



BLOODBORNE AND AIRBORNE PATHOGENS

PREVENTING DISEASE TRANSMISSION

Meets Current OSHA and CDC Guidelines and Standards

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CONTINUING EDUCATION

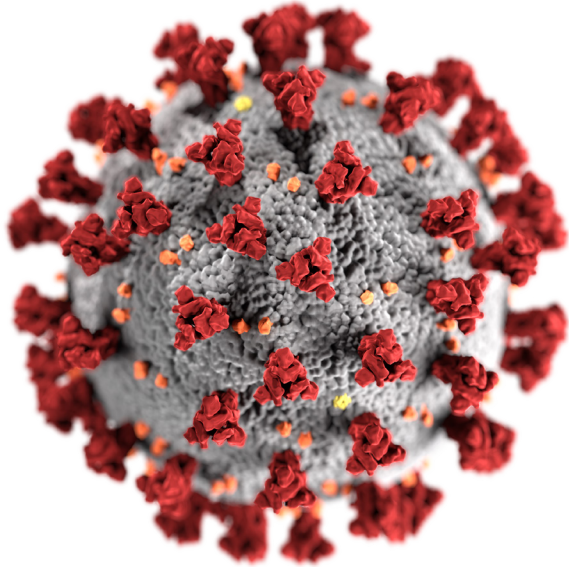
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Chapter One

Understanding Disease Transmission



Learning Outcomes

After reading this chapter and completing any related course work, you should be able to:

- Identify various bloodborne and airborne pathogens and resulting possible diseases
- Describe how various diseases are transmitted
- Identify basic disease prevention practices

Chapter Overview

- Bloodborne and Airborne Pathogens (pg 2)
- How Diseases Are Transmitted (pg 4)
- Basic Disease Prevention Practices (pg 5)
- For Your Review (pg 10)

Bloodborne And Airborne Pathogens

Pathogens are microorganisms (germs) which cause disease. These include the following types: bacteria, viruses, fungi, and protozoa. Pathogens may be present in blood, in body substances, in the air, in contaminated water, on contaminated surfaces, or come from an infected animal or insect. Some pathogens can be prevented with vaccines. To directly address the pathogen that is causing an illness, physicians may prescribe antibiotics for bacterial infections, anti-viral agents for viral infections, and anti-fungal drugs for fungal infections. How a pathogen affects someone may vary from person to person. Most people infected with a pathogen will have some outward sign of an illness, ranging from mild to severe. However, some people may be **asymptomatic**, which means that they are infected with a pathogen but show no obvious signs of the disease. Unfortunately, asymptomatic but infected individuals may still be able to pass the pathogen on to others.

Not all infections can be treated directly and certain treatments may not always be effective. The effectiveness of treatment may be influenced by how early the infected person received medical care and if other health conditions or diseases are also present. Once diagnosed, physicians may prescribe medications and advise care ranging from at home convalescence to hospitalization, depending on how severely the illness is impacting the infected person. In many cases, once a person becomes ill, physicians may only be able to help manage symptoms until the person's immune system is able to take care of the infection.

There are several **bloodborne pathogens** of concern, such as Hepatitis A, B and C viruses and human immunodeficiency virus (HIV). These pathogens are transmitted between people when exposed to blood and/or other body substances of the infected person. Bacterial infections can also be transmitted in this manner. Some pathogens such as Tetanus are typically only transmitted into the blood via contact with contaminated surfaces. Several harmful pathogens can be transmitted from animal and insect bites or body substance exposure, which can be a concern if you are working in certain locations and/or certain times of the year. Pathogens such as E. coli can be transmitted by ingesting contaminated food, water, or other substances. Protozoa pathogens, including giardia and cryptosporidium also may also enter the body through ingestion, resulting in illness.

Airborne pathogens are transmitted when respiratory droplets or aerosols from an infected person are inhaled or come into contact with mucous membranes associated with the upper respiratory system and the eyes of another person. Some especially infectious airborne viruses, such as SARS-CoV-2 (the pathogen which causes COVID-19) may remain infectious for many days on a contaminated surface (**Figure 1.1**). Other diseases caused by airborne pathogens include: tuberculosis, chickenpox, measles, mumps, rubella, meningitis, and the annual strain of influenza. Fungal infection risks typically occurs in wet or humid environments and may also be airborne.

