Bloodborne Pathogens Course

The OSHA Standard

This standard limits occupational exposure to blood and other potentially infectious materials since any exposure could result in transmission of bloodborne pathogens, which could lead to disease or death. Acquired Immunodeficiency Syndrome (AIDS), Hepatitis B and Hepatitis C are serious concerns for workers exposed to blood and other potentially infectious materials. To reduce or eliminate the hazards of occupational exposure, an employer must implement an exposure control plan for the worksite with details on protection measures. Engineering controls are the primary means of eliminating or minimizing employee exposure and include the use of safer medical devices. Work practice controls such as hand washing are stressed by the standard. Appropriate personal protective equipment must be used when necessary. The standard requires that the Hepatitis B vaccination be made available to all employees who have occupational exposure to blood. The standard specifies procedures to be made available to all employees who have had an exposure incident. The Occupational Exposure to Bloodborne Pathogens Standard is published by OSHA. This standard defines the rules employers must follow to protect employees who may have a reasonable chance of being exposed to blood or blood-containing materials in their jobs. (AHA, 2009)

What are Bloodborne Pathogens?

Bloodborne pathogens are germs in the blood that can make people sick. The pathogens of greatest concern are HIV, Hepatitis B Virus (HBV), and Hepatitis C Virus (HCV). These viruses can cause sickness. They often cause no short-term symptoms, can be passed on to others, and can lead to death. There are some long-term effects of the bloodborne pathogens. Some long-term effects of the Hepatitis B virus and Hepatitis C virus are: Yellowing of the skin or whites of eyes, feeling tired, pain in abdomen, nausea, vomiting, diarrhea, loss of appetite, damage to the liver, and can lead to death. Some long-term effects of the HIV virus are: Extreme unexplained tiredness, poor appetite with rapid weight loss, unexplained fever, swollen glands, increased chance of other illnesses, can cause acquired immune deficiency syndrome (AIDS), and can lead to death. (AHA, 2009)

How do Bloodborne Pathogens enter the body?

Occupational exposure to bloodborne pathogens can occur in four different ways: Cutaneous contact, mucous membrane contact, percutaneous penetration, and aerosolization of blood. The first mode of transmission is through cutaneous contact, and intact skin is the first line of defense that helps to prevent contamination. Most cutaneous exposures, however, occur as a result of breaks in the skin that go unnoticed by the health care worker (HCW). Many HCWs, especially operating room (OR) personnel, develop breaks in their skin that are thought to be a result of repeated scrubbing and hand washing and dermatitis linked to latex glove use. Thus, the very item used to protect HCWs also
may be putting some of them at risk. Latex sensitivity is reported to be 3% in HCWs as a whole and 6% in OR personnel. The second mode of transmission is through mucous membranes (i.e., the lining of the mouth, nostrils, eyes, and genital mucosa), which are more vulnerable to disease organisms than intact skin. There is a 0.9% chance of contracting HIV through mucous membrane contamination. One study reported 4 documented cases of US health care workers who seroconverted after exposure to HIV-infected blood as a result of contact with mucous membranes. A single case in Italy also was documented. Also, there have been many examples of HBV and HCV infection after mucous membrane exposure. The third mode of transmission is the percutaneous route, also known as the transcutaneous or potential route. This type of transmission occurs when an item, which may include a sharp instrument such as a hollow-bore or blunt needle, a scalpel, or even rigid tissue (e.g., bone, teeth) penetrates the skin. There is approximately a 0.3% risk of seroconversion for HIV for all health care providers after a needle stick injury or cut occurs. The risk increases to a 30% chance of infection for contact with HBV and 1.8% to 10% for contact with HCV from a contaminated percutaneous injury. (Taylor, Holm, & Bakewell, 2006)

**Industrial Hygiene Model versus Standard Precautions**

Perioperative personnel are particularly vulnerable to percutaneous exposure because surgeries are invasive procedures that require prolonged contact with open surgical sites, frequent manipulation of dangerous equipment and sharp instruments, and exposure to large quantities of blood, body fluids, and other types of tissue. (Taylor, Holm, & Bakewell, 2006). According to one study, standard precautions is an insufficient strategy to reduce exposure to bloodborne pathogens in the OR and that an industrial hygiene model would be more useful. This approach is the basis for the Occupational Safety and Health Administration’s (OSHA) bloodborne pathogen standard. This model emphasizes a hierarchy of controls that should be applied in ORs: (Stringer, Rivard, & Hanley, 2001).

