

Bloodborne Pathogens and Infection Control**How to Receive Your CE Credits**

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Purpose

This course is provide the participants with the knowledge required to identify bloodborne pathogens and to protect themselves and the patients against exposure. This course will identify standard of practice, and OSHA standards for preventing a exposure. Infection control standards will also be addresses and the procedures that must be followed when a bloodborne pathogen exposure occurs.

Objectives

1. Explain the types of bloodborne pathogens.
2. Identify the prevalence of bloodborne pathogens
3. Discuss ways to Reduce the spread of microorganisms

4. List essential behaviors to prevent disease transmission, including the use of personal protective equipment, hand washing, waste disposal, and sterilization.
5. Describe infection control precautions
6. Understand OSHA's regulation of the exposure control plan and what to do in the event of an exposure.

Introduction

Transmission of bloodborne pathogens and microorganisms are the most common reasons why health care workers are exposed to infectious diseases. Exposures to bloodborne pathogens and infectious diseases is a preventable health care problem resulting in illness, suffering, and sometimes death to the persons who are exposed. Eradication of certain bloodborne pathogens, and bacteria is also becoming a major public health problem, and the key for health care workers is to practice their organization exposure control plan, and OSHA bloodborne pathogens standards (recommendations) (Center for Disease Control and Prevention, 2006).

The Center for Disease Control and Prevention (2012) illustrates that exposures to blood and other body fluids occur across a wide variety of occupations. Furthermore, health care, emergency response and public safety personnel workers can be exposed to blood by sharp related injuries, needle-stick, mucous membrane, and skin exposures. These exposures contain bloodborne pathogens with infectious microorganisms.



The Bloodborne pathogens are infectious microorganisms present in blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV), the virus that causes AIDS. Workers exposed to bloodborne pathogens are at risk for serious or life-threatening illnesses.

The World Health Organization (2012) reported that the transmission of blood-borne pathogens, e.g., the hepatitis B virus (HBV), the hepatitis C virus (HCV), the human immunodeficiency virus (HIV) and treponema pallidum (TP), continue to be a major public health problem. These pathogens were reported and documented to be the most common infectious pathogens that were transmitted in health care organizations from patients to health care personnel (HCP). Duan, et al., (2013) illustrates that hepatitis B virus (HBV), the hepatitis C virus (HCV), the human immunodeficiency virus (HIV) and treponema pallidum (TP), continue to be a chronic health care problem worldwide (globally).

Pathology of Microorganisms Infections

As previously mentioned a pathogen are microorganism that is capable of causing an infection. The organism inserts toxins into a normal functioning cell that either kills the cell or damages the cell (). Infection and Sepsis are terms that are used interchangeably to describe any disease cause by a microorganism. These microorganisms can also be called agent of infection. Agents of infection include viruses, bacteria, fungi, prions, parasites, and multidrug-resistant organisms.

Agent	Example of Agent
Viruses	Any living organism composes of particles of nucleic acid and protein that are often membrane bound. The most common health care exposure viruses may be: Hepatitis Human Immunodeficiency Virus (HIV) Influenza Norovirus
Bacteria	Single celled living microorganisms that can cause disease to humans. Bacteria can be transmitted by air, water, soil, food, vectors, hands, and sexual activity. The most common health care exposure bacteria can be: Acinetobacter Burkholderia cepacia Clostridium difficile Clostridium sordellii Gram-negative bacteria Klebsiella Mycobacterium abscessus Pseudomonas aeruginosa Staphylococcus aureus Tuberculosis (TB) Vancomycin-intermediate Staphylococcus aureus (CDC, 2014)
Prions	Prions are transmissible spongiform encephalopathies that affect both human and animals. Example of Prions that can be fatal and highly contagious is CJD Creutzfeldt-Jakob Disease. Health care organization should take extreme caution with patients with CJD. All equipment used on patient diagnosed with CJD should be disposable and never reused on another patient.
Fungi	Fungi are single celled organisms of molds and yeast. The most common health care exposure Fungi can be: Candida infections most commonly occurs in individual with a “weak: immune system. Because Candida is an element of the bodies normal flora, it has the ability to live on many environmental surfaces, and can be fatal among individual with an altered immune system (Wornock, 2007)
Parasites	A parasite is a multicellular organism that lives on or in a host and gets its food from or at the expense of its host. The most common health care exposure Fungi can be: Helminth

