hands should be washed with soap and water immediately after the cleanup.

## **HIV EXPOSURE IN THE HEALTH CARE SETTING**

### ***Background***

Health care workers are often at risk of exposure to HIV and other infectious diseases because of the environment in which they work. Following standard precautions easily minimizes this risk. All health care settings should have a written plan of action that conforms to national guidelines for handling HIV exposures. All health care workers should be familiar with this plan of action and should know where to find a copy of it. The plan should include instructions for reporting the exposure, instructions for managing the exposure; information on testing and counseling; and information on postexposure prophylaxis (PEP; treatment to try to prevent the acquisition of HIV infection), follow-up, and monitoring.

Data on time to HIV seroconversion are limited because of the low prevalence of infection after work-related exposure among health care workers. Among those health care workers who do seroconvert, available data indicate that 81% will seroconvert at a mean interval of 65 days after exposure and an estimated 95% will seroconvert by 6 months after initial exposure.

In theory, there is a short time between HIV exposure and infection during which transmission of HIV may be prevented. In the first 24 hours after exposure, HIV attacks dendritic-like cells in the mucous membranes and skin. Within 5 days after exposure, these infected cells then make their way to the lymph nodes and eventually to the peripheral blood, where viral replication becomes rapid. According to this theory of pathogenesis, preventing HIV infection should be possible if antiretrovirals are used before 24-48 hours after exposure. Animal studies have indicated that PEP is not effective when it is received more later than 72 hours after the exposure.

### ***Reporting Exposures***

All exposures to potentially infectious fluids should be reported so that appropriate action can be taken. The report should include the date and time of the exposure, details of the procedure being performed, details of

the exposure, and details about the exposure source. The wound or skin site should be washed immediately with soap and water, and exposed mucous membranes should be flushed with water. The use of caustic agents or antiseptics or disinfectants at the wound site is not recommended. Squeezing the site to encourage bleeding does not decrease the risk seem of transmission. The source patient and the health care worker should then be tested for HIV and for hepatitis B and C, and the need for HIV PEP should be assessed.

### ***Management of Exposure***

The exposure should be assessed for potential to transmit HIV on the basis of the type of fluid, the route of the exposure, and the severity of the exposure (**Appendix 1**). Exposure to fluids containing visible blood or other fluids that transmit or contain HIV should be considered sources of possible infection. Evaluation of human bites should take into account the HIV status of both the person who was bitten and the biter. Transmission through a bite is rare, but if a bite draws blood, PEP may be considered.

The person who is the source of the exposure should be evaluated for the presence of HIV (**Appendix 2**). The evaluation should include information on risk factors for HIV, questions about HIV-related symptoms, and HIV testing. If the source is known to be HIV infected, information about viral load and CD4<sup>+</sup> count should be obtained. This information may be used in the consideration of PEP, but PEP should not be delayed pending these results. Changes to PEP can always be made after treatment has begun. If the source of the exposure is unknown, an epidemiologic evaluation should be performed. An epidemiologic evaluation includes assessing the geographic area in which the exposure occurred for its prevalence of HIV. The geographic area would include the country, the province, the city, the village, the hospital, and the hospital ward. If HIV exists at a high rate in any of these areas, the exposure should be considered high risk and PEP should be started. Testing of needles and other sharp instruments for the presence of HIV is not recommended because the reliability of this type of testing is unknown.

Occupational exposure to HIV among pediatricians was previously underestimated. New studies suggest that pediatricians represent a high-risk group.

### **Evaluation and Testing**

Health care workers who are exposed to potentially infectious fluids should have baseline testing performed within hours of exposure to check for the presence of HIV antibodies. Evaluation of the health care worker also should include questions about medications and current or past medical conditions. PEP should not be started in a person who is found to be HIV positive to prevent the possible development of resistance from a two-drug regimen and to prevent the waste of PEP medications on a person who is already HIV positive. Baseline testing is not required prior to initiating PEP but should be strongly encouraged for the aforementioned reasons.

