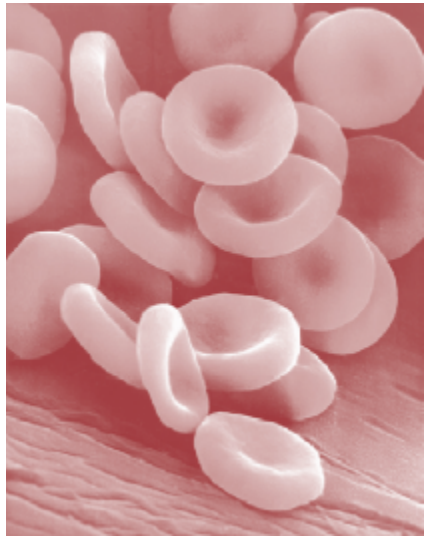


# Exposure to Blood

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**What Health-Care  
Workers Need to  
Know**



Department of Health & Human Services

**CDC**  
CENTERS FOR DISEASE CONTROL  
AND PREVENTION

# OCCUPATIONAL EXPOSURES TO BLOOD

## Introduction

Health-care workers are at risk for occupational exposure to bloodborne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Exposures occur through needlesticks or cuts from other sharp instruments contaminated with an infected patient's blood or through contact of the eye, nose, mouth, or skin with a patient's blood. Important factors that may determine the overall risk for occupational transmission of a bloodborne pathogen include the number of infected individuals in the patient population, the chance of becoming infected after a single blood contact from an infected patient, and the type and number of blood contacts.

Most exposures do not result in infection. Following a specific exposure, the risk of infection may vary with factors such as these:

- ◆ The pathogen involved
- ◆ The type of exposure
- ◆ The amount of blood involved in the exposure
- ◆ The amount of virus in the patient's blood at the time of exposure

Your employer should have in place a system for reporting exposures in order to quickly evaluate the risk of infection, inform you about treatments available to help prevent infection, monitor you for side effects of treatments, and to determine if infection occurs. This may involve testing your blood and that of the source patient and offering appropriate postexposure treatment.

## How can occupational exposures be prevented?

Many needlesticks and other cuts can be prevented by using safer techniques (e.g., not recapping needles by hand), disposing of used needles in appropriate sharps disposal containers, and using medical devices with safety features designed to prevent injuries. Many exposures to the eyes, nose, mouth, or skin can be prevented by using appropriate barriers (e.g., gloves, eye and face protection, gowns) when contact with blood is expected.

## IF AN EXPOSURE OCCURS

### What should I do if I am exposed to the blood of a patient?

#### 1. Immediately following an exposure to blood:

- ◆ Wash needlesticks and cuts with soap and water
- ◆ Flush splashes to the nose, mouth, or skin with water
- ◆ Irrigate eyes with clean water, saline, or sterile irrigants

No scientific evidence shows that using antiseptics or squeezing the wound will reduce the risk of transmission of a bloodborne pathogen. Using a caustic agent such as bleach is not recommended.

#### 2. Following any blood exposure you should:

**Report the exposure** to the department (e.g., occupational health, infection control) responsible for managing exposures. Prompt reporting is essential because, in some cases, postexposure treatment may be recommended and it should be started as soon as possible.

Discuss the possible risks of acquiring HBV, HCV, and HIV and the need for postexposure treatment with the provider managing your exposure. You should have already received hepatitis B vaccine, which is extremely safe and effective in preventing HBV infection.

## RISK OF INFECTION AFTER EXPOSURE

### What is the risk of infection after an occupational exposure?

#### **HBV**

Health-care workers who have received hepatitis B vaccine and have developed immunity to the virus are at virtually no risk for infection. For an unvaccinated person, the risk from a single needlestick or a cut exposure to HBV-infected blood ranges from 6-30% and depends on the hepatitis B e antigen (HBeAg) status of the source individual. Individuals who are both hepatitis B surface antigen (HBsAg) positive and HBeAg positive have more virus in their blood and are more likely to transmit HBV.