Tables 1a and 1b provide an overview of several pathogens and the diseases that may result if exposed. There may be other possible pathogens in your work environment that may be a specific concern to you because of your job responsibilities and duties. Your employer can provide you with additional information concerning these pathogens.

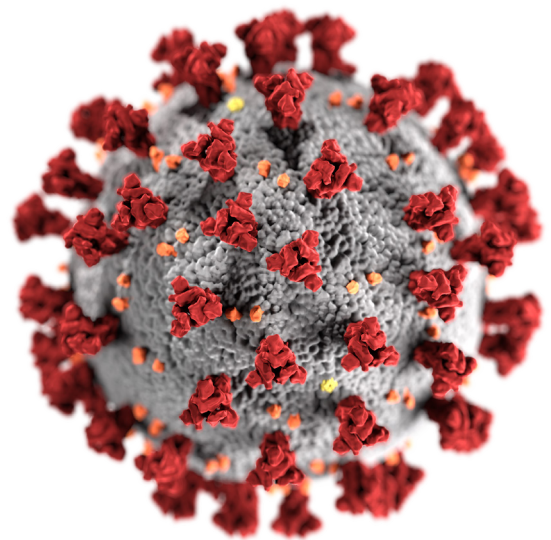


Figure 1.1 The SARS-CoV-2 virus is highly contagious and is known to remain active on surfaces for an extended period.