**Level one:** The first level of control involves using engineering controls to modify the environment where work is performed or modifying the tools with which work is performed rather than attempting to change human behavior. In an OR, this could mean performing bloodless surgery (e.g., using ultrasound to reduce kidney stones rather than a laparotomy), as well as redesigning devices and equipment (e.g., use of blunt suture needles whenever possible). In one study, 56 of 61 percutaneous injuries involving suture needles occurred using curved, conventional suture needles, five using straight suture needles, and none using blunt needles. In another study, the use of blunt needles was progressively more protective as more blunt needles replaced sharp ones. It also is possible to blunt other devices, such as scissors, retractors, and clamps. The use of robots also can be considered a first level of control when robotic hands replace the surgeon's hands. (Stringer, Rivard, & Hanley, 2001).

**Level two:** The second level in OSHA's hierarchy is work practice controls (i.e., changing the way in which the work is performed). Some of the safety recommendations made by individuals and professional associations at this level include: Surgical masks and goggles are the two most commonly used pieces of personal protective equipment.
Surgical masks are worn for surgical asepsis and to prevent contamination of the mucous membranes of the nose and mouth of the person wearing the mask. The use of face shields is less common. Until recently, gloves have been worn primarily to maintain sterility of the surgical wound. Glove use for protection of OR personnel is an extension of that practice. Standard precautions require that gloves be worn whenever there may be contact with blood and body fluids, when touching mucous membranes and nonintact skin, when handling contaminated instruments, and when performing venipuncture or other vascular and arterial access procedures. Unfortunately, faulty surgical gloves have been common. Thus, ‘double gloving’ during surgery has been recommended. That has been left to the discretion of the health care worker and, as a result, is not applied regularly. For purposes of comfort, a larger pair of gloves may be worn first followed by gloves in the wearer's usual size. Like gloves, gowns, shoe covers, and caps have been worn to maintain asepsis. Safety recommendations for the use of these items have been aimed at preventing blood or body fluids from contact with health care workers' skin and underclothing. Gowns vary in their ability to resist liquid penetration. Factors that affect gown permeability include: The type of barrier material used, whether high contact areas are reinforced or coated, length of time the material is in contact with fluid, and the number of launderings of reusable gowns. (Stringer, Rivard, & Hanley, 2001). ‘Double gloving’ reduces the risk of exposure to bloodborne pathogens during surgical procedures. (Ogg, 2007). In a study of glove perforation rates during orthopedic procedures, surgeons who wore a single set of gloves were 13 times more likely to experience a perforation and contamination than surgeons who wore a double set of gloves. Furthermore, the likelihood of glove perforations increases with the length of the surgical procedure. Surgical team members wear sterile gloves to protect the patient from infection, and also as an important barrier to decrease the risk of exposure and transfer of bloodborne pathogens, including hepatitis B, hepatitis C, and HIV, to surgical team members. A Cochrane Collaboration review of 20 clinical trials of single versus double gloving involved the surgical specialties of dental, obstetrics and gynecology, abdominal, plastic, gastrointestinal, general, arthroscopic, orthopedic, and vascular surgery. The review included trials of single gloving, double gloving with two pairs of latex gloves, and double gloving using an indicator system. An indicator system is defined as colored gloves worn under the outermost pair of gloves, enabling the perioperative team to detect a perforation more quickly. Glove perforations were reduced when either two pairs of latex gloves or the perforation indicator system were used versus when a single pair of latex gloves was used. More perforations were detected with the indicator system. (Ogg, 2007).