All women should be offered pregnancy testing. If the woman is pregnant, her evaluation for the risk of acquiring HIV should not be different from that of any other health care worker. Pregnancy is not a contraindication for PEP. PEP should be explained to the health care worker. The health care worker should be informed about the rationale for using PEP and about the risks and benefits of receiving it.

### **PEP**

Factors that have influenced the recommendation of PEP include knowledge about the pathogenesis of the infection, experience in preventing perinatal transmission, and studies of the risks versus the benefits of receiving PEP. Animal and human studies have provided direct and indirect information indicating that postexposure treatment with zidovudine (ZDV, AZT) prevents infection. Some animal studies have shown that treatment with other antiretrovirals also works, but human study data are very limited.

The three types of antiretroviral drugs most commonly used in PEP include the following:

1. Nucleoside reverse transcriptase inhibitors, such as ZDV, stavudine (d4T), lamivudine (3TC), and didanosine (ddI)
2. Nonnucleoside reverse transcriptase inhibitors, such as nevirapine and delavirdine
3. Protease inhibitors, such as saquinavir, nelfinavir, and ritonavir

ZDV and nevirapine are the only drugs proven to prevent perinatal HIV transmission as indicated by the ACTG 076 trial and HIVNET 012 trial in Uganda. Limited data are available to indicate that adding other antiretrovirals is additive or synergistic in preventing transmission, but

the use of combination therapy in HIV-infected patients suppresses viral replication better than monotherapy. Thus, use of combination therapy in PEP might be even more effective than single-agent treatment in reducing the risk of transmission.

Current HIV treatment guidelines recommend the use of at least three drugs for HIV-infected adults, but the use of all three drugs in PEP is not always considered necessary. The decision to use two or three drugs is based on the risk of transmission after exposure. The WHO recommends the use of two nucleosides. The nucleoside combinations recommended for PEP include ZDV-3TC, 3TC-d4T, and tenofovir-3TC. ZDV is recommended because of the ACTG 076 results, and 3TC is recommended because experts believe that the combination of ZDV and 3TC suppresses HIV replication more potently than does ZDV alone, with less chance of developing viral resistance. The other combinations may be preferred when resistance to ZDV and/or 3TC is thought to be present or believed to be necessary. The third drug can be chosen from any currently approved for use for HIV by the U.S. Food and Drug Administration boosted by the protease inhibitor, ritonavir. These include the protease inhibitors nelfinavir, indinavir, saquinavir, ritonavir, and lopinavir-ritonavir. The nonnucleoside reverse transcriptase inhibitor efavirenz can be used when there is suspicion of protease inhibitor resistance. It is not recommended for use during pregnancy. Abacavir can also be used, but because it has been associated with serious hypersensitivity reactions, patients taking this medication should be monitored. The WHO guidelines for PEP recommend a preferred two-drug regimen and several alternative two-drug regimens, plus a preferred three-drug and alternative three-drug regimens. (**Appendix 3**). PEP needs to be taken for at least 4 weeks. It is important to minimize the possibility of side effects when choosing which medications to use.

The selection of which postexposure regimen to use—the basic regimen (two drugs) or the expanded regimen (three drugs)—should be based on the severity of exposure and information about the exposure source (**Appendix 4** and **Appendix 5**). Information about the exposure source would include information about antiretroviral history, the presence of possible resistance to anti-HIV drugs, CD4<sup>+</sup> count, viral load, and disease stage. Most exposures will require only the basic regimen of two nucleoside reverse transcriptase inhibitors. In exposures in which the risk of transmission is considered great, or when

resistance may be an issue, a protease inhibitor should be added.