Table 1a - Examples of Common Diseases and How Their Pathogens are Transmitted

Pathogenic Condition	Symptom Recognition	Description	Transmission	Vaccination or Treatment
“Common Cold” (Human Coronavirus group, “typical” HCoV)	Congestion, cough, runny nose, fever, sore throat, swollen glands and non-specific symptoms.	Along with Rhinoviruses and a few others, Coronaviruses are thought to be a cause of the “Common Cold”. Colds due to typical Human Coronaviruses are highly contagious but rarely result in severe symptoms or secondary infections.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces (Coronaviruses can remain active on surfaces for days).	No vaccine available at time of writing. Typically resolves without treatment within a few days.
“Common Cold” (Rhinoviruses A & B Virus Group)	Congestion, cough, runny nose, fever, sore throat, swollen glands and non-specific symptoms.	Along with Coronaviruses and a few others, Rhinoviruses are thought to be the primary cause of the “Common Cold”. Colds due to Rhinoviruses may result in secondary infections which may increase illness severity and duration.	Airborne aerosol from coughing and sneezing. Direct contact with infected droplets on surfaces may be possible.	No vaccine available at time of writing. Typically resolves without treatment within a few days.
Chickenpox (Varicella Zoster, Herpesvirus 3 - HV3)	Fever, fatigue, rash, and fluid-filled, itchy blisters on body.	Traditionally seen as a childhood illness, it is increasingly less common due to vaccination availability. In addition to its primary symptoms, it may result in pneumonia, brain swelling, and other complications. The virus may remain dormant in the body and causes Shingles in older adults.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces, skin blisters or mucous secretions.	Vaccine available. Treatment of symptoms available if infected.
Herpes Infections (Herpesvirus Group)	Sores or ulcerations, fever-blisters, rash, fever, swollen glands, runny nose, diarrhea, swollen eyelids, fatigue & non-specific symptoms.	There are a variety of Herpesviruses, including Herpes Simplex 1 & 2, Epstein-Barr, Shingles (Chickenpox), Roseola, Kapolsi’s sarcoma, among others. Infections from Herpesviruses are a frequent cause of viral meningitis.	Most Herpesviruses require direct person-to-person contact or contact with body substances. Some, like HV3 can be airborne.	Only Chickenpox vaccine is available. Treatment of symptoms available if infected.
Hepatitis Infections (Hepatitis A, B & C Virus Group)	Jaundice (yellowing skin and eyes), fever, fatigue, nausea, vomiting, abdominal pain, joint pain, dark urine, loss of appetite.	Each virus type can cause serious diseases of the liver, including cirrhosis and cancer. Hepatitis B is the most common in this group due to situational or employment exposure.	Bloodborne and direct contact with body substances including blood, saliva, vomit, semen, vaginal fluids, and mucous secretions.	Vaccines are available for Hepatitis A & B. Effective treatments available with early diagnosis.
Human Coronaviruses (Novel) COVID-19 (Novel group - SARS-CoV, MERS-CoV, SARS-CoV-2)	Mild-to-severe infection of the respiratory and other body systems. Flu-like symptoms, cough, fever, diarrhea, rash, hypoxia, circulation disorders, blood disorders, organ failure, altered taste and smell ability.	SARS-CoV-2 causes COVID-19, which became a worldwide pandemic in 2020. This disease may present with or without symptoms, with many cases requiring hospitalization. The elderly, those with compromised immune systems, or other chronic conditions are most susceptible for severe illness.	Airborne aerosol from coughing, sneezing, and talking. Direct contact with droplets on surfaces. Emerging evidence of bloodborne and body substance transmission.	At time of writing, multiple vaccines are in development and some promising treatments are being explored.
Human Immunodeficiency Virus / AIDS Infections (HIV)	Headache, fever, fatigue, sore throat, rash, muscle, and joint pain. Compromised immune system. Secondary infections.	HIV attacks the white blood cells, destroying the body’s ability to fight infection, resulting in secondary infections becoming potentially life-threatening.	Bloodborne and direct contact with body substances. HIV is typically sexually transmitted.	At time of writing, no vaccine available with some promising treatments being explored
Human Papillomavirus Infections (HPV Group)	Warts, rash, skin irritations in the infected area. Frequently no symptoms are seen.	There are over 100 types of HPV with most being harmless. However, some strains are linked to the development of various cancers and other life-threatening conditions.	Bloodborne and direct contact with body substances. The most dangerous strains are sexually transmitted.	Vaccine series available for ages 9-45 for HPV strains associated with cancers. Treatment for symptoms is available.
Influenza (Influenzavirus A,B,C)	Fever, runny nose, sore throat, muscle and joint pain, headache, coughing, and fatigue.	Depending on the strain, influenza may present mild-to-severe symptoms, with some requiring hospitalization. “Flu-season” is typically the Fall and Winter months each year.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces.	Annual vaccine available. OTC treatment regimens and antiviral treatment for severe cases.
Ingested Bacterial Infections (E. coli, Salmonella, Shigella)	Abdominal cramping, diarrhea, bloody stool, gas, loss of appetite, nausea, vomiting, fatigue, chills, dehydration, and fever	Infections caused by E.coli, Salmonella and Shigella have similar symptoms, which are frequently mild-to-moderate. Prolonged or severe symptoms require medical attention and possibly hospitalization.	Direct contact with contaminated surfaces, handling, or ingestion of infected raw or undercooked food.	No vaccines available at time of writing. Antibiotics for treatment for severe cases are available. Generally, will self-resolve.
Measles (Measles Morbillivirus)	Blotchy red rash, fever, cough, sore throat, white spots in the mouth, secondary infections.	Measles is an infection of the respiratory system resulting in a red rash covering the body. It is immunosuppressive and may result in secondary infections including pneumonia, swelling of the brain, and blindness.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces.	Vaccine available. Symptom treatments available if infected.

Table 1b - Additional Examples of Common Diseases and How Their Pathogens are Transmitted

