OSHA BLOOD-BORNE PATHOGENS STANDARD: MANAGEMENT OF EXPOSURE TO BLOOD-BORNE PATHOGENS

Dana Bartlett, RN, BSN, MSN, MA

Dana Bartlett is a professional nurse and author. His clinical experience includes 16 years of ICU and ER experience and over 20 years of as a poison control center information specialist. Dana has published numerous CE and journal articles, written NCLEX material and textbook chapters, and done editing and reviewing for publishers such as Elsevier, Lippincott, and Thieme. He has written widely on the subject of toxicology and was recently named a contributing editor, toxicology section, for Critical Care Nurse journal. He is currently employed at the Connecticut Poison Control Center and is actively involved in lecturing and mentoring nurses, emergency medical residents and pharmacy students.

Abstract

Healthcare workers are continuously exposed to hazards of blood-borne pathogen transmission. Many bacteria and viruses may be transmitted to healthcare workers by needlesticks, sharps injury, or splash contact. Hepatitis B, hepatitis C, and the human immunodeficiency virus (HIV) account for the greatest number of exposures and infections. Important aspects of the Occupational Safety and Health Administration (OSHA) standard and information on the management of exposure to blood-borne pathogens are discussed.
**Continuing Nursing Education Course Director & Planners**
William A. Cook, PhD, Director, Douglas Lawrence, MA, Webmaster,
Susan DePasquale, CGRN, MSN, FPMHNP-BC, Lead Nurse Planner

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**Statement of Need**
As front-line health professionals, nurses need to know OSHA safety protocol to prevent and to report exposure to blood-borne pathogens, in addition to initial interventions for exposure.

**Course Purpose**
To provide nursing professionals with basic knowledge of OSHA recommendations for exposure to blood-borne pathogens.
Learning Objectives

1. Define risk situations involving blood-borne pathogens.
2. Identify blood-borne pathogens that nurses may be exposed to.
3. Identify recommended methods and techniques for the prevention of exposure to blood-borne pathogens.
4. Identify how exposures to blood-borne pathogens should be managed.

Target Audience

Advanced Practice Registered Nurses, Registered Nurses, Licensed Practical Nurses, and Associates

Course Author & Director Disclosures

Dana Bartlett, RN, BSN, MSN, MA, William S. Cook, PhD,
Douglas Lawrence, MA, Susan DePasquale, CGRN, MSN, FPMHNP-BC – all have no disclosures

Acknowledgement of Commercial Support

There is no commercial support for this course.

Activity Review Information

Reviewed by Susan DePasquale, CGRN, MSN, FPMHNP-BC

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Please take time to complete the self-assessment Knowledge Questions before reading the article. Opportunity to complete a self-assessment of knowledge learned will be provided at the end of the course.
1. The majority of occupational exposures to blood-borne pathogens are:
   a. Percutaneous.
   b. Air-borne.
   c. Cutaneous.
   d. Percutaneous and cutaneous together.

2. The most common blood-borne pathogens in occupational exposures are:
   a. Hepatitis B, hepatitis D, and MRSA.
   b. Hepatitis C, HIV, and tuberculosis.
   c. Hepatitis B, hepatitis C, and HIV.
   d. Hepatitis E, HIV, and gram-negative bacteria.

3. The risk of HIV transmission after a percutaneous exposure is approximately:
   a. 3.0%.
   b. 0.3%.
   c. 30%.
   d. 13%

4. True or false: Infection with a blood-borne pathogen can occur after contact with a contaminated surface.
   a. True.
   b. False.
5. The first step in managing an exposure to a blood-borne pathogen is:
   a. Testing of the source patient
   b. Notifying the employee health department.
   c. Testing of the affected healthcare professional.
   d. Perform basic wound care or flush the affected area.

6. An exposure to a blood-borne pathogen should be reported:
   a. Within 24 hours of the exposure.
   b. At the end of the shift.
   c. Immediately.
   d. Within seven days of the exposure.

7. Post-exposure prophylaxis for hepatitis B:
   a. Is not needed if vaccination is complete and the response is adequate.
   b. Should be given only if the exposure involved a large amount of blood.
   c. Is not needed if the source patient has had hepatitis B for > 10 years.
   d. Should be given only if the source patient is not known.

8. True or false: There is effective post-exposure prophylaxis for hepatitis C.
   a. True.
   b. False.
9. Post-exposure prophylaxis for HIV should be started:
   a. Within 7 days of the exposure.
   b. After drug-resistance testing is completed.
   c. Within 1-2 hours of the exposure.
   d. After tests for hepatitis B and C and HIV have been completed.