Pregnant women should be informed of the possible risks of receiving and of not receiving PEP. Education should include information on the limited data available about the effects of many of these medications on the fetus. Efavirenz is teratogenic (causing birth defects) in primates and thus is not recommended for use in pregnant women. Indinavir can cause hyperbilirubinemia and renal stones and should be used cautiously in pregnant women. Reports of the development of fatal and nonfatal lactic acidosis with concomitant use of d4T and ddI during pregnancy suggest that this combination should be used only when the benefits are believed to outweigh the risks. Studies with women who received ZDV after 14 weeks of gestation suggest that the drug is safe. The decrease in risk of transmission of HIV to the fetus outweighs any risk associated with receipt of ZDV.

The education and information provided to the pregnant woman should also include that the fact that there is an increased risk of infecting the baby via breast-feeding if seroconversion occurs during breastfeeding. If possible, the woman should exclusively bottle-feed her baby, and if it is not possible she should exclusively breast-feed.

PEP should be started as soon as possible. If the HIV status of the source is not known, the basic regimen may be started based on the source and geographic prevalence of HIV. The regimen can be stopped when it is proven that the source is not HIV infected. Some animal studies have shown that PEP is not effective when started more than 24-36 hours after exposure. However, in current practice, PEP is begun as late as 72 hours after exposure when the risk of transmission is high. Once PEP is started, it should be given for at least 4 weeks. Antiretroviral adherence rates of at least 95% or more are required to achieve the maximum benefits from treatment regimen. It is important to provide education, counseling, and support related to adherence.

**Follow-Up and Monitoring**

HIV counseling, medical follow-up, and HIV testing after exposure should be carried out for at least 6 months after exposure. Recommended testing intervals are 6 weeks, 12 weeks, and 6 months after exposure. Seroconversion after 6 months is rare. However, any health care worker who experiences acute retroviral syndrome (fever, rash,

pharyngitis, and lymphadenopathy) should be tested for HIV, even if more than 6 months has elapsed since the known exposure. HIV antibody tests using enzyme immunoassay should be used to test for seroconversion, and Western blot can confirm any positive results. Direct virus assays such as cultures or PCR are not recommended in cases of exposed health care workers because few actually acquire the virus this way and direct virus assays are expensive.

If PEP is used in health care workers, it is important to monitor the individual with laboratory tests for drug-associated toxic effects. Baseline screening including a complete blood count and liver and renal function tests should be performed prior to starting therapy and again 2 weeks after the initiation of therapy. Serum glucose should be tested in individuals receiving a protease inhibitor. Some patients cannot complete the course of medication required for PEP because of medication side effects, including nausea and diarrhea. Administration of antiemetics and antidiarrheals often helps to prevent or relieve these symptoms.

**Counseling**

Health care workers who are exposed to HIV need to be counseled about the effect that the exposure will have on their lives. This includes the possibility of HIV seroconversion, the importance of starting prophylaxis, and behavioral changes that will have to be made for at

**APPENDIX 1. Factors to be assessed after possible occupational exposure to HIV<sup>1</sup>**

<b>Type of Exposure</b>
<ul style="list-style-type: none"> <li>• Percutaneous injury</li> <li>• Mucous-membrane exposure</li> <li>• Non-intact skin exposure</li> <li>• Bites resulting in blood exposure to either person involved</li> </ul>
<b>Type and Amount of Fluid/Tissue</b>
<ul style="list-style-type: none"> <li>• Blood</li> <li>• Fluids containing blood</li> <li>• Potentially infectious fluid or tissue (semen, vaginal secretions, and cerebrospinal, synovial, pleural, peritoneal, pericardial, and amniotic fluids)</li> <li>• Direct contact with concentrated virus</li> </ul>
<b>Infectious Status of Source</b>
<ul style="list-style-type: none"> <li>• Presence of HIV antibody</li> </ul>
<b>Susceptibility of Exposed Person</b>
<ul style="list-style-type: none"> <li>• HIV immune status</li> </ul>