#### **HCV**

Based on limited studies, the risk for infection after a needlestick or cut exposure to HCV-infected blood is approximately 1.8%. The risk following a blood splash is unknown, but is believed to be very small; however, HCV infection from such an exposure has been reported.

## **HIV**

- ◆ The average risk of HIV infection after a needlestick or cut exposure to HIV-infected blood is **0.3%** (i.e., three-tenths of one percent, or about 1 in 300). Stated another way, 99.7% of needlestick/cut exposures do not lead to infection.
- ◆ The risk after exposure of the eye, nose, or mouth to HIV-infected blood is estimated to be, on average, **0.1%** (1 in 1,000).
- ◆ The risk after exposure of the skin to HIV-infected blood is estimated to be less than 0.1%. A small amount of blood on intact skin probably poses no risk at all. There have been no documented cases of HIV transmission due to an exposure involving a small amount of blood on intact skin (a few drops of blood on skin for a short period of time). The risk may be higher if the skin is damaged (for example, by a recent cut) or if the contact involves a large area of skin or is prolonged (for example, being covered in blood for hours).

## **How many health-care workers have been infected with bloodborne pathogens?**

### **HBV**

The annual number of occupational infections has decreased sharply since hepatitis B vaccine became available in 1982 (i.e., there has been a 90% decrease in the number of estimated cases from 1985 to 1996). Nonetheless, approximately 800 health-care workers become infected with HBV each year following an occupational exposure.

### **HCV**

There are no exact estimates on the number of health-care workers occupationally infected with HCV. However, studies have shown that 1% of hospital health-care workers have evidence of HCV infection (about 1.8% of the U.S. population has evidence of infection). The number of these workers who may have been infected through an occupational exposure is unknown.

### **HIV**

As of December 1998, CDC had received reports of 54 documented cases and 134 possible cases of occupationally acquired HIV infection among health-care workers in the United States since reporting began in 1985.

## **TREATMENT FOR THE EXPOSURE**

### **Is vaccine or treatment available to prevent infections with bloodborne pathogens?**

#### **HBV**

As mentioned above, hepatitis B vaccine has been available since 1982 to prevent HBV infection. All health-care workers who have a reasonable chance of exposure to blood or body fluids should receive hepatitis B vaccine. Vaccination ideally should occur during the health-care worker's training period. Workers should be tested 1-2 months after the vaccine series to make sure that vaccination has provided immunity to HBV infection.

Hepatitis B immune globulin (HBIG) is effective in preventing HBV infection after an exposure. The decision to begin treatment is based on several factors, such as:

- ◆ Whether the source individual is positive for hepatitis B surface antigen.
- ◆ Whether you have been vaccinated.
- ◆ Whether the vaccine provided you immunity.

#### **HCV**

There is no vaccine against hepatitis C, and no treatment after an exposure that will prevent infection. Immune globulin is not recommended. For these reasons, following recommended infection control practices is imperative.

#### **HIV**

There is no vaccine against HIV. However, results from a small number of studies suggest that the use of zidovudine after certain occupational exposures may reduce the chance of HIV transmission.

Postexposure treatment is not recommended for all occupational exposures to HIV because most exposures do not lead to HIV infection and because the drugs used to prevent infection may have serious side effects. Taking these drugs for exposures that pose a lower risk for infection may not be worth the risk of the side effects. You should discuss the risks and side effects with a health-care provider before starting postexposure treatment for HIV.

## **What about exposures to blood from an individual whose infection status is unknown?**

### **HBV-HCV-HIV**

If the source individual cannot be identified or tested, decisions regarding follow-up should be based on the exposure risk and whether the source is likely to be a person who is infected with a bloodborne pathogen. Follow-up testing should be available to all workers who are concerned about possible infection through occupational exposure.