10. The OSHA blood-borne pathogens standard requires employers to:
    a. Test each employee yearly for infection with blood-borne pathogens.
    b. Provide pre-exposure prophylaxis for HIV.
    c. Test at-risk patient for blood-borne pathogens.
    d. Have a plan for the management of exposures to blood-borne pathogens.
Introduction

Exposure to blood-borne pathogens is a serious, ongoing hazard for healthcare workers and the Occupational Safety and Health Administration (OSHA) developed a standard that was designed to protect at-risk employees: the blood-borne pathogens standard, which is identified by the Code of Federal Regulations number CFR 1910.1030.¹ The standard was amended in 2001 to include the Needlestick Safety and Prevention Act, and CFR 1910.1030 provides:

- Definitions of risk situations.
- Recommendations for the prevention of exposures to blood-borne pathogens
- Recommendations for the management of exposures to blood-borne pathogens.

Nurses have considerable risk for exposure to blood-borne pathogens, and they are required to have a basic knowledge of, and comply with, the recommendations of the OSHA blood-borne pathogens standard. This module will review important aspects of the standard and provide information on the management of exposure to blood-borne pathogens.

Epidemiology Of Exposures To Blood-Borne Pathogens

Many bacteria and viruses can be, and have been transmitted to healthcare workers by needlesticks, sharps injury, or splash contact,² but hepatitis B, hepatitis C, and the human immunodeficiency virus (HIV) account for the greatest number of exposures and infections.² The majority of occupational exposures to and infections from these
viruses are caused by percutaneous injury.\textsuperscript{3} The term percutaneous injury refers to any puncture of the surface of the skin such as a needlestick and a sharps injury, the latter being a puncture of the skin from a scalpel, a trochar, or any other medical device or instrument.

The exact incidence of needlesticks, sharps injuries, and splash exposures is not known, but it is clear they are a common occurrence, as seen by the following reports:

- The Centers for Disease Control and Prevention (CDC) has estimated that in the United States there are 385,000 needlesticks every year.\textsuperscript{4}
- The Exposure Prevention and Information Network (EPInet) noted in their 2011 report that the number of needlestick injuries was 19.46 per 100 occupied beds.\textsuperscript{5}
- Karmon \textit{et al.}, (2013) surveyed healthcare workers in an urban hospital and they found that in the previous year 9.4\% of nurses, physicians, and other employees had a needlestick, a sharps injury, or a splash contact with blood or potentially infectious body fluid.\textsuperscript{6}
- Henderson (2012) estimated that almost 1 of every 10 healthcare workers in the United States has a needlestick exposure each year.\textsuperscript{7}
- Under-reporting of needlestick injuries, sharps injuries, and splash contacts with potentially infectious fluids is not unusual.\textsuperscript{8-12} The CDC has estimated that 50\% or more of these incidents are not reported.\textsuperscript{4}

Nurses work in a wide variety of patient care areas, \textit{i.e.}, emergency room (ER), intensive care unit (ICU), and operating room (OR), they
frequently use needles and handle sharps, and they are often exposed to blood and body fluids. These factors increase their risk for exposure and needlesticks, sharps injuries, and splash exposures, all of which occur more often to nurses than to other healthcare workers.12-15

**Risk Of Infection After Occupational Exposure**

The risk of infection after an occupational exposure to a blood-borne pathogen depends on many factors7,16,17 and the viral load of the source (the patient) is probably the most critical of these.7 Infection is least likely from a splash contact (cutaneous exposure), and it is most likely from a deep puncture by a large-gauge, hollow bore needle that contains a large amount of blood that has a high viral load. Simultaneous transmission of several blood-borne pathogens from a needlestick has been reported.18

