OSHA STANDARD FOR PREVENTION OF EXPOSURE TO BLOOD-BORNE PATHOGENS: A REVIEW

INTRODUCTION

Exposure to blood-borne pathogens is a serious hazard in healthcare. The exact incidence of occupational exposures to hepatitis B, hepatitis C, and the human immunodeficiency virus (HIV) isn’t known, but the Centers for Disease Control and Prevention (CDC) has estimated that > 380,000 needle stick exposures happen every year in hospitals and other healthcare facilities. Occupational exposure to blood-borne pathogens can also occur by dermal, mucous membrane, and ocular routes, as well.

In response to this hazard, the Occupational Safety and Health Administration (OSHA) developed a standard - the Blood-Borne Pathogens Standard (29 CFR 1910.1930) - that was designed to protect at-risk employees from exposure to blood-borne pathogens. The Blood-Borne Pathogens Standard was amended in 2001 to include the Needlestick Safety and Prevention Act (Pub. L. 106-430). The standard has many specific recommendations (these will be discussed later), but the essentials of it:

- Define what situations are risk situations.
- Outline how the risks for exposure(s) to blood-borne pathogens should be managed.
- Outline how exposures to blood-born pathogens should be managed.

Hospitals and other health care facilities and their employees are required to comply with the Blood-Borne Pathogens Standard and the Needlestick Safety and Prevention Act. Because of the considerable exposure nurses have to blood-borne pathogens and because nurses regularly use needles and sharps, they must be especially careful to comply with these standards in order to protect their health, to keep the patients safe, and to prevent the transmission of blood-borne pathogens to others.

OBJECTIVES

After completing this module the learner will be able to:

1. Define what situations are risk situations.
2. Outline how the risks for exposure(s) to blood-borne pathogens should be managed.
3. Outline how exposures to blood-born pathogens should be managed.
EXPOSURES TO BLOOD-BORNE PATHOGENS: RISK FACTORS AND EPIDEMIOLOGY

Exposure to blood-borne pathogens is a common occurrence. The data suggests that each year 1 in 10 health care workers in the United States suffers a needlestick injury. The incidence of exposure to blood-borne pathogens by other routes of exposure - dermal, mucous membrane, and ocular - is less well defined but it is clearly far less than the incidence of percutaneous exposures. The primary concerns for the person who has been exposed are the risks for a) transmission of a pathogen, and b) development of an infection.

- The risk for transmission of HIV and development of an infection after a percutaneous exposure to HIV infected blood is approximately 0.32%.5

- The risk of transmission of hepatitis B and development of an infection after a percutaneous exposure to hepatitis B infected blood has been estimated to be between 6% to 37%.6,7

- The risk of transmission of hepatitis C and development of an infection after a percutaneous exposure to hepatitis C infected blood has been estimated to be between 1% to 2%.8,9

- Splash exposures appear to be much less risky than percutaneous exposures. The risk of transmission and infection after mucosal exposure to HIV infected blood is approximately 0.03%.10 Dermal, mucosal, and ocular transmissions of hepatitis B and hepatitis C have been reported, but these situations are rare.

Learning Break: The risk of transmission of hepatitis B and hepatitis C and the subsequent development of an infection with these viruses is higher than it is for HIV because these viruses are more stable than HIV and the viral load of the hepatitis viruses is higher.11

Nursing staff are at risk for an occupational exposure to blood-borne pathogens: years of experience, the type of nursing unit (e.g., ER, IV team nursing, OR), the number of contacts with blood and blood-contaminated bodily fluids, and the prevalence of infection in the patient population increase the danger. Whether or not an infection develops in the exposed person will depend on many variables, but the primary determinants are a) how much blood is transmitted, b) the viral load in the blood, c) the depth of the injury, and d) the immune status and the immune response of the person who was exposed. Exposures may not be obvious and large amounts of blood are not necessary for a blood-borne pathogen to be transmitted. It has been estimated that approximately 1/10 000 mL of infected blood is needed for transmission of hepatitis B and many times this volume can be found in the bore of a needle or on the surface of a medical/surgical sharp.12 Many people who are infected with hepatitis B or hepatitis C have no identifiable history of contact with a blood-borne pathogen, hepatitis B can survive for up to 7 days in dried blood, hepatitis C can survive for up to 16 hours in dried blood13, and infections with
hepatitis B after contact with hard surfaces in clinics, laboratories, etc. have been documented.