**APPENDIX 2. Evaluating the occupational exposure source<sup>1</sup>**

Known Sources
<ul style="list-style-type: none"> <li>• Test known sources for HIV antibody.</li> <li>• Direct virus assays for routine screening of source patients are not recommended.</li> <li>• Consider using a rapid HIV-antibody test.</li> <li>• If the source person is not infected with HIV, baseline testing or further follow-up of the exposed person is not necessary.</li> <li>• For sources whose infection status remains unknown (e.g., if the source person refuses testing), consider medical diagnoses, clinical symptoms, and history of risk behaviors.</li> <li>• Do not test discarded needles for HIV.</li> </ul>
Unknown Sources
<ul style="list-style-type: none"> <li>• For unknown sources, evaluate the likelihood of exposure to a source at high risk of infection.</li> <li>• Consider the likelihood of HIV infection among patients in the exposure setting.</li> </ul>

**APPENDIX 3. WHO-recommended two- and three-drug therapy combinations**

Two-drug therapy combinations	
<b>Preferred</b>	<b>Alternative</b>
ZDV–3TC	TDF–3TC d4T–3TC
Three-drug therapy combinations	
<b>Preferred</b>	<b>Alternative</b>
ZDV–3TC–lopinavir/ritonavir	ZDV–3TC–atazanavir–ritonavir ZDV–3TC–saquinavir–ritonavir ZDV–3TC–fosamprienvir–ritonavir TDF–3TC–atazanavir–ritonavir TDF–3TC–saquinavir–ritonavir TDF–3TC–fosamprienvir–ritonavir d4T–3TC–atazanavir–ritonavir d4T–3TC–saquinavir–ritonavir d4T–3TC–fos-amprienvir–ritonavir

**APPENDIX 4. Recommended HIV post-exposure prophylaxis for percutaneous injuries<sup>1</sup>**

Exposure Type	HIV Infection Status of Source				
	HIV-Positive Class 1*	HIV-Positive Class 2*	HIV Status of Source Is Unknown†	Unknown Source‡	HIV-Negative
Less Severe‡	Basic 2- drug PEP	Expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** if source has HIV risk factors++	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIV-infected persons is likely	No PEP
More Severe††	Expanded 3-drug PEP	Expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** if source has HIV risk factors++	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIVinfected persons is likely	No PEP

\* HIV-Positive Class 1: Asymptomatic HIV infection or known low viral load (e.g. <1,500 copies/ml). HIV-Positive Class 2: Symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of PEP should not be delayed pending expert consultation, and, because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.

+ Source is of unknown HIV status (e.g., deceased source person with no samples available for HIV testing).

† Source is unknown (e.g., a needle from a sharps-disposal container).

‡ Less severe (e.g., solid needle and superficial injury)

\*\* The designation “consider PEP” indicates that PEP is optional and should be based on an individualized decision by the exposed person and the treating clinician.

++ If PEP is offered and taken and the source is later determined to be HIV-negative, PEP should be discontinued.

†† More severe (e.g., large-bore hollow needle, deep puncture, visible blood on device, or needle used in patient’s artery or vein)

**APPENDIX 5. Recommended HIV post-exposure prophylaxis for mucous-membrane exposures and non-intact skin\* exposures<sup>1</sup>**

Exposure Type	HIV Infection Status of Source				
	HIV-Positive Class 1*	HIV-Positive Class 2*	HIV Status of Source Is Unknown+	Unknown Source†	HIV-Negative
Small Volume‡	Consider basic 2-drug PEP**	Basic 2-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** if source has HIV risk factors++	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIVinfected persons is likely	No PEP
Large Volume††	Basic 2-drug PEP	Expanded 3-drug PEP	Generally, no PEP warranted; however, consider basic 2-drug PEP** if source has HIV risk factors++	Generally, no PEP warranted; however, consider basic 2-drug PEP** in settings where exposure to HIVinfected persons is likely	No PEP

\* For skin exposures, follow-up is indicated only if there is evidence of compromised skin integrity (e.g. dermatitis, abrasion, or open wound).