**Table Risk 1: Factors for Infection after Exposure to a Blood-borne Pathogen**6,7,16

<table>
<thead>
<tr>
<th>Amount of blood injected</th>
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<tbody>
<tr>
<td>Availability/efficacy of post-exposure prophylaxis</td>
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<tr>
<td>Depth of the injury</td>
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<tr>
<td>Health status of the source person</td>
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<tr>
<td>Hollow bore needle</td>
</tr>
<tr>
<td>Immune system competency</td>
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<tr>
<td>Placement of the injuring device in an artery or a vein</td>
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<tr>
<td>Prevalence of the pathogen in the population</td>
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<tr>
<td>The pathogen</td>
</tr>
<tr>
<td>Type of injury, <em>i.e.</em>, puncture wound versus splash contact</td>
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<tr>
<td>Viral load</td>
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<td>Visible blood on a needle or sharp</td>
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The risk of infection after a percutaneous exposure to HIV has been estimated to be 0.32%\(^7\) and the risk for infection after a mucous membrane exposure to HIV has been estimated to be 0.03%-0.09%.\(^{16,19,20}\) No transmission of HIV through intact skin has been documented. All known sero-conversions from occupational exposure to HIV have occurred after exposure to blood, bloody fluids, or viral cultures.\(^{19}\) Semen, vaginal fluids, and body fluids visibly contaminated with blood can transmit HIV; and, amniotic fluid, cerebrospinal fluid, pericardial fluid, peritoneal fluid, pleural, and synovial fluid are potentially HIV-infected. Feces, gastrointestinal fluids, nasal secretions, saliva, sputum, sweat, tears, urine, and vomitus are not considered to be HIV infectious unless they contain blood.

The risk for transmission after exposure to fluids or tissues other than HIV-infected blood has not been quantified but is probably quite low.\(^{21}\) In most reported instances involving transmission of HIV, the needlestick injury occurred within seconds or minutes after the needle was withdrawn from the source patient.\(^{22}\) The CDC surveyed occupational exposures to HIV that occurred in the years 1981-2010 and found 57 cases of documented HIV sero-conversion; and, 84.2% of these were percutaneous exposures and in greater than 90% of the cases there were non-occupational risk factors for HIV exposure.\(^{23}\)

The risk of infection after percutaneous exposure to hepatitis B has been estimated to be between 6%-62%\(^{16,19,24}\) and is especially high if the source is positive for hepatitis B surface antigen (HbsAg) and hepatitis B e antigen (HbeAg).\(^{16}\) Infection in healthcare workers with hepatitis B who have not had a needlestick or other percutaneous exposure could be due to exposure to the virus through an abrasion, a
burn, a scratch, or a mucous membrane, and in approximately two-thirds of all people infected with hepatitis B, no needlestick was identified. Hepatitis B surface antigen is found in other body fluids aside from blood such as bile, breast milk, cerebrospinal fluid, feces, nasopharyngeal washings, saliva, semen, sweat, and synovial fluid. However, these fluids contain low levels of the virus and exposure to them would not be likely to cause hepatitis B infection.

The risk for infection after percutaneous exposure to hepatitis C has been estimated to be approximately 1.8%, the reported range being 0-10%. Approximately 39% of all hepatitis C infections in healthcare workers are considered to be occupational. Infection with hepatitis C after mucous membrane exposure is considered to be unlikely, but infection after conjunctival or ocular exposure has been reported. Hepatitis C virus has been found in ascites, menstrual fluid, saliva, semen, spinal fluid, and urine. These fluids have a much lower hepatitis C viral content than blood and transmission of the virus from these fluids has not been reported but if they were contaminated with blood or if there was a large exposure, transmission and infection could occur.

Learning Break:
Blood-borne pathogens can contaminate surfaces and persist in the environment and contact with these contaminated surfaces can cause infection. Hepatitis B and HIV in dried blood can remain on surfaces for a week and hepatitis B is capable of causing infection during that time. Hepatitis C also can survive outside the body on environmental surfaces and it can remain infective at room temperatures on surfaces for up to six weeks.
How Do Exposures To Blood-borne Pathogens Occur?

Needlestick injuries and other exposures to blood-borne pathogens are usually caused by human error. These errors can involve personal and organizational issues, and factors such as poor staffing, a relative lack of nursing experience, long hours at work, stress and fatigue, and poor or improper use of equipment have been identified as causes of needlestick injuries.\textsuperscript{38-42}

The most common situations that are involved in needlestick injuries and other exposures to blood-born pathogens are listed in Table 2.

\begin{table}[h]
\centering
\begin{tabular}{|l|}
\hline
Accessing an IV line  
Cleanup  
Collision with another nurse or another healthcare worker  
Manipulating the needle while it is in a patient  
Passing a needle or a sharp  
Poor or improper disposal technique  
Puncturing skin with a needle or a sharp  
Suturing  
Recapping needles  
Transferring blood from one container to another  
Equipment that must be manipulated after or during use such as disposable syringes, IV catheter stylettes, needles attached to tubing such as winged infusion sets and suture needles  
Acute care, ER, ICU, or OR settings  
\hline
\end{tabular}
\caption{At-Risk Situations for Needle-stick Injuries}
\end{table}
The OSHA Blood-Borne Pathogens Standard

The OSHA blood-borne pathogens standard is both general and specific in its recommendations. Some sections provide detailed guidance while others provide basic direction. For example, the standard states that employers must provide hand-washing facilities but if providing these is not possible the employer must provide either an appropriate antiseptic hand cleaner or antiseptic towelettes. The standard, however, does not specify what type of hand cleaners or towelettes. A fact sheet that provides a short overview of the standard is available at this link: http://www.osha.gov/OshDoc/data_BloodborneFacts/bbfact01.pdf.