Pathogenic Condition	Symptom Recognition	Description	Transmission	Vaccination or Treatment
Meningitis (Various pathogens)	Fever, vomiting, headache, stiff neck, confusion, sound and light sensitivity, cold extremities, leg pain and abnormal skin color.	Meningitis can be caused by viruses (including many mentioned in this section), bacteria, fungi, or parasite that results in inflammation of the meninges (membranes) covering the brain and spinal cord	Transmission is dependent on the pathogen and may include: bloodborne, airborne aerosol, direct contact with droplets on surfaces, or oral ingestion. There are also non-pathogenic causes.	Vaccines for some pathogens linked to Meningitis are available. Anti-inflammatory drugs combined with antibiotics or antivirals if infected.
Mumps (Mumps Orthorubulavirus)	Facial swelling, fatigue, muscle aches, headache, fever.	Mumps infections are characterized by severe inflammation of glands. In severe cases, this can result in meningitis and infertility.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces.	Vaccine available. Anti-inflammatory and OTC drugs for treatment if infected.
Protozoan Infections (Giardia and Cryptosporidium)	Fever, abdominal cramping, cough, runny nose, severe diarrhea, nausea, fatigue, dehydration	Protozoan parasites like Cryptosporidium and Giardia are found on surfaces, soil, food, or water that has been contaminated with the feces of an infected host animal or human. The cycle repeats when a new host ingests the contamination.	Direct contact with contaminated surfaces, soil, handling, or ingestion of infected raw or undercooked food or ingestion infected liquid.	Symptomatic treatments available. Generally, will pass on its own within two weeks.
Rubella (Rubella virus)	Irritating rash covering the body, fatigue, muscle aches, headache, fever, common cold-like symptoms	Also known as German measles, it has symptoms similar to both Mumps and Measles. Secondary infections including pneumonia and swelling of the brain.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces.	Vaccine available. Anti-inflammatory and OTC drugs for treatment if infected.
Tetanus (Clostridium tetani)	Fever, headache, sweating, muscle spasms, difficulty swallowing, breathing difficulty, difficulty with urination and defecation, high blood pressure and tachycardia	Tetanus infection symptoms are caused by the Tetanus neurotoxin which interferes with neuromuscular control. This results in mild to severe muscle spasms which may become life-threatening.	Direct contact with common Clostridium tetani endospores through an exposed open wound, puncture wounds, heroin drug use, and animal bites.	Vaccine available with a booster recommended every 10 years. Antibiotics if infected.
Tuberculosis (Mycobacterium tuberculosis)	Bad cough lasting weeks, chest pain, coughing up blood or sputum, fatigue, loss of appetite, and nail clubbing.	The majority of those infected may not show any symptoms. Those with the active disease will show severe lung infection. In cases of weakened immune system, this infection may spread to several other body symptoms.	Airborne aerosol from coughing and sneezing. Direct contact with droplets on surfaces.	A vaccine is available but rarely used in North America. Antibiotics if infected.
Candidiasis Yeast Infections (Candida fungi)	Skin – cracked, dry and/or red itchy skin, chaffing; Nails – discolored, thick, cracked nail and nail bed; Mouth – white discolorations of the tongue and throat, difficulty swallowing, sore throat; Genitals – burning sensation, red itchy skin, inflammation, discharge, odor.	One of the most common chronic pathogenic infections, yeast infections can affect anywhere on the body. While rarer, yeast infections in the blood or internally are life-threatening and require hospitalization. A normal immune system and good hygiene will typically prevent most yeast infections.	Direct contact with Candida fungi combined with a moist environment that promotes growth. Infections of mucous membranes or broken skin may lead to internal infections.	Antifungal treatments available.

How Diseases Are Transmitted

There are three conditions that must be met for disease transmission to occur:

- The pathogen must be present in adequate quantity to cause disease
- A person must be susceptible to the pathogen
- The pathogen must enter the body through an opening such as the eyes, nose, mouth, mucus membrane, skin cuts, abrasions, bites, needlestick, or puncture with a contaminated object

In order to cause disease, a minimum amount of the pathogen must be present in the medium through which it transfers. The amount of the pathogen present in a medium is known as the microbial “load”. When microbial loads are low, but have reached the minimum threshold for infection, it is likely that the disease will be more easily attacked by the immune system and result in milder symptoms. However, if the microbial load is high, the resulting illness may be more severe.

Disease susceptibility is normally a product *innate immunity* or *acquired immunity* to a pathogen. An innate immunity suggests that the person is naturally immune to the disease as a product of genetics. Acquired immunity occurs following exposure to the pathogen (or in some cases, a related or similar pathogen) in the past. It can also occur as a result of vaccination, which confers immunity to the pathogen. Depending on the pathogen involved, acquired immunity may diminish over time. For such pathogens, a scheduled series of vaccine administration, such as with the Hepatitis B vaccine is required to obtain long term immunity. “Booster shots” for certain vaccines can be scheduled to help ensure continued immunity after a designated period of time. For example, boosters are recommended for Tetanus and Diphtheria every 10 years. Immunity may also wane when a pathogen mutates or a different strain emerges, such as is common with the Influenza virus. As a result, annual vaccinations for the Flu are recommended.

If the pathogen is present in sufficient volume and you are susceptible to the infection, the pathogen must be able to enter your body in some way to cause disease. There are several ways this could happen. Understanding how disease transfer may occur is the foundation for knowing how to avoid it.