**Learning Break:** There are many other blood-borne pathogens that nurses are exposed to but these three - the two hepatitis viruses and HIV - are by far the most common.

**THE CAUSES OF EXPOSURES TO BLOOD-BORNE PATHOGENS AND NEEDLESTICK INJURIES**

Exposures to blood-borne pathogens and needlestick injuries are for the most part, caused by human error. Some of these errors involve personal or organizational factors (e.g., poor staffing, lack of nursing experience, long hours at work) and some of them involve poor and/or improper use of equipment. Others involve equipment that can be used safely, but safe use requires a high level of attention and care. The most common situations that are involved in needlestick injuries and the equipment most commonly involved in needlestick injuries are:

- 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
- 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 (e.g., winged infusion sets), and suture needles

**PREVENTION OF EXPOSURE TO BLOOD-BORNE PATHOGENS AND NEEDLESTICK INJURIES: THE OSHA STANDARD**

Adherence to the OSHA Blood-Borne Pathogen Standard is mandatory for all hospitals. Compliance with the Standard is a requirement for employers and employees. To be in compliance with the Standard employers must:
• Establish a written plan for controlling exposure to blood-borne pathogens: This plan should include a) an assessment of risk situations, b) a determination of which employees are at risk and when they are at risk (i.e., their job actions and duties), and c) 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.

• Implement standard precautions, ensure that employees know how to use standard precautions - and make sure they do use standard precautions.

• Provide personal protective equipment (PPE) at no cost to all employees who need it.

• Provide initial training and annual training to all employees: This training should include a) a review of the OSHA Blood-borne Pathogens Standard, b) information on the risks of exposures and how exposures happen, c) information on how to prevent exposures to blood-borne pathogens, d) 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 sharps disposal boxes, safe medical devices, needles that do not need to be re-capped, proper waste disposal containers, appropriate signs to warn of danger and to instruct employees on the proper use of equipment, etc.

• 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, patient care areas, etc.

• 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 (e.g., evaluation, first aid, laboratory screening tests, post-exposure prophylactic medications) and follow-up care.

Employees have the responsibility of understanding and following the engineering and work practice controls established by the employer. This would include: using standard precautions; using PPE correctly; proper waste disposal; proper use of medical equipment (e.g., not re-capping needles), proper handling of blood and other bodily fluids; promptly reporting exposures to blood-borne pathogens and/or needlestick injuries; using proper handwashing technique; and adhering to the safety and sanitary rules set up by the employer.
The OSHA Blood-Borne Pathogens Standard is both general and specific in its recommendations. Some sections provide detailed guidance while others provide relatively basic direction. For example, the Standard states that employers must provide handwashing facilities but if providing these is not possible the employer must provide either an appropriate antiseptic hand cleaner or antiseptic towelettes, but the Standard 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:


This fact sheet is just one of many that are available at the OSHA website; there are others that address topics such as the Standard’s recommendations on handwashing, recommendations for the safe use of needles and sharps, etc. Another helpful resource that has more detailed information about the Standard - Most Frequently Asked Questions Concerning the Blood-Borne Pathogens Standard - is available at this link:


There are parts of the Blood-Borne Pathogens Standard that clearly dictate what should and what should not be done in order to prevent exposure to blood-borne pathogens. Many of these apply directly to the practice of nursing, and nurses must follow these recommendations to be in compliance - and to provide good care and protect their health. Examples of these include:

- Exposure incidents: If there has been an exposure to a blood-borne pathogen, the employee must report the incident as soon as possible. The minimum documentation required is information about a) the engineering controls and work practices in place at the time of the incident, b) if applicable, a description of the device being used, c) the PPE being used at the time of the incident, d) where and when the incident happened and what was being done when it happened, e) documentation of the employee’s training in the Blood-Borne Pathogens Standard, and f) the name of the employee. Some of this documentation must be done by the employee (or at least with the employee’s assistance) and some must be done by the employer. (Note: Exposure incidents will be discussed in more detail later in the module)

- Use of needles and sharps: Bending, recapping, or removing contaminated needles is prohibited, except under certain circumstances.