There are other fact sheets on the OSHA website that address topics such as the standard’s recommendations on hand washing and the recommendations for the safe use of needles and sharps.

Learning Break:
The blood-borne pathogen standard was amended in 2001 to include the Needlestick Safety and Prevention Act that was passed by Congress in 2000. This Act amended standard CFR 1910.1030 in order to require employers to: 1) maintain a sharps injury log, and 2) involve non-managerial personnel in the decision-making process of selecting safer needle devices. The Act also added language to the blood-borne pathogens standard that redefined engineering controls as "controls (i.e., sharps disposal containers, self-sheathing needles, safer medical devices, such as sharps with engineered sharps injury protections and needleless systems) that isolate or remove the blood-borne pathogens hazard from the workplace."
Another helpful OSHA resource that has detailed information about the standard is: Most Frequently Asked Questions Concerning the Blood-Borne Pathogens Standard. It is available at this link: https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=INTERPRETATIONS&p_id=21010.

**OSHA Blood-Borne Pathogen Standard: Definitions**

Familiarity with definitions used by the OSHA blood-borne pathogens standard can help increase understanding of and compliance with the standard. The definitions provided here are essentially the same as those found in the standard.

**Blood-borne pathogens:**
Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus and HIV.

**Contaminated:**
The presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

**Exposure:**
Eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee’s duties.

**Other potentially infectious material:** 1) semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body
fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; 2) Any unfixed tissue or organ (other than intact skin) from a human (living or dead); 3) HIV-containing cell or tissue cultures, organ cultures, and HIV- or hepatitis B virus-containing culture medium or other solutions; and, 4) blood, organs, or other tissues from experimental animals infected with HIV or hepatitis B virus.

**Compliance With The Blood-Borne Pathogens Standard:**

*Employers And Employees*

Adherence to the OSHA blood-borne pathogen standard is mandatory for all hospitals and healthcare facilities. To be in compliance with the standard employers must establish a written plan for controlling exposure to blood-borne pathogens. This plan should include 1) an assessment of risk situations; 2) a determination of which employees are at risk and when they are at risk; and, 3) specific actions the employer will use to control and manage exposure to blood-borne pathogens. The plan must be reviewed and updated annually and it must be accessible to all employees, as outlined below.

- Implement standard precautions, ensure that employees know how to use standard precautions, and ensure they use standard precautions.
- Provide personal protective equipment (PPE) at no cost to all employees who need it.
• Provide initial training and annual training on blood-borne pathogens to all employees:
  This training should include 1) a review of the OSHA Blood-borne pathogens standard; 2) information on the risks of exposures and how exposures happen; 3) information on how to prevent exposures to blood-borne pathogens; and, 4) information on the benefits and risk of vaccination against hepatitis B.

• Use engineering controls to control risk:
  Engineering controls that control the risk of exposure to blood-borne pathogens would include providing sharps disposal boxes, using safe medical devices, using needles that do not need to be re-capped, providing proper waste disposal containers, and using appropriate signs to warn of danger and to instruct employees on the proper use of equipment.

• Use work practice controls:
  The employer must have a plan or plans in place for the proper handling and disposal of blood and other specimens, the proper handling and disposal of contaminated waste, and for the proper cleaning and decontamination of equipment, patient rooms, and patient care areas.

• Offer vaccination against hepatitis B to all employees who may be reasonably expected to have an occupational exposure to the hepatitis B virus.

• Have a plan to handle employee exposure to blood-borne pathogens. This plan should include provisions for immediate care (i.e., evaluation, first aid, laboratory screening tests, post-exposure prophylactic medications) and follow-up care.
Nurses must comply with the requirements of the blood-borne pathogens standard. The ones that address needlestick injuries and exposure to a blood-borne pathogen will be discussed separately.