**Costs of Contracting a Bloodborne Disease**

There are many costs associated with contracting a bloodborne illness from an occupational source. Those costs include human costs, medical expenses, and organizational losses. Human costs include not only physical pain, discomfort, and injury, but also psychological and emotional trauma. Multiple personal consequences may occur for a HCW after a needle stick injury involving patients who are HCV or HIV positive. These may include altering of sexual practices, chronic disabilities, denial of worker compensation claims, postponement of childbearing, punitive disciplinary action,
job discrimination, need for a liver transplant, loss of employment, side effects of prophylactic medications, and premature death. Those who survive will incur huge medical bills, whether paid for through privately owned insurance or the employer’s workers compensation insurance as a work-related injury. Costs incurred when treating a body substance exposure can range from $141 for initial treatment to $1,700 for prophylactic treatment and follow-up care for one year. If an exposure leads to chronic hepatitis and consequently necessitates a liver transplant, the costs rise significantly. The cost for a liver transplant and subsequent hospitalization can be as high as $140,000. This cost does not include the antirejection medications and follow-up care that can exceed $10,000 a year. Treatment costs can vary significantly. However, this is just one example of what an employer may incur from one employee’s exposure. This does not include continuously paying the employee’s salary during disability and compensating for the lost manpower via overtime expenses for other employees performing the work of the injured worker. The employer may need to hire and train new employees to replace the employee on disability. The injured employee may return but be unable to perform at the same level as before the injury. The employer also may encounter additional costs, such as an accident investigation, legal fees, or a fine citation from OSHA, and the accreditation status of the institution could be affected. The onus does not fall solely on the employer. Health care workers who are injured on the job must report the injury. Failing to do so may make it difficult to obtain worker’s compensation and other benefits or the benefits may be denied altogether. Failing to use appropriate personal protective equipment (PPE) may incur punitive disciplinary action, job discrimination, denial of worker’s compensation claims, and loss of future employment opportunities. These are salient reminders of the importance for the early introduction and training of safe needle-handling techniques. (Taylor, Holm, & Bakewell, 2006)

Improving Protection of Healthcare Workers

If the health care workplace is going to become safer in the next decade, a better understanding is needed of what drives HCWs’ behavior and adherence to universal or standard guidelines. Health care facilities must invest enough resources into wide-ranging programs that attempt to reduce occupational exposures. Although hazards associated with working in the OR always will be present, behaviors associated with protection can be modified to decrease the chances of exposure. Increasing awareness through education, communication, and effective leadership will promote a healthier workforce. It is the combination of these changes that will lead effectively to improved safety not only for HCWs but also for patients. With the Needlestick Safety and Prevention Act in place, injury prevention is a shared responsibility between employer and employee. Instituting appropriate policies and procedures; jointly evaluating products; ensuring adequate staff member training and education; identifying and using safety engineered, needle stick avoidance devices; and maintaining an injury log are all methods to prevent injury.

Policies and Procedures

Employers have to evaluate policies and procedures concerning exposure control on an annual basis and should not wait for their accreditation review process. This ensures that all policies are up to date and match what products are being used by staff members.
Product Evaluation
Prevention planning charges employees with actively seeking out and deciding what products should be used in the work setting. This makes sense since employees are the ultimate users of the products. Selection, evaluation, and implementation of new devices can be a daunting task that must be undertaken by individuals who will use the devices under review. This is necessary to provide protection.

Training and Education
Participating in purchasing decisions results in increased responsibilities for training and educating HCWs. This responsibility falls on both the employer and employees to ensure that everyone is trained on current technologies and products being used in the facility.

Safety Engineered, Needle Stick Avoidance Devices
Needle stick injuries are preventable. According to one study, 86% of needle stick injuries could be prevented with use of safety engineered needle stick avoidance devices. Producing safety engineered sharps injury-avoidance devices is essential in preventing percutaneous injuries; however, they constitute only part of a strategy that includes education and collection of appropriate surveillance data.

