Bloodborne Pathogens and Infection Control

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Objectives

By the end of this course, the nurse will be able to:

1. Recognize importance of infection control regulations in the workplace
2. Identify OSHA Regulations regarding bloodborne pathogens
3. Identify regulations regarding sharps safety and handling

Introduction

The purpose of this educational activity is to give the nurse a working knowledge of Occupational Safety and Health Administration Standards (OSHA) and to educate and reinforce knowledge regarding bloodborne pathogen and sharps safety as well as other important OSHA standards relative to infection control for healthcare workers.

OSHA was established by an act of Congress in 1970 with the mission to “assure the safety and health of America's workers by setting and enforcing standards; providing training, outreach, and education; establishing partnerships; and encouraging continual improvement in workplace safety and health" (Shenold, 2008).

OSHA regulations in healthcare are enforced by a joint effort between OSHA, Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), and Medicare. All regulatory agencies work together by ensuring compliance with OSHA standards during surveys.

In 2005, there were 4.2 million job related accidents and illnesses that were non fatal in nature that amount to 117 billion dollars in costs. In 2006, there were a total of 5, 703 employee deaths, although these figures do not account for deaths that were from occupationally acquired illnesses.

Three federal agencies comprise OSHA as a whole: OSHA, within the Department of Labor; the Occupational Safety and Health Review Commission; and the National Institute for Occupational Safety and Health (NIOSH), within the Department of Health and Human Services (Shenold, 2008).

The duties of OSHA include writing the standards or regulations for workplace safety, conducting reviews to assure compliance, and prosecuting violations of standards. The Review Commission is responsible for the mediation of disputes between OSHA and the employers, and NIOSH is responsible for research into best practices for workplace safety and making recommendations regarding proper procedures and equipment.

The need for OSHA in the healthcare environment came to the forefront with the emergence of the HIV virus and concern for the possibility of health workers acquiring the virus through patient contact. In 1989, OSHA made recommendations regarding bloodborne pathogens and after review and comments by experts in multiple sectors of healthcare the final rule was published in 1991.

Bloodborne Pathogens

The bloodborne pathogens act of 1991 is to limit the exposure of the healthcare worker to blood and body fluids that could potentially cause occupational disease. The standards cover all employees who could reasonably be expected to come into contact with blood or other body fluids during the course of their job activities.

Employers are required to implement an Exposure Control Plan than makes Universal Precautions mandatory and treats all blood and body fluids as infectious with the exception of sweat. This plan centralizes hand hygiene and the use of Personal Protective Equipment (PPE) as protection against blood and body fluid infection. PPE includes gowns, gloves, masks, goggles and resuscitation bags. These materials must be available to the employee at no charge.

Also part of the standard are measures to prevent needle sticks and blood splashing, and to ensure the appropriate packaging and handling of body fluid specimens and to label the specimens and waste with biohazardous labeling before shipping or waste removal. The standard also requires methods for the disposal of contaminated sharps and the container used for such disposal.

Another rule of the standard allows for the vaccination, within 10 days of employment, of all healthcare workers at no charge, against Hepatitis B if they have occupational exposure to blood. For employees that have an exposure, post-exposure evaluation and followup such as laboratory evaluation, counseling, and prophalaxis are made available to the employee

Common pathogens transmitted by bloodborne exposure include Hepatitis B, Hepatitis C, and HIV.

Hepatitis C Virus (HCV)

Hepatitis C can be transmitted to healthcare workers by accidental needle sticks, cuts, or blood splashed onto the conjunctiva. Following percutaneous injury the infection rate is only 1.8%. One thousand health care workers are infected on an annual basis and Hepatitis C is the number one cause of liver transplantation in the United States.

Hepatitis C is considered more lethal than Hepatitis B because there is no preventative vaccine for the illness. Hepatitis C can lead to liver failure and liver transplant. Often patients with Hepatitis C have HIV as well and both viruses can be acquired with one exposure of the health care worker. HCV is usually treated with interferon injections, but the medication is expensive, side effects are many, and the disease often returns when the treatment is stopped. It is not recommended that healthcare workers who have an exposure to HCV be treated by prophylaxis with interferon preparations.

HIV

The likelihood of HIV infection after percutaneous injury is 0.3%. However, if the patient has severe advanced disease, the needle was used in an artery or vein prior to exposure and the needle is visibly contaminated with blood, then the risk is increased.

For healthcare workers who are exposed to HIV, then post-exposure prophylaxis is recommended with HIV specific medications to prevent seroconversion. A two-drug regimen must be used and continued for at least 4 weeks of therapy. The medications can cause side effects and are often discontinued by the worker due to the side effects, before the 4-week time interval is up (CDC, 2003).