Other requirements of standard 1910.1030 that apply to nurses and the practice of nursing:

- Understanding and following the engineering and work practice controls established by the employer such as proper waste disposal and adhering to the employer’s safety and sanitary rules.
- Using PPE correctly:
  The employee is required to wear the appropriate PPE. The PPE must be removed immediately upon removing the work area, or as soon as possible, and it must be placed in a container specifically designated for the purpose of receiving contaminated waste.
- Proper handling of blood and other body fluids.
- Understanding and using Universal Precautions
- Proper use of medical equipment; i.e., do not bend, break, or recap needles. Do not re-use disposable medical equipment.
- Proper disposal of contaminated/potentially contaminated medical equipment.
- Disposable gloves:
  Disposable gloves must be discarded as soon as possible after they have become contaminated, punctured, or torn. Gloves are not required to be worn when giving an injection as long as hand contact with blood or other potentially infectious material is not reasonably expected.
• Hand washing:
  Employees must wash their hands immediately after removing
gloves or as soon as possible after removing gloves. Employees
must wash their hands after contact with blood or other
potentially infectious material and before and after performing
patient care. If hand washing with soap and running water is not
possible, the employee must use either an antiseptic hand
cleaner with clean cloth or paper towels or antiseptic towelettes.
After using an antiseptic hand cleaner or a towelette, the
employees must wash their hands with soap and running water
as soon as feasible.

• Food and drink storage:
  Food and drink should not be stored in refrigerators, cabinets,
_etc._, where blood or other potentially infectious material will be
stored.

• Bagging specimens:
  Double-bagging specimens is required if the outside of the
specimen container is contaminated or if the specimen could
puncture the primary container.

  **Managing Exposures To Blood-Borne Pathogens**

Managing exposures to blood-borne pathogens involves three steps: 1) initial care of the exposed person; 2) reporting the exposure and investigating the circumstances; and, 3) post-exposure prophylaxis, if needed.
Table 3: Managing Exposures to Blood-Borne Pathogens

| Initial Care ↓ | Reporting the Exposure/Investigating the Circumstances ↓ | Post-Exposure Prophylaxis |

Initial care of the exposed person involves basic wound care. The first step in managing an exposure to a blood-borne pathogen is to clean the exposed area. If it is a percutaneous exposure or a skin exposure wash the area with soap and water. Small puncture wounds can be washed with an alcohol-based hand-wash; these are considered to be virucidal for hepatitis B, hepatitis C, and HIV. Squeezing the wound to express blood is not recommended nor is the use of over-the-counter disinfectants such as bleach. Wash the eyes with saline or water and flush mucous membranes with water.

Learning Break:
The blood-borne pathogens standard defines an exposure as eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that results from the performance of an employee’s duties. Expanding this definition, an exposure can also be described as: 1) a percutaneous injury such as a needlestick or a sharps injury; 2) mucous membrane contact or non-intact skin (skin that is abraded, chapped, or has dermatitis) contact with blood, tissue, or potentially infectious body fluids.
The next step is to report the exposure. This should be done as soon as possible; do not delay reporting the incident. Information that should be obtained and documented includes:

1. Exposure circumstances:
   Documentation of the exposure circumstances should include the date and time of the exposure; the type of exposure; the location of the exposure (i.e., finger, hand, eye); the estimated time of contact with the blood or body fluid; how the exposure occurred; the body fluid that was involved; any first aid that was done; the PPE that was in use; documentation of the affected person’s blood-borne pathogens standard training; and, if it was a percutaneous exposure, an estimation of the depth of the wound, if the needle or sharp was in a blood vessel, and the size and type of the needle or sharp.

2. Information about the affected healthcare professional:
   Specific information about her/his vaccination for hepatitis B; any previous tests for hepatitis B, hepatitis C, or HIV; status of his/her tetanus immunization; medical history; and, the names and doses of prescription medications currently being taken.

Learning Break:
If the affected healthcare professional has received the complete hepatitis B vaccination and she/he is known to have a response to the vaccination - defined as Hepatitis B surface antibody concentration ≥ 10 mIU/mL - then the source patient does not need to be evaluated for the presence of hepatitis B and the affected person does not need post-exposure prophylaxis.⁷
3. Information about the source:
The source patient should be evaluated for the presence of hepatitis B, hepatitis C, and HIV, unless their status regarding these diseases is known. The laws that govern testing of source patients will not be discussed here. Affected healthcare professionals must assume that their employer will comply with these laws.

**Post-Exposure Treatment And Prophylaxis For Hepatitis B**

The need for post-exposure treatment and prophylaxis after exposure to hepatitis B is determined by an evaluation of the source patient and the affected healthcare professional.

1. Evaluation of the source patient.
   a. The source patient should be tested for hepatitis B surface antigen even if they have previously been tested.27
   b. If the source patient is known to be infected or if the affected healthcare professional has received hepatitis B vaccination and has a documented adequate response, the source patient does not need to be tested.