Sharps Injury Log
Maintaining a sharps-injury log is another intervention that identifies the number of employees injured as well as annotating the products and circumstances involved in the injury. This helps to identify true numbers of incidents. It also helps nurses and other HCWs feel comfortable reporting all injuries that occur on the job and not feel intimidated by the employer for fear of repercussions as a result of an injury. Ultimately, use of a sharps-injury log provides current information on the risk of needle stick injuries and blood borne pathogen transmission and helps identify interventional strategies to reduce these risks. (Taylor, Holm, & Bakewell, 2006)

Promoting Safe Practices in the Perioperative Environment
Nurses should not accept intolerable work conditions and unsafe patient care situations. Perioperative nurses are in an excellent position to take the lead role in preventing occupational exposures to bloodborne pathogens and decreasing the risk factors associated with the job. All perioperative nurses should use PPE, ensure use of a multidisciplinary team approach to developing policies regarding bloodborne pathogens that every HCW is required to follow, and become actively involved with evaluating and purchasing products and equipment. Although it may be difficult to change certain aspects of the perioperative physical environment, HCWs can promote safe practices by modifying behaviors and attitudes toward standard precautions and compliance with reporting protocols. This is not a simple task to accomplish. These safety measures are going to require a fresh perspective and new strategies. Measurable results will require professional HCW competence and accountability and effective management to improve techniques in reporting, safety, and education. Current work environments must be adapted through comprehensive orientation programs before significant changes can be
implemented successfully. Implementing these ideas can lead to a safer work environment and can act as a workforce multiplier. Safety goes hand-in-hand with knowledge, skill, and competency. If perioperative nurses are lax in safety and protection practices, long-term injury can result. Potential hazards should be identified and safe practices established. Perioperative nurses should make full and appropriate use of the safety and control measures established by the facilities in which they work and the procedures set in place to protect them from occupational hazards. As new technologies and procedures evolve, all hazards in the perioperative environment may not necessarily be fully understood or viewed as a hazard. That is why perioperative HCWs must decrease their chances of a blood borne pathogen exposure through education, patient and staff member identification, and change in behaviors related to the use of PPE and standard precautions. (Taylor, Holm, & Bakewell, 2006)

**Regulation of Healthcare Workplace Hazards**

Although nurses are better protected from environmental hazards now than they were 100 years ago, many of the new technologies and illnesses of today present additional health risks. New legislative mandates and regulatory standards require employers to maintain safe, healthy workplaces, train HCWs to follow safe practices, supply personal protective equipment, and notify HCWs of hazards in the workplace. Many aspects of the job require vigilant adherence to policies, procedures, and regulations that protect nursing staff members so they can provide safe and adequate nursing care to patients. Many hazards can be avoided, reduced, or managed by adhering to sound policies, procedures, and regulations, and in so doing, risk can be managed more effectively. Infection control programs meant to improve compliance with standard precautions must address the perceptions that may influence compliance. Policies and standard operating procedures of hospitals and other health care settings should be developed and enforced by complying with local, state, and federal regulations. Many guidelines are available from professional organizations and governmental agencies, including but not limited to, the American Conference of Governmental Industrial Hygienists (http://www.acgih.org); American National Standards Institute (http://www.ansi.org); Center for Devices and Radiologic Health (http://www.fda.gov/cdrh/); CDC (http://www.cdc.gov); Environmental Protection Agency (http://www.epa.gov); US Food and Drug Administration (http://www.fda.gov); JCAHO (http://www.jcaho.org); National Fire Protection Association (http://www.nfpa.org); and National Institute for Occupational Safety and Health (http://www.cdc.gov/niosh). Even with numerous agencies overseeing the environment, many occupational risks still exist, and newer methods should be developed to reduce the risk of HCWs contracting an illness from bloodborne pathogens. The cost of safety devices and the unwillingness of personnel to modify their practice behavior may make many interventions difficult to implement. Administrators and management teams should share ideas and work collectively with employees to develop acceptable prevention programs. One method of managing the high risk environment is developing risk management services or teams. A successful risk management plan always seeks to provide working conditions that will not put the health and safety of the workforce at risk. At a minimum, these programs should contain four key elements: administration, prevention, correction, and documentation. Often, governmental agencies, health care
settings, and nurses themselves do not communicate well. For instance, legislation and regulations are in place only to provide the framework for protection from occupational injuries and illnesses. Gaps in education, enforcement, observance, and regulation still exist. Filling these gaps before they become potential killers is the joint responsibility of employers and employees. The Needlestick Safety and Prevention Act of November 2000 provides stricter guidelines for the protection of HCWs. As part of the Needlestick Safety and Prevention Act, new provisions of the bloodborne pathogens standard took effect July 17, 2001. The revised provisions specify types of engineering controls, such as safer medical devices in the health care setting, and add new requirements for employers. Employers must review their exposure control plans annually to reflect changes in technology that will help eliminate or reduce exposure to bloodborne pathogens. Employers also must involve managerial workers in evaluating and selecting safety engineered devices and maintain a sharps injury log that ensures employee privacy and contains, at a minimum, the type and brand of device involved in the incident, if known; the location of the incident; and a description of the incident. (Taylor, Holm, & Bakewell, 2006)