Hepatitis B Virus (HBV)

Hepatitis B virus is a highly infectious and transmissible virus. Between 6 and 62% of all needle stick exposures result in transmission of the hepatitis B virus. Vaccination of healthcare workers has dramatically reduced the incidence to occupational transmission of hepatitis B, however, not all workers who have the potential for blood exposure have been vaccinated against the virus.

If you receive a blood exposure, wash cuts and needle sticks with soap and water. There is no scientific evidence that squeezing the wound or using antiseptics or bleach on the wound will prevent inoculation with bacteria or a virus. If the exposure is to the mouth, nose, or skin flush those areas immediately with water. For splashes to the eye, irrigate the eyes with clean water, saline, or sterile irrigation solution. You should report the exposure to the department that handles occupational events such as employee health, infection control, or occupational health. Prompt reporting is essential, as some measures may need to be taken to prevent infection within the first 24 hours if deemed appropriated to the situation.

The CDC reports that 385,000 hospital workers receive sharps injuries each year. These statistics prompted the requirement that all healthcare facilities have in place a plan to prevent needle stick injuries and that the plan is updated at least annually. This plan must be made accessible to employees, and education regarding the standards must be done as each employee is hired and at yearly intervals thereafter.

Employers are required to implement improved engineering controls to prevent the occurrence of needle sticks when feasible, such as needless systems, or needle shield devices. Employees should avoid the use of needles where safer controls have been instituted. Avoid recapping needles, if needles must be recapped, use the one-handed scoop technique. Never bend or break needles under any circumstance.

Dispose of sharps appropriately in designated sharps containers, which display the red sticker with the biohazard symbol. Never pick up broken glass with your hands, always use a dust pan and brush or other approved method as designated by your facility and dispose of it in a puncture proof container.

Sharps containers are required to be rigid, leak proof and puncture resistant at the bottom and around the sides. The containers must be placed in areas close to where the devices are to be used, maintained in an upright position and not allowed to become overly full. A sharps container is considered full when it is

filled to ¾ of its capacity, and should be closed and placed in the appropriate area for disposal.

When the containers are removed from the area, they must be closed immediately prior to moving, and placed in a secondary container if leaking. The secondary container must be closeable and able to contain the entire contents during shipping, handling, and transport. The secondary container must also be labeled or color-coded correctly.

Eating, drinking, applying cosmetics, or lip balm is prohibited in areas where contamination with blood or body fluids is likely to occur. In addition, no food or drink is to be kept in refrigerators or at workstations where contamination with body substances is likely.

All procedures involving blood or other body substances shall be performed in a manner to reduce the likelihood of splashing or spattering of droplets.

PPE

Personal protective equipment shall be provided to the employee at no cost in the appropriate sizes. PPE is considered appropriate if it does not allow the passage of potentially infectious substances too the employees works clothes, street clothes, undergarments or skin, eyes, mouth, or mucous membranes under normal circumstances and for normal durations of use. Hypoallergenic gloves, glove liners, powderless gloves or alternatives shall be provided for employees who are allergic to the gloves normally provided. The employer shall also clean, launder, or dispose of personal protective equipment at no cost to the employee.

If garments become soiled with blood or body fluids, the garments should be removed as soon as reasonably feasible to do so. All PPE should be removed before the employee leaves the immediate work area. When PPE is removed is shall be placed in the proper designated area for disposal, cleaning, storage, or decontamination.

When gloves become contaminated, they should be replaced as soon as it is feasible. They should also be promptly replaced if they become torn, punctured, or their ability to effectively act as a barrier is lost. When using gloves, remember to use the correct size. Gloves that are loose, floppy, and too big pose a hazard to the patient and the employee as they obscure the nurse’s view during procedures and can be potentially caught in equipment posing an injury risk to the hands.

OSHA standards state that the employer shall provide handwashing stations for employees. If hand-washing facilities are not feasible then the employer is required to provide waterless antiseptic hand gel and clean towels. When using hand gel, hands should be washed with soap and water as soon as is reasonably possible. Hand washing should occur as soon as possible after the removal of gloves or other PPE.

When it is anticipated that blood or body fluid spattering or splashing is likely and it is reasonable to assume that contact with the eyes, face, or mucous membranes could occur, the employee shall wear a chin length face shield or a combination of mask and eye protection. The eye protection must have wraparound shields to protect the eyes from the sides.

Gowns, aprons, clinical jackets or other suitable protection shall be worn over the clothing when it can reasonable be expected that blood or body substance contact is likely to occur. Surgical hoods or caps and shoe covers should also be worn when it is likely that gross contamination could feasibly occur.