2. Evaluation of the affected healthcare professional: There are five possibilities and there is a specific post-exposure prophylaxis plan for each one:
   a. Complete hepatitis B vaccination with response
   b. There is evidence of a prior infection with hepatitis B
   c. Hepatitis B vaccination has been completed but the hepatitis B surface antibody concentration is < 10 mIU/mL
d. Hepatitis B vaccination has been completed but serologic testing for a response has not been done or serologic testing was done and the response is not known

e. The affected person has not been vaccinated or the vaccination series has not been completed

For a and b there is no need for post-exposure prophylaxis. For c, d, and e post-exposure prophylaxis may be needed depending on the Hepatitis B status of the source. If the source patient is known to be infected, or if the hepatitis B status of the source patient cannot be determined, post-exposure prophylaxis should be done.27

Table 4: Post-Exposure Prophylaxis for Hepatitis B

| One dose of hepatitis B immune globulin |
| One dose of hepatitis B vaccine |
| Two more doses of hepatitis B vaccine |

The immune globulin and the first dose of the hepatitis B vaccine can be given at the same time but at different injection sites. The hepatitis B immune globulin should be given within 24 hours after the exposure and it must be given within 7 days of the exposure.43 The second and third doses of the hepatitis B vaccine are given 1 month and 6 months after the initial dose even if the source patient is subsequently known not to be infected. Testing for hepatitis B infection should be done six months after the exposure. During this six-month period the affected healthcare professional should not donate blood, organs, plasma,
semen, or tissue, but she or he can perform their normal duties. The need for tetanus vaccination should also be considered.

**Post-Exposure Treatment And Prophylaxis For Hepatitis C**

There is no effective post-exposure prophylaxis for hepatitis C. If there has been an exposure the source patient should be tested for the presence of hepatitis C, unless it is known that the patient is infected. The affected healthcare professional should be tested for the presence of hepatitis C, as well. If the source patient is not infected then no further evaluation of the affected healthcare professional is needed. If the source patient is infected with hepatitis C then the healthcare professional: 1) should be counseled about the risk for transmission and infection; 2) he/she should be tested for hepatitis C antibodies and hepatitis C RNA at the time of exposure and every two months for six months; and, she/he should be referred to a specialist for ongoing evaluation and, if needed, treatment. Donation of blood, organs, plasma, semen, and tissue should not be done before the hepatitis C status has been determined. The need for tetanus vaccination should also be considered.

**Post-Exposure Treatment And Prophylaxis For HIV**

The need for post-exposure treatment and prophylaxis after exposure to human immunodeficiency virus is determined by an evaluation of the source patient and the affected healthcare professional.

1. Evaluation of the source patient.
   a. If the HIV status of the source patient is unknown, rapid HIV testing should be done. Depending on the specific test used, the
result will be available in 5-20 minutes and these tests have excellent sensitivity and specificity.

b. If the source patient is known to be HIV-positive testing is not necessary.

2. Evaluation of the affected healthcare professional.
   a. Evaluation should be done immediately after wound care or decontamination has been completed.
   b. The benefits and risks of post-exposure prophylaxis should be thoroughly discussed.
   c. If the source patient is known to have an HIV infection, post-exposure prophylaxis should be started within 1-2 hours of the exposure.\textsuperscript{19} Animal studies indicate that delaying administration of post-exposure prophylaxis decreases its effectiveness,\textsuperscript{44,45} and post-exposure prophylaxis should be started as soon as possible and ideally within 72 hours of the exposure.\textsuperscript{21,46} It is not known at what point after an exposure there would be no benefit from post-exposure prophylaxis.\textsuperscript{21}
   d. If the HIV status of the source patient is unknown post-exposure prophylaxis should be started and if the result of the rapid testing is negative, treatment can be discontinued.\textsuperscript{21} Do not delay starting treatment while waiting for the test results.
   e. Laboratory evidence and confirmation of an HIV infection can be delayed for up to 3 months after an exposure; this is commonly termed the “window period” of HIV infection. However, the U.S. Public Health Services Guidelines for post-exposure prophylaxis state “ . . . investigation of whether a source patient might be in the window period is unnecessary for determining whether HIV
PEP is indicated unless acute retroviral syndrome is clinically suspected.”21 In most cases, rapid testing alone is sufficient.
f. The affected healthcare professional should be tested for the presence of HIV and other blood-borne pathogens, if needed. The need for tetanus vaccination should also be considered.