## **What specific drugs are recommended for postexposure treatment?**

### **HBV**

If you have not been vaccinated, then hepatitis B vaccination is recommended for any exposure regardless of the source person's hepatitis B status. HBIG and/or hepatitis B vaccine may be recommended depending on your immunity to hepatitis B and the source person's infection status.

### **HCV**

Currently there is no recommended postexposure treatment that will prevent HCV infection.

### **HIV**

The Public Health Service recommends a 4-week course of two drugs (zidovudine and lamivudine) for most HIV exposures, or zidovudine and lamivudine plus a protease inhibitor (indinavir or nelfinavir) for exposures that may pose a greater risk for transmitting HIV (such as those involving a larger volume of blood with a larger amount of HIV or a concern about drug-resistant HIV). Differences in side effects associated with the use of these two drugs may influence which drug is selected in a specific situation.

These recommendations are intended to provide guidance to clinicians and may be modified on a case-by-case basis. Determining which drugs and how many drugs to use or when to change a treatment regimen is largely a matter of judgement. Whenever possible, consulting an expert with experience in the use of antiviral drugs is advised, especially if a recommended drug is not available, if the source patient's virus is likely to be resistant to one or more recommended drugs, or if the drugs are poorly tolerated.

## **How soon after exposure to a bloodborne pathogen should treatment start?**

### **HBV**

Postexposure treatment should begin as soon as possible after exposure, preferably within 24 hours, and no later than 7 days.

### **HIV**

Treatment should be started promptly, preferably within hours as opposed to days, after the exposure. Although animal studies suggest that treatment is not effective when started more than 24-36 hours after exposure, it is not known if this time frame is the same for humans. Starting treatment after a longer period (e.g., 1-2 weeks) may be considered for the highest risk exposures; even if HIV infection is not prevented, early treatment of initial HIV infection may lessen the severity of symptoms and delay the onset of AIDS.

## **Has the FDA approved these drugs to prevent blood-borne pathogen infection following an occupational exposure?**

### **HBV**

Yes. Both hepatitis B vaccine and HBIG are approved for this use.

### **HIV**

No. The FDA has approved these drugs for the treatment of existing HIV infection, but not as a treatment to prevent infection. However, physicians may prescribe any approved drug when, in their professional judgment, the use of the drug is warranted.

## **What is known about the safety and side effects of these drugs?**

### **HBV**

Hepatitis B vaccine is very safe. There is no information that the vaccine causes any chronic illnesses. Most illnesses reported after an HBV vaccination are often related to other causes and not the vaccine. However, you should report any unusual reaction after a hepatitis B vaccination to your health-care provider.

### **HIV**

All of the antiviral drugs for HIV have been associated with side effects. The most common side effects include upset stomach (nausea, vomiting, diarrhea), tiredness, or headache. The few serious side effects that have been reported in health-care workers using combination postexposure treatment have included kidney stones, hepatitis, and suppressed blood

cell production. Protease inhibitors (indinavir and nefinavir) may interact with other medicines and cause serious side effects and should not be used in combination with certain other drugs, such as prescription antihistamines. It is important to tell the health-care provider managing your exposure about any medications you are currently taking, if you need to take antiviral drugs for an HIV exposure.

## **Can pregnant health-care workers take the drugs recommended for postexposure treatment?**

### **HBV**

Yes. Women who are pregnant or breast feeding can be vaccinated against HBV infection and/or get HBIG. Pregnant women who are exposed to blood should be vaccinated against HBV infection, because infection during pregnancy can cause severe illness in the mother and a chronic infection in the newborn. The vaccine does not harm the fetus.

### **HIV**

Pregnancy should not rule out the use of postexposure treatment when it is warranted. If you are pregnant you should understand what is known and not known regarding the potential benefits and risks associated with the use of antiviral drugs in order to make an informed decision about treatment.