The employee health department is most frequently responsible for the training and documentation of training on the proper use of Personal Protective Equipment (PPE). Since the employer is required to have documentation that the employee received and understood the training given, the employee health department should define clear objectives for the training and ensure that the content and testing of the training revolves around the objectives. Elements for PPE training should include:

When to wear PPE
How to properly put on, apply, wear, and dispose of PPE
When the use of PPE is necessary
Limitations of PPE
Care and Maintenance of PPE

Environmental

All equipment shall be cleaned after use with an approved disinfectant per hospital policy after contact with blood or body fluids. Contaminated work surfaces shall be cleaned as soon as possible after the procedure is completed or as soon as is feasible if it is contaminated with blood or body substances. Work surfaces shall be cleaned at the end of every shift if there is possibility of contamination since the last cleaning.

Protective coverings of plastic or other materials shall be replaced as soon a possible when they become contaminated by potentially infectious material or at the end of the shift if they become contaminated during the shift.

Any pails, bins, or storage receptacles that are not designed to be disposable will be routinely inspected and removed for cleaning and decontamination when visible contamination is detected.

Laundry must not be sorted or rinsed in patient care areas. Contaminated laundry must be placed in red bags or in bags labeled with the biohazard symbol unless the facility uses Universal precautions in the handling of all soiled linens.

Tuberculosis (TB)

According to the Centers for Disease Control (CDC), one third of the world's population was infected with TB in 2005. TB kills an estimated 2 million persons annually, and has become the second most common cause of death on the worldwide level after (HIV).

OSHA allows for the use of N95 disposable respirator for employee protection against Tuberculosis in the health care setting. The N95 disposable respirator must be fit tested. The N95must be retested for fit on an annual basis and the employee must receive training in its use. The devices must be stored in a clean, sanitary, and convenient location. The employee must undergo a medical evaluation and be declared physically capable of performing regular duties while wearing the respirator without causing physical distress to the employee. The respirator must be one of the types that is approved for use by NIOSH.

Workplace Violence

Homicide is the fourth leading cause of workplace death. In 2005, 792 workers were killed in workplace assaults in the United States. Each week 18,000 workers are the victims of non-fatal workplace assaults. Most of these assaults occur in hospitals, nursing homes and social service settings. Most of the assaults are inflicted by a patient or client.

Hazard Communication/ MSDS

The Hazard Communication Standard was first made law in 1983. This OSHA standard is also called the right to know law, and its basis is the right of every

employee to know about and have access to information concerning all potentially hazardous materials found in the workplace.

The employer must evaluate the workplace for potentially harmful chemicals, assure that they are properly and completely labeled, have available Material Safety Data Sheets (MSDS) on every potentially hazardous substance, train and document the training of employees, and maintain a written Hazard Communication Program. Training must also be conducted whenever a new hazardous chemical is introduced into the workplace. In addition to the above requirements, the employer is required to maintain protection for employees, eye wash stations, and must monitor the levels of exposure from hazardous chemicals to employees.

Radiation

The employer is responsible to monitor levels of radiation exposure of employees whenever there is potential for contact with radiation. In the healthcare setting, common sources of radiation include radiation that occurs during the exposure of exposure of x-ray film or the presence of radioactive isotopes such as used in nuclear medicine. The employer is responsible for having appropriate monitoring equipment available and areas of potential radiation exposure must be posted with a radiation symbol.

OSHA has set standards for radiation levels and a radiation-monitoring program is a requirement of OSHA standards. Employers are required to provide radiation-monitoring badges to employees likely to receive a radiation dose in excess of 25% of the quarterly allowable radiation limit and to employees who work in high radiation levels. When a healthcare facility can document that routine exposure levels are below 25% of the allowed quarterly limit, or the employee does not work in a high-level radiation area, then routine monitoring can be discontinued.

Chemical and Blood Spills

The employer is responsible for maintaining a safe working environment for all employees. Blood or chemical spills can represent a hazard and have the potential for employee injury.

When a spill occurs certain factors must be evaluated:

- The location of the spill
- The size of the spill

- The characteristics of the substance involved
- The type of equipment needed to contain the spill

Supplies that may be needed to contain a spill may include: ▪
Neutralizers
- Absorbents such as sand or commercial solidifying agents
- Scoops, pans, or shovels
- Covered containers for disposal of clean-up waste

In the event of a spill the following priorities assessed and appropriate action(s) taken:
- Contamination of any employees or persons
- Notification of persons in immediate spill area.
- In the event of flammable spill, electrical devices should be turned off ▪ Containment of spill

Absorbent material should be poured around the area of the spill. The additional absorbent is placed in the center of the spill. The spill is then cleaned from the outer area, moving the contents toward the center. Proper protective equipment should be used during cleanup of the spill. The area of the spill should be ventilated if necessary. Cleanup of chemical spills should only be undertaken by personnel having the knowledge to safely contain and cleanup the spill. Some chemicals can present a greater hazard if improper clean up is attempted.