The recommended therapy is a three-drug regimen using the nucleotide analogue reverse transcriptase inhibitor-nucleotide reverse transcriptase inhibitor tenofovir-emtricitabine (Truvada™) and the integrase inhibitor raltegravir (Isentress™) for four weeks.19,21 Four weeks is recommended as in vitro studies, animal studies, and occupational studies indicate this is the optimal duration of treatment.21

The combination of tofovir-emtricitabine and raltegravir is a commonly used regimen for HIV prophylaxis but there are other regimens that are considered acceptable.21 As with any drug therapy, medications used for post-exposure prophylaxis for HIV should be prescribed with considerations of their effectiveness and tolerability. Tolerability is especially important as the side effects of tofovir-emtricitabine and raltegravir and other post-exposure prophylaxis medications can have a negative influence of compliance with therapy.21 The potential for drug-drug interactions is also very important. Commonly used drugs such as oral contraceptives, H2 receptor antagonist, and proton pump inhibitors can cause potentially serious drug interactions when used with HIV post-exposure prophylaxis drugs.

Follow-up care is essential for persons receiving post-exposure prophylaxis. The exposed person should be re-evaluated 72 hours
after the incident regardless of whether or not he or she is being treated.\textsuperscript{21} Testing for HIV should be done at the time of the exposure, and 6 weeks, 12 weeks, and 6 months after the exposure.\textsuperscript{21} A complete blood count and measurement of hepatic and renal function should be done at the time of exposure and two weeks later.\textsuperscript{21} In the six months following the exposure abstinence from sexual intercourse or the use of condoms is recommended, and the exposed healthcare professional should not donate blood, organs, plasma, semen, or tissues.\textsuperscript{19} These precautions are especially important in the first 6 - 12 weeks after an exposure. \textsuperscript{21}

**Special Situations**

In some circumstances of exposure to HIV an expert consultation should be sought.

**Table 5: The Need for Expert Consultation**

<table>
<thead>
<tr>
<th>Breastfeeding</th>
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<tbody>
<tr>
<td>Chronic illness that may increase drug toxicity</td>
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<tr>
<td>Delay is reporting the exposure</td>
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<tr>
<td>Current drug therapy that may increase toxicity of post-exposure prophylaxis</td>
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<tr>
<td>Drug-resistant HIV</td>
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<tr>
<td>Pregnancy</td>
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<tr>
<td>Unknown source, \textit{i.e.}, a needle that is in a sharps container</td>
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Breastfeeding and pregnancy are not contraindications for the use of post-exposure prophylaxis for HIV,\textsuperscript{21} and women who are breastfeeding or pregnant should receive post-exposure prophylaxis if
it is indicated. There is a significant risk of in utero transmission of HIV and transmission of HIV through breastfeeding and although the data is limited, it does not appear that the use of post-exposure prophylactic drugs increases the number of birth defects or is harmful to breastfeeding infants. Efavirenz (Sustiva™) is teratogenic and should not be used in pregnant women. Up-to-date information about the use of antiviral drugs during pregnancy can be found on the website of the Antiviral Pregnancy Registry, www.apr.com. Information can also be obtained by calling the National Perinatal HIV Hotline, 7 days a week, 24 hours a day, 1-888-448-8765.

Exposure to, and subsequent infection with drug-resistant strains of HIV has been reported to occur after occupational exposure to HIV, despite early use of post-exposure prophylaxis. It is not practical to perform drug-resistance testing immediately after exposure to HIV so standard post-exposure prophylaxis should be initiated as soon as possible; treatment should not be delayed while waiting for drug-resistance testing. If there is a possibility that the source patient may be infected with a drug-resistant strain of HIV, expert consultation should be sought and without delay; post-exposure prophylaxis should be started right away. The drug regimen can be changed later if this is needed.

Exposure to a needle or a sharp from an unknown source should not occur with good adherence to the blood-borne pathogens standards. If an exposure of this type occurs the need for post-exposure prophylaxis should be determined on a case-by-case basis. The needle or the sharp does not need to be tested.
Summary

The OSHA blood-borne pathogens standard was developed to help reduce transmission of and infection with blood-borne pathogens. The Blood-borne pathogens standard has general and specific recommendations, and nurses are required to have a basic knowledge of and comply with the recommendations of the standard.