**How to Act when Dealing with Exposure**

If blood or blood-containing materials enter your eye, nose, or mouth or an opening in your skin, you must act quickly to lessen the chance that you will become sick. Upon exposure to blood or blood-containing materials, the following steps must be taken: (1) If you are wearing gloves, take them off; (2) Immediately wash your hands, and any skin that came into contact with blood, very well with soap and large amounts of water. (3) If blood or blood-containing material has splashed in your eyes, nose, or the inside of your mouth, rinse these areas with lots of water. (4) Tell your supervisor or other designated company representative what happened as soon as possible; (5) Your employer may send you to a healthcare professional for evaluation after an exposure incident. (AHA, 2009)

**How to take off protective gloves**

If the outside of your gloves has touched blood or blood-containing materials, you must take off your gloves without touching the outside of the gloves with your bare hands. To take off gloves, the following steps must be taken: (1) Grip one glove on the outside of the glove near the cuff and peel it down until it comes off inside out; (2) Cup it with your gloved hand; (3) Place 2 fingers of your bare hand inside the cuff of the glove that is still on your hand. Be careful not to touch any wet or contaminated area; (4) Peel that glove off so that it comes off inside out with the first glove inside it; (5) If blood or blood-containing material is on the gloves, dispose of the gloves properly; (6) Wash your hands following the handwashing steps in the earlier part of this course. (AHA, 2009)

**Disposing of Sharps**

Sharps are needles or other sharp items that may have come in contact with blood. These might include devices that people with diabetes may use to give themselves medicine. Anyone can be stuck by one of these sharps, including cleaning staff and coworkers. It is
best to dispose of sharps in a sharps disposal container. Do not try to recap an exposed needle that has come in contact with blood. Note that some needles or items with sharp points have special engineering controls to help protect you. For example, some intravenous needles have a special mechanism that automatically covers the needle after use. (AHA, 2009)

**Cleaning Up**

It is critical that you quickly and completely clean up any blood or blood-containing materials to limit the chance of your coworkers being exposed to bloodborne pathogens. Small spills can often be cleaned simply with a disinfectant cleaner and a cloth or other absorbent material. Larger spills will require you to first wipe up the liquid blood with a cloth or other absorbent material. Once the liquid blood is removed from the surface, a disinfectant cleaner can be used to clean the surface. If the surface is disposable, you may dispose of it rather than disinfect it. The following steps must be taken: (1) Put on the appropriate personal protective equipment; (2) Use absorbent materials such as paper towels to wipe up large amounts of blood; (3) Use a surface disinfectant cleaner to clean any contaminated work surfaces; (4) Dispose of cleaning materials and any personal protective equipment in the appropriate waste containers. (AHA, 2009)

**Reporting Exposures**

It is very important that you report any exposure to blood or blood-containing materials. These reports help you get treatment and help your employer identify and reduce causes of exposure. Your employer’s exposure control plan lists the people at your work-place that you must tell about an exposure. You should tell your supervisor what happened as soon as possible. Your employer may need to complete OSHA Form 300 (Log of Work-Related Injuries and Illnesses) for a serious work-related injury. After most workplace exposures, the employer may make a confidential medical evaluation available to the employee who has been exposed to blood. This medical evaluation may include a blood test for specific bloodborne pathogens. To protect everyone’s privacy, your employer must keep employee medical records or injuries from sharps confidential. (AHA, 2009)

**Conclusion**

Upon completion of this Bloodborne Pathogens Course, to meet OSHA regulations, training must be done in employer’s site-specific exposure control plan. Also, to meet OSHA regulations, a bloodborne pathogens course must be taken every year. (AHA, 2009)
References