	Arthropod species Protozoa
Multidrug-resistant organisms	Microbes have the ability as humans to adapt to its environment, resulting in a resistant form organism to pharmacological treatment that use to be highly effective. The most common health care exposure Fungi can be: Enterobacteriaceae (carbapenem-resistance) Vancomycin-resistant Staphylococcus aureus Vancomycin-resistant Enterococci (VRE) Methicillin-resistant Staphylococcus aureus

Prevalence

In 2007 the World Health Organization estimated that approximately 33 million people were chronically infected with HIV (World Health Organization, 2007), 170 million with HCV, (World Health Organization, 2002), 350 million with HBV, (World Health Organization, 2004) and approximately 12 million with TP World Health Organization (2001). This estimation of exposures includes the most affected populations live in developing countries, where the economy is bad and there is no or low levels of health care (Duan, et al., 2013).

Reducing the Spread of Bloodborne Pathogens

The Health care team spend a great deal of time to reduce or eliminate the hazards of occupational exposure to bloodborne pathogens by developing and maintaining practices to control the spread of microorganisms. These practices are called aseptic techniques, and infection control. Aseptic technique is a standard of practice that, the entire health care team must start with hand washing and end with hand washing. At the beginning of patient care health care provider should wash his or her hands and upon completion of the care of the patient hands must also be washed. Another form of aseptic practices is process of cleaning, disinfection, and sterilization of health care equipment.

Hand Washing (Mode of Transmission)

Hand washing is one of the most effective ways to prevent the spread of organisms from one patient to another. Health care organization should follow the CDC guidelines for hand hygiene found on at <http://www.cdc.gov/handhygiene/>. Because the mode of transmission is the way in which an organisms can is carried from one source to another can be by direct contact. Direct contact includes anybody surface transmission to another body surface. Health care personnel can transfer organisms through:

- a. Insertion of invasive devices
- b. Dressing Changes
- c. Bathing a patient
- d. Health care equipment (Blood pressure cuffs, electronic thermometers, glucometer, Electro-cardiac monitoring equipment)
- e. Toys in a pediatric setting
- f. Improper handling and Sterilization of surgical devices

Personnel finger nails should be short non-artificial, without cracked, or chipped nail polish.

Because long nails, artificial nails and cracked, and chipped nail polish has the potential to be reservoirs for bacteria. Hand Hygiene should be performed in the following situations:

- a. At the beginning of your shift
- b. Before eating
- c. After removing gloves



- d. Before and after using the bathroom
- e. After sneezing, blowing nose or coughing
- f. After contact with patients environment
- g. Before and after patient contact
- h. Before and after contact with patients dressings, IV sites, wounds, specimens or bed linen
- i. Before and after any invasive procedure
- j. Before and after administration of medication
- k. Before and after contact with patients body fluids
- l. ALWAYS WEAR GLOVES and wash your hand before and after removing gloves.

In the United States, hospital patients get an estimated 722,000 infections each year that is estimated to be about 1 infection for every 25 patients (CDC, 2015). It is imperative to practice thorough hand hygiene at key points in time to disrupt the transmission of microorganisms to patients including: before patient contact; after contact with blood, body fluids, or contaminated surfaces (even if gloves are worn); before invasive procedures; and after removing gloves (wearing gloves is not enough to prevent the transmission of pathogens in healthcare settings) (CDC, 2015).

Infection Control

Prevention and control of infection is very important in a health care environment. Because proper infection control practices generate cost saving within the health care organization and improve health care outcomes. Health care organization should have an infection control practitioner to monitor the organizations surveillance, and infection control practices. In addition to ensure all health care department having an infection control policy



catered to the environment (e.g., oncology, housekeeping, healthcare personnel, transportation, Pediatric, outpatient and inpatient settings).

Surveillance is a method used by infection control practitioners in a health care setting to monitor microbial trends or disease outbreaks. Surveillance is an essential responsibility of an infection control program. Surveillance used to monitor trends and outbreak can be done locally or compared to a specialized database for monitoring microbial, and disease outbreaks.