- Use of 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.
• Handwashing: 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. If handwashing with soap and running water is not possible, the employee must use either an appropriate antiseptic hand cleaner with clean cloth/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.

• Personal protective equipment: 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.

• 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.

Note that these recommendations are specific, but they also assume that the nurse understands basic concepts of disease transmission and sterility, the nurse can recognize situations in which exposure to blood-borne pathogens is likely to happen, and the nurse can assess patient care situations to determine when PPE would be required and what PPE should be used.

TREATING AN EXPOSURE TO A BLOOD-BORNE PATHOGEN

The Blood-Borne Pathogens Standard clearly outlines the employer’s and the employee’s responsibilities when an exposure to a blood-borne pathogen occurs or is suspected to have occurred. The Standard has specific requirements for a) reporting the incident, b) medical evaluation, c) treatment, and d) follow-up.

Learning Break: A fact sheet that discusses the basics of the Blood-Borne Pathogens Standard’s requirements for handling an occupational exposure to a blood-borne pathogen can be accessed using this link.


If an exposure to a blood-borne pathogen occurs or is suspected to have occurred, the employee must immediately - or as soon as possible - notify a supervisor or other responsible person. The employer must arrange for immediate, confidential medical evaluation, the evaluation must be provided at no cost to the employee, and it must be performed by a licensed physician or other appropriate licensed healthcare professional. During the evaluation the employee must be told the risks of developing an infection, the benefits and risks of prophylactic treatment, and the medical implications of developing
an infection with a hepatitis virus and/or HIV. If treatment is needed, the treatment that is prescribed must be in accordance with the latest US Public Health Service (UPHS) recommendations, and the treatment must be provided at no cost to the employee. Free follow-up must also be offered to the affected worker. The employer is required to identify the source individual from which the blood-borne pathogen is known to have originated and to test that person’s blood for the presence of hepatitis B, hepatitis C, and HIV, if this status is not known. The test results must be made known to the employee as soon as possible. Whether or not the source individual has the right to refuse testing and whether or not testing may be done without that person’s consent are complicated issues that will not be discussed here. (Note: The information in this section is a summary of the OSHA recommendations)

**Learning Break:** There are multiple sources of information on managing occupational exposures to the hepatitis viruses and/or HIV. One that is very useful and that is cited on the CDC website is the National Clinicians’ Post-Exposure Prophylaxis (PEP) Hotline. This service has easily accessed information on their website and a telephone service, the PEPline: 1-888-448-4911. Information on how and when to treat occupational exposures to hepatitis B, hepatitis C, or HIV can be found using this link to the PEP website.


Basic care of the employee should be as follows. If an employee has been exposed to a blood-borne pathogen or suffered a needlestick injury, the area should be washed with soap and water. Antiseptics can be used, but as they do not reduce the incidence of infection, use them if they are immediately available but don’t delay washing the area to find an antiseptic. The employee’s immunization status (tetanus, hepatitis B) should be assessed and a medical history should be taken. Prophylaxis for exposure to hepatitis C is not available, and it is not clear if the currently available medications used for treating a chronic hepatitis C infection should be used for prophylaxis after acute exposures. Post-exposure prophylaxis for exposure to hepatitis B and HIV is available. When and how it is used should be determined on a case-by-case basis, there are standard treatment algorithms available to guide these decisions, and prophylactic care should be offered to the employee free of charge.
REFERENCES

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