Taylor III, David L., RN, MSN, CPT, Holm, Rebecca, RN, MSN, CNOR, & Bakewell, Susan, RN, MS, BC. (2006). Bloodborne pathogen exposure in the OR—What research has taught us and where we need to go. *AORN Journal.* Vol. 83, No. 4. Retrieved September 7, 2010 from 

http://download.journals.elsevierhealth.com/pdfs/journals/0001-2092/PIIS0001209206600045.pdf
Bloodborne Pathogens

Quiz

1. What should an employee do after exposure to blood? Choose the correct statement(s):
   a. Report the incident at the next staff meeting
   b. Report the incident to the person designated by the company as soon as possible
   c. Follow company exposure plans after the incident
   d. Call OSHA and report the incident

2. Each of the listed steps deal with an incident where there is a risk of exposure to bloodborne pathogens. You see a spill on a surface or object that may contain blood. What comes first?
   a. Clean surface with approved surface cleaner
   b. Wash hands/clean yourself
   c. Dispose of things you used to clean
   d. Put on personal protective equipment
   e. Fill out appropriate paperwork

3. You have cleaned up a blood spill and have removed your gloves. To protect yourself you should also
   a. Use waterless hand sanitizer
   b. Wash your hands immediately with soap and large amounts of water
   c. Go to the break room for a glass of water
   d. Put the gloves in the regular trash

4. Your coworker takes items soaked with blood to the regular trash. After you put on personal protective equipment, you should
   a. Place it in a biohazard bag or container that has been furnished by the employer and follow company policy.
   b. Double wrap in a biohazard bag or container that has been furnished by the employer and take the items home to be laundered.
   c. Take blood soaked items to the front office

5. Choose all of the statements below that are true about bloodborne pathogens.
   a. You may become sick only if enough of the pathogen enters your body
   b. You may become sick only if there is a large amount of blood
   c. You may become sick if your body is at risk for getting the illness

6. The main way(s) bloodborne pathogens can enter the body and make you sick include:
   a. Picking up a towel with a small drop of blood while wearing gloves
   b. Wearing gloves and picking up a container that has blood inside it
   c. Getting stuck with a sharp object that has blood on it
7. How should you best protect yourself from illness caused by bloodborne pathogens?
   Choose the correct statement(s) below:
   a. Hand washing
   b. Hepatitis B vaccination
   c. Use personal protective equipment
   d. All of the above

8. Washing hands and skin after exposure
   a. Is not always necessary
   b. Is not necessary if gloves are worn
   c. Is not necessary if waterless hand sanitizers are available and used
   d. Is done with soap and large amounts of water

9. Which 3 workers are at risk of exposure to blood borne pathogens?
   a. Physician, nurse, police, firefighter
   b. Housekeeper, clergy, steward
   c. Priest, cook, hostess

10. What are the ways exposure to bloodborne pathogens commonly occurs?
    a. Needlesticks
    b. Cuts from other contaminated sharps such as scalpels or broken glass.
    c. Contact of the eye, nose, mouth or cut/abraded skin with contaminated blood.
    d. All of the above

11. What are the key aspects of a Bloodborne Pathogen Exposure Control Plan?
    a. Must be a written plan.
    b. Identifies jobs and tasks where occupational exposure to blood or other potentially infectious material occurs.
    c. Describes how the employer will use engineering and work controls.
    d. Describes how the employee will ensure use of personal protective equipment (PPE).
    e. The plan must be accessible to employees.
    f. All of the above

12. Explain how properly used PPE and appropriate housekeeping methods protect against exposure to bloodborne pathogens.
    a. Gowns, gloves, face shields, eye protection, mouthpieces and resuscitation devices provide a barrier between potential contaminants and susceptible parts of the body.
    b. Cleaning and decontamination of work surfaces reduce the chances of exposure to a bloodborne pathogen.
    c. a and b
13. What is an important step to take if exposed to a bloodborne pathogen?
   a. Wash exposed area with soap and water.
   b. Flush splashes to nose, mouth or skin with water.
   c. Irrigate eyes with water or saline.
   d. All of the above
Bloodborne Pathogens

Answers to Quiz

1. C
2. D
3. B
4. A
5. C
6. C
7. D
8. D
9. A
10. D
11. F
12. C
13. D