• HIV-Positive Class 1: Asymptomatic HIV infection or known low viral load (e.g. <1,500 copies/ml). HIV-Positive Class 2: Symptomatic HIV infection, AIDS, acute seroconversion, or known high viral load. If drug resistance is a concern, obtain expert consultation. Initiation of PEP should not be delayed pending expert consultation, and, because expert consultation alone cannot substitute for face-to-face counseling, resources should be available to provide immediate evaluation and follow-up care for all exposures.

+ Source is of unknown HIV status (e.g. deceased source person with no samples available for HIV testing).

† Source is unknown (e.g. splash from inappropriately disposed blood).

‡ Small volume (i.e. a few drops)

\*\* The designation “consider PEP” indicates that PEP is optional and should be based on an individualized decision by the exposed person and the treating clinician.

++ If PEP is offered and taken and the source is later determined to be HIV-negative, PEP should be discontinued.

†† Large volume (i.e. major blood splash)

least 6 months to prevent the possibility of transmitting HIV to others. These changes include sexual abstinence or condom use and cessation of breast-feeding, if appropriate. Access to information about HIV/AIDS should be provided, and appropriate referrals should be made for further counseling and medical care.

HIV-infected health care workers need not discontinue patient contact. HIV-infected health care workers should be allowed to continue to work without fear of stigmatization or discrimination. The diagnosis of HIV infection should be strictly confidential. HIV-infected health care workers should continue to follow infection control measures and standard precautions to prevent acquiring other infections and prevent transmitting HIV to others.

**COMPONENTS OF STANDARD PRECAUTIONS**

1. Respiratory hygiene/cough etiquette.
  - Persons with respiratory illnesses who enter a health care facility should wear masks.
  - Handwashing is recommended after coughing/sneezing.
  - Maintain a distance of at least 3 feet from a person who has a respiratory illness.
2. Hand hygiene: enforce handwashing with soap and water before and after every patient contact or use of alcohol-based solutions.
3. Use of protective equipment as deemed necessary based on procedures/risks of contamination. Precautions should be taken to avoid having the skin, eyes, and mucous membranes come into contact with blood.

- Gloves should be worn for most procedures (e.g., venipuncture).
  - Goggles should be worn if there is a risk of splashing with body fluids.
  - Gown should be worn.
  - Mask should be worn to prevent contamination of sterile sites with respiratory secretions.
4. Environmental cleaning.
- Needles/sharps disposal: needles should never be recapped, bent, or broken; they should be discarded into sealed, puncture-resistant containers.
  - Waste/linen disposal: spills of blood or other infectious fluids should be cleaned while wearing gloves, using a solution of one part household bleach to 10 parts water.

## SUMMARY OF MANAGEMENT OF HIV EXPOSURE IN THE HEALTH CARE SETTING

Following standard precautions can prevent exposure to HIV. Treat all individuals as if they were infected with HIV or other infectious pathogens. *If an exposure does occur, carry out the following steps:*

1. Wash the exposure site:
  - Either broken or intact skin should be washed with soap and water, or flush it with water or a gel or hand-rub solution immediately.
  - A splash to the eye should be flushed with water immediately.
  - A splash to the mouth should be spit out immediately, and then the mouth should be rinsed with water, which should then be spit out. Repeat several times. Do not use soap or disinfectant in the mouth.
2. Report the exposure as soon as possible so that appropriate interventions can be started.
3. Assess the exposure's potential to transmit HIV on the basis of the type of fluid involved, the route, and the severity of the exposure.
4. Evaluate the person who is the source of the exposure for the presence of HIV.
5. Gather information on risk factors for HIV and questions about HIV-related symptoms.
6. Counsel the exposed health care worker about HIV.

7. Perform baseline HIV testing for the exposed health care worker
8. Evaluate the risks and benefits of receiving post-exposure prophylaxis (PEP).
9. Initiate PEP if warranted within in 72 hours of the exposure—the health care worker needs to be an active participant in the decision of whether to start PEP.
10. Repeat the HIV testing for at least 6 months after the exposure, usually at the intervals of 6 weeks, 12 weeks, and 6 months.

## REFERENCES

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