The recommendations are general and specific and requirements of standard 1910.1030 that apply to nurses and the practice of nursing are:

- Understanding and following the engineering and work practice controls such as proper waste disposal and adhering to the employer’s safety and sanitary rules.
- Using PPE correctly.
- Proper handling of blood and other body fluids.
- Proper use of medical equipment, particularly needles, sharps, and disposable medical equipment.
- Proper disposal of contaminated or potentially contaminated medical equipment
- Hand washing
- Universal precautions
- Proper use of gloves

Familiarity with the plan is required of nurses, but as needle sticks, sharps injuries, and splash contact with blood and body fluids are common occupational occurrences for nurses they need more information, such as:

- Transmission of and infection with a blood-borne pathogen is unusual after a needlestick, sharps injury or cutaneous exposure, but the potential medical consequences are quite serious and research indicates that the psychological burden of a needlestick can be significant.\textsuperscript{52,53}

- The risk of transmission of and infection with a blood-borne pathogen depends on the circumstances of the exposure, the pathogen, and the characteristics of the exposed individual. Hepatitis B is highly transmittable, hepatitis C and HIV much less so, and the risk of infection from a mucous membrane exposure to any of these viruses is slight.

- All exposures to blood-borne pathogens must be reported immediately. Do not try and evaluate the level of risk yourself.

- Clean or flush the affected area.

- The need for treatment and post-exposure prophylaxis will depend on the circumstances of the exposure, the infectivity of the source patient, and the characteristics of the person who was exposed.
• If there is a risk for infection with HIV post-exposure prophylaxis should be started as soon as possible after the exposure, preferably within 1-2 hours.
• There is no post-exposure prophylaxis for hepatitis C.
• Post-exposure prophylaxis for hepatitis B is available.
• Expert consultation should be sought if there are special or unusual circumstances, i.e., potential for exposure to a drug-resistant virus.

The OSHA blood-borne pathogens standard also requires employers to have in place a plan for managing exposures to blood-borne pathogens. The plan should provide basic information about blood-borne pathogen transmission and guidance about what to do in the event of an exposure.

Please take time to help the NURSECE4LESS.COM course planners evaluate nursing knowledge needs met following completion of this course by completing the self-assessment Knowledge Questions after reading the article. Correct Answers, page 33.
1. The majority of occupational exposures to blood-borne pathogens are:
   a. Percutaneous.
   b. Air-borne.
   c. Cutaneous.
   d. Percutaneous and cutaneous together.

2. The most common blood-borne pathogens in occupational exposures are:
   a. Hepatitis B, hepatitis D, and MRSA.
   b. Hepatitis C, HIV, and tuberculosis.
   c. Hepatitis B, hepatitis C, and HIV.
   d. Hepatitis E, HIV, and gram-negative bacteria.

3. The risk of HIV transmission after a percutaneous exposure is approximately:
   a. 3.0%.
   b. 0.3%.
   c. 30%.
   d. 13%

4. True or false: Infection with a blood-borne pathogen can occur after contact with a contaminated surface.
   a. True.
   b. False.
5. The first step in managing an exposure to a blood-borne pathogen is:
   a. Testing of the source patient
   b. Notifying the employee health department.
   c. Testing of the affected healthcare professional.
   d. Perform basic wound care or flush the affected area.

6. An exposure to a blood-borne pathogen should be reported:
   a. Within 24 hours of the exposure.
   b. At the end of the shift.
   c. Immediately.
   d. Within seven days of the exposure.

7. Post-exposure prophylaxis for Hepatitis B:
   a. Is not needed if vaccination is complete and the response is adequate.
   b. Should be given only if the exposure involved a large amount of blood.
   c. Is not needed if the source patient has had Hepatitis B for > 10 years.
   d. Should be given only if the source patient is not known.

8. True or false: There is effective post-exposure prophylaxis for Hepatitis C.
   a. True.
   b. False.
9. Post-exposure prophylaxis for HIV should be started:
   a. Within 7 days of the exposure.
   b. After drug-resistance testing is completed.
   c. Within 1-2 hours of the exposure.
   d. After tests for Hepatitis B and C and HIV have been completed.

10. The OSHA blood-borne pathogens standard requires employers to:
   a. Test each employee yearly for infection with blood-borne pathogens.
   b. Provide pre-exposure prophylaxis for HIV.
   c. Test at-risk patient for blood-borne pathogens.
   d. Have a plan for the management of exposures to blood-borne pathogens.

Correct Answers

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REFERENCE SECTION

The reference section of in-text citations include published works intended as helpful material for further reading. Unpublished works and personal communications are not included in this section, although may appear within the study text.


51. Perdue B, Wolfe Rufael D, Mellors J, Quinn T, Margolick J. HIV-1 transmission by a needle-stick injury despite rapid initiation of


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