Spill kits for blood and chemicals should be placed in convenient areas within the facility. All personnel must be trained in the use of spill kits and that training must be documented. Written policies must also be in place for dealing with spills and the storage of chemicals.

Fire Safety

OSHA regulations mandate that any facility that houses patients have a fire safety program. Smoke alarms, sprinklers, and fire extinguishers must be present. Fire safety is a part of the employer's Hazards Communication program and training in fire safety must be documented. All employees must know the fire risks associated with chemicals, gases, or equipment. The employee must be trained in rescuing patients, and the location and correct use of fire extinguishers. The acronym RACE (Rescue, Alert, Confine, Extinguish) is used by many hospitals to assist employees in remembering how to manage fire.

Indoor Environmental Air Quality

During the 1970's, changes in the way that buildings were made resulted in virtually airtight structures. This decrease in natural ventilation can allow for the buildup of emissions from office products, mechanical equipment, biological contaminants such as fungi, and air pollution.

The NIOSH office is responsible for the oversight of air quality in the workplace. NIOSH has found that most problems of physical complaints that the employee believes to be poor air quality are really due to a variety of factors in addition to the quality of the air such as lighting, temperature, building comfort and ergonomics, and physical and job related stressors.

With regard to hospitals, one area of concern is the operating room where ergonomic concerns exist along with potential problems due to latex allergy and anesthetic gases such as nitrous oxide.

NIOSH has identified these measures to help with air quality in operating rooms:

- A properly functioning air scavenging system must be in place
- Monitoring of anesthetic equipment with leak test monitors
- Monitor room air
- Replace improperly fitting hoses, gaskets, seals and other parts of the anesthesia administration equipment which would allow the escape of anesthetic gases
- Make sure that waste nitrous oxide emissions into the room are controlled by scavenging systems and vented vacuum pumps

Ergonomics

Back injuries are the most common injury of the workplace. However, back injuries are not the only threats to employee disability. Approximately 75% of all jobs now require the use of video display terminals or computers. These changes in the workplace have led to increased employee problems with occupational related neck pain and carpal tunnel syndrome.

OSHA attempted to pass universal Ergonomic standards in 2001, but the standards were struck down by lawmakers. As of this time, OSHA has no standard that is specific to ergonomics, but this does not mean that they will no issue citations. At the present OSHA can utilize the General Duty Clause to issue citations for ergonomics related hazards. "The General Duty Clause (CFR Par 1977.1) states:

(a) Each Employer--

(1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees.

(2) shall comply with occupational safety and health standards promulgated under this Act.

(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders pursuant to this Act which are applicable to his own actions and conduct.

Latex Glove and Allergy Management

An increasingly important problem for both employees and patients is the problem of Latex allergy in the healthcare setting. Latex allergy has been increasingly seen since Universal Precautions requiring the use of gloves for all contact with body substances was implemented. Most latex allergies are not serious, however, in some instances they can be life threatening. Persons at highest risk for latex allergy include medical personnel, persons with previous history of allergies, and persons with repeated exposure to latex.

There are three main categories of latex allergy:

- Irritant contact dermatitis- A non-allergenic inflammatory response to latex gloves. A combination of sweat and glove powder irritates the dermatitis. Irritant contact dermatitis is manifested by rash of the hands with cracks, sores, dryness, and flaking. Irritant contact dermatitis can be controlled or eliminated by wearing cotton glove liners, using vinyl or nitrile gloves, or avoiding glove use altogether whenever possible.
- Allergic Contact Dermatitis- The symptoms of allergic contact dermatitis are almost identical to Irritant Contact Dermatitis. However, in this case it is caused by the activation of a cellular response due to repeated exposure to latex.
- Hypersensitivity immune system response is an actual allergic manifestation of latex allergy. The patient may experience systemic symptoms such as itching, hives, shortness of breath, and anaphylaxis in response to latex. This can be a life-threatening emergency.

The changing of gloves to a non-latex product may not solve the problem. Some non-latex gloves still contain chemical sensitizers. Latex proteins can become airborne in the powder from gloves being used by other healthcare workers and glove powder can be deposited on environmental surfaces. Latex is also found

in a multitude of sources in the healthcare setting such as urinary catheters, elastic, and foam rubber.

Conclusion

A full examination of all OSHA regulations and issues applicable to the healthcare setting is beyond the scope of this educational encounter. What has been aimed to accomplish is to give the clinician a working knowledge of OSHA standards and an understanding of how those standards apply to workplace health and safety.

OSHA regulations are under constant scrutiny and revisement as the equipment, procedures, and technology of the workplace continually changes. Employers are required to provide the employee with annual retraining on applicable standards and when major changes occur. Knowledge of current OSHA standards will make the healthcare environment a safer place for all employees.

Information derived from OSHA Quick Start Website unless other wise indicated.

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