## **FOLLOW-UP AFTER AN EXPOSURE**

### **What follow-up should be done after an exposure?**

#### **HBV**

Because postexposure treatment is highly effective in preventing HBV infection, CDC does not recommend routine follow-up after treatment. However, any symptoms suggesting hepatitis (e.g., yellow eyes or skin, loss of appetite, nausea, vomiting, fever, stomach or joint pain, extreme tiredness) should be reported to your health-care provider.

#### **HCV**

You should have an antibody test for hepatitis C virus and a liver enzyme test (alanine aminotransferase activity) as soon as possible after the exposure (baseline) and at 4-6 months after the exposure. Some clinicians may also recommend another test (HCV RNA) to detect HCV infection 4-6 weeks after the exposure. Report any symptoms suggesting hepatitis (mentioned above) to your health-care provider.



## **HIV**

You should be tested for HIV antibody as soon as possible after exposure (baseline) and periodically for at least 6 months after the exposure (e.g., at 6 weeks, 12 weeks, and 6 months).

If you take antiviral drugs for postexposure treatment, you should be checked for drug toxicity by having a complete blood count and kidney and liver function tests just before starting treatment and 2 weeks after starting treatment.

You should report any sudden or severe flu-like illness that occurs during the follow-up period, especially if it involves fever, rash, muscle aches, tiredness, malaise, or swollen glands. Any of these may suggest HIV infection, drug reaction, or other medical conditions.

You should contact the health-care provider managing your exposure if you have any questions or problems during the follow-up period.

## **What precautions should be taken during the follow-up period?**

### **HBV**

If you are exposed to HBV and receive postexposure treatment, it is unlikely that you will become infected and pass the infection on to others. No precautions are recommended.

### **HCV**

Because the risk of becoming infected and passing the infection on to others after an exposure to HCV is low, no precautions are recommended.

### **HIV**

During the follow-up period, especially the first 6-12 weeks when most infected persons are expected to show signs of infection, you should follow recommendations for preventing transmission of HIV. These include not donating blood, semen, or organs and not having sexual intercourse. If you choose to have sexual intercourse, using a condom consistently and correctly may reduce the risk of HIV transmission. In addition, women should consider not breast-feeding infants during the follow-up period to prevent exposing their infants to HIV in breast milk.

## **OTHER SOURCES OF INFORMATION**

### **HBV and HCV**

For additional information about hepatitis B and hepatitis C you can call

the hepatitis information line at 1-888-4-HEPCDC (1-888-443-7232) or visit CDC's hepatitis website at

[www.cdc.gov/ncidod/diseases/hepatitis/index.htm](http://www.cdc.gov/ncidod/diseases/hepatitis/index.htm)

Anyone believing they have had a reaction or adverse event should report it to his/her health care provider. The Vaccine Adverse Event Reporting System (1-800-822-7967) receives reports from health-care providers and others about vaccine side effects.

### **HIV**

Information specialists who staff the CDC National AIDS Hotline (1-800-342-2437) can answer questions or provide information on HIV infection and AIDS and the resources available in your area. The HIV/AIDS Treatment Information Service (1-800-448-0440) can also be contacted for information on the clinical treatment of HIV/AIDS. For free copies of printed material on HIV infection and AIDS, please call or write the CDC National Prevention Information Network, P.O. Box 6003, Rockville, MD 20849-6003, telephone 1-800-458-5231, Internet address [www.cdcnpin.org](http://www.cdcnpin.org)

Additional information about occupational exposures to bloodborne pathogens is available on CDC's Hospital Infections Program's website at [www.cdc.gov/ncidod/hip](http://www.cdc.gov/ncidod/hip) or on CDC's National Institute of Occupational Safety and Health's website at [www.cdc.gov/niosh](http://www.cdc.gov/niosh) or call 1-800-35 NIOSH (1-800-356-4674).



**Information from the  
Hospital Infections Program  
and the  
Division of Viral and Rickettsial Diseases**

**For additional brochures contact:**

**The Public Health Foundation  
877-252-1200 (toll free)  
or  
[www.bookstore.phf.org](http://www.bookstore.phf.org)**