Health care organization should follow infection control practices are based on state and federal mandates, OSHA regulations, CDC Guidelines/ Recommendations, and professional practice guidelines from various professional disciplines (e.g., the association for Professional in Infection Control, and Epidemiology). Practices may also be based on supportive scientific evidence-based data from professional journals and research. Having infection control practices in place will protect patient, and health care personnel by minimizing the risk of transmission of infections associated with the use of procedures, patient to patient contact, medical equipment, and medical devices thus reducing morbidity and mortality and shorten periods of illness to and hospitalization of patients, and reducing the risk of exposure of bloodborne pathogens to personnel.

Infection Control Precautions

PRECAUTION	INDICATION	PPE REQUIRED
STANDARD PRECAUTIONS	Standard Precautions apply to 1) blood; 2) all body fluids, secretions, and excretions except sweat, regardless of whether or not they contain visible blood; 3) nonintact skin; and 4) mucous membranes. Standard Precautions should be taken with all types of patient contact.	Hand washing Gloves
DROPLET PRECAUTIONS	Transmission of large droplet through coughing, sneezing, or talking and during the performance of	Private Room Mask

	certain procedures such as suctioning and bronchoscopy.	Gown Goggles
CONTACT PRECAUTIONS	Direct-contact transmission involves skin-to-skin contact and physical transfer of microorganisms to a susceptible host from an infected or colonized person, such as occurs during patient-care activities that require physical contact.	Private Room Strict Hand washing Mask Gown Goggles Protective Barriers Disposable Equipment
AIRBORNE PRECAUTIONS	Airborne transmission occurs by dissemination airborne droplet nuclei (small-particle droplets)	Private Room Mask (Particulate respirator) Gown Goggles CDC,2007;

Personnel Protective Equipment

Equipment used to prevent the transfer of pathogens from one person to another are referred to as barriers or Personnel protective equipment. According to Occupational Safety and Health Administration (OSHA) (n.d.). Personal protective equipment, is commonly referred to as "PPE". PPE is equipment worn to minimize exposure to serious workplace injuries and illnesses. These injuries and illnesses may result from contact with:

- a. Chemical
- b. Radiological
- c. Physical
- d. Electrical
- e. Mechanical, or other workplace hazards.

Personal protective equipment may include items such as:

- a. Gloves
- b. Goggles
- c. Shoes or shoe cover
- d. Surgical Mask
- e. Respirators
- f. Full Body Suits
- g. Keeping the patient in a negative airflow private room
- h. Waterproof disposable gowns and Trash
- i. Disposable linen
- j. Proper labeling of contaminants

Personnel should follow their health care organizations exposure control plan and the OSHA guidelines on how to effectively use PPE.

Disinfection and Sterilization

Disinfection refers to using a chemical or performing a physical process to reduce the number of pathogens on a surface. When disinfecting an area it is important to know that disinfecting the areas do not necessarily mean that all the pathogens were removed. Keep in mind that spores has the potential to growing over a period of time. Terms to remember:

1. Antiseptic- chemical used on living objects
2. Disinfectant- Chemical used on lifeless objects
3. Bactericidal- Chemicals used to kill microorganisms

4. Bacteriostatic- Chemical used to prevent growth of pathogens however does not kill all forms of the organisms (Johnson, Lineweaver, and Maze, 2009)

Sterilization involves in the completely killing all microorganisms, including spores. Sterilization requires high temperature of heat, potent bactericidal, and possible gas sterilization (depending on the equipment). Sterilization usually involved operating room surgical instrument, pre-packages and invasive procedure equipment.

Exposure Control Plan

Health care organizations should always try to provide a safe, health, and ergonomic wellness work environment. It is important to offer, direct, and counsel employees on ways to keep themselves and the patients free from bloodborne pathogens. OSHA recommends that health care organization should always implement an exposure control plan for the worksite with details on employee protection measures. OSHA facts sheet (2011) clearly indicates the exposure control plan must also describe how an employer will use a combination of engineering and work practice controls, ensure the use of personal protective clothing and equipment, provide training , medical surveillance, hepatitis B vaccinations, and signs and labels, among other provisions. Engineering controls are the primary means of eliminating or minimizing employee exposure and include the use of safer medical devices, such as needleless devices, shielded needle devices, and plastic capillary tubes. Health care organizations that would like and the Model Plans and Programs for the OSHA Bloodborne Pathogens and Hazard Communications Standards can retrieve it form <https://www.osha.gov/Publications/osh3186.pdf>.



Any personnel that is exposed or come in contact with blood or body fluids should wash the site with soap and water; mucous membranes should be flushed with water. Penetrating injuries should also be cleansed and reported to a supervisor. The leadership team, and the personnel must always follow the health care organizations exposure control plan. Keep in mind that all types of exposures should be immediately evaluated by a qualified health care professional, and the health care organization should follow all federal (including the Occupational Safety and Health Administration (OSHA)) and state requirements for recording and reporting occupational injuries and exposures. Post-exposure evaluation and follow-up are to be provided to the employee consistent with the requirements of 29 CFR 1910.1030 (OSHA, 1994).

Conclusion

Educational in-services is key to communicating health care organizations plans. It is very important that personnel and patients know that infection control measure are in place that will aid in a safe environment, and excellent patient outcomes. The health care leadership team should employ all stakeholders involved in patient care to learn the organizations policies on infection control and bloodborne pathogens.

References

- Center for Disease control and Prevention. (2007). Guidelines for isolation precautions: preventing transmission of infectious agent in healthcare setting. Retrieved from [www.cdc.gov/hicpac/2007IP/2007isolation precautions.html](http://www.cdc.gov/hicpac/2007IP/2007isolation%20precautions.html).
- Center for Disease control and Prevention. (2012). Bloodborne Infectious Disease: HIV/AIDS, Hepatitis B, Hepatitis C. Retrieved from <http://www.cdc.gov/niosh/topics/bbp/>.
- Center for Disease control and Prevention. (2014). Diseases and Organisms in Healthcare Settings <http://www.cdc.gov/HAI/organisms/organisms.html>
- Center for Disease control and Prevention. (2015). Hand Hygiene Basics <http://www.cdc.gov/handhygiene/Basics.html>.
- Centre for Reviews and, D. (2012). Double gloves for prevention of transmission of blood borne pathogens to patients: a review of the clinical evidence (Structured abstract).
- Duan, F., Huang, Q., Liao, J., Pang, D., Lin, X., & Wu, K. (2013). How often are major blood-borne pathogens found in eye patients? A serosurvey at an eye hospital in Southern China. *Plos One*, 8(9), e73994.
- Flynn, M. H., & Reid, A. (2015). Management of occupational blood exposures: looking at progress. *British Journal of Nursing (Mark Allen Publishing)*, 24(1), 8-11.
- Johnson, D., Lineweaver, L., & Maze, L. M. (2009). Patients' bath basins as potential sources of infection: A multicenter sampling study. *American Journal of Critical Care*, 18, 31-40.

Infection Control Precautions. (2005). Outline. Retrieved from

www.sfcdec.org/document.html?id=68.

Luksamijarulkul, P., Pipitsangjan, S., & Vatanasomboon, P. (2014). Occupational risk towards blood-borne infections among ambulance personnel in a provincial hospital network in Thailand. *The Southeast Asian Journal of Tropical Medicine and Public Health*, 45(4), 940-948.

Occupational Safety & Health Administration. (1994). Exposure Control Plan for OSHA

Personnel with Occupational Exposure to Bloodborne Pathogens Retrieved from

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=1574.

Occupational Safety & Health Administration. (n.d.)

<https://www.osha.gov/SLTC/personalprotectiveequipment/>

Occupational Safety & Health Administration. (2003). Model Plans and Programs for the OSHA

Bloodborne Pathogens and Hazard Communications Standards. Retrieved from

<https://www.osha.gov/Publications/osh3186.pdf>.

Wornock, D. W. (2007). Trends in epidemiology of invasive fungi infections. *Japanese Journal of Medical Mycology*, 48(1), 1-12.

World Health Organization (2001) Global prevalence and incidence of selected curable sexually transmitted infections: overview and estimates. Geneva: World Health Organization.

World Health Organization (2002) Hepatitis C. Geneva: World Health Organization.



World Health Organization (2007) Joint United Nations Programme on HIV/ AIDS. AIDS

epidemic update: December 2007. Geneva: World Health Organization.