You risk disease transmission from bloodborne pathogens when providing first aid care such as controlling bleeding (**Figure 1.2**). Transmission can occur if infected blood splashes in your eyes or mouth, or if you touch the infected person’s blood without gloves when your hand has an open sore (even just a scratch). Disease transmission can also occur when the skin is penetrated by an infectious source, such as an insect bite or sting. Mosquito and tick bites are often associated with this type of disease transmission. Accidental punctures with sharp objects such as needles is a common means for this type of transmission. However, any sharp object that punctures the skin may contain an adequate pathogenic load to confer disease. The pathogen may even be present on your skin, at or near the location of the puncture and this may be how it enters your body.



Figure 1.2 You risk infection from bloodborne pathogens when providing emergency care that involves bleeding.

Eating undercooked or raw food may contain pathogens that can infect your digestion track. Likewise, drinking water or another fluid that has been contaminated or not adequately decontaminated may similarly provide a pathway for infection. Warm, damp, or humid environments may promote fungal growth if not adequately cleaned, which can infect skin and mucus membranes with minimal exposure.

Transmission of select viruses and bacteria can sometimes occur through direct contact with a person or indirect contact with a contaminated object such as soiled clothing or rescue supplies when not wearing personal protection equipment. You risk transmission of airborne pathogens if an infected person in your immediate vicinity coughs or sneezes. This produces aerosols and droplets which may broadcast for several feet. To become infected, you may inhale those aerosols or make contact with infected droplets on surfaces. You may also inhale the airborne pathogen if you are performing an **aerosol generating procedure**, such as when performing CPR or rescue breathing to someone who is infected with an airborne pathogen. Touching or handling something contaminated with an infected respiratory droplet or body fluid and then later touching your mouth, nose, or eyes is a common means of pathogen transmission.

Basic Ways to Prevent Disease Transmission

We are surrounded by pathogens. While many are of little concern, others will infect us and make us ill. Everyday best practices and good habits can prove to be very effective at preventing disease transmission (**Figure 1.3**). While you are unable to control what others do, you can protect yourself, which in turn may help protect those you will be around.

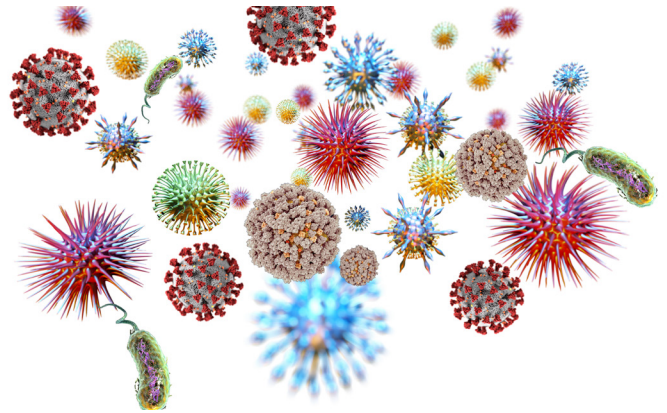


Figure 1.3 Everyday best practices and good habits will provide us with basic protection from pathogens of various types.

Frequent Hand Washing

One of the single most effective things you can do to protect yourself from pathogens is frequent and thorough hand washing. Studies show that thoroughly washing your hands with standard soap and running water will remove a significant number of microbes from your skin. According to the CDC, pathogens on your hands may be effectively removed with a minimum of 20 seconds of scrubbing with soap and water, followed by a thorough rinse and the drying your hands with a clean, single use towel. **Table 2** on the next page details the recommended procedure for hand washing.

Using antimicrobial soap that can be purchased by consumers (instead of standard soap) does not typically result in additional benefit or protection. However, certain industrial or hospital grade soaps or cleansers may provide additional protection if warranted, with a specific washing procedure to follow. If applicable, your employer will provide training on the use of any specialized soap or sanitation procedure. For most work related tasks and routine contact, washing with soap and water as described in **Table 2** is your most effective option. However, alcohol based hand sanitizers (ethyl alcohol 60% or greater) can also be effective in removing the majority of pathogens from hands that are not additionally soiled. To use, place an amount in the palm of one hand, adequate to cover your hands and wrists. Thoroughly rub the product onto your hands, being sure to cover each finger, under fingernails, palms, the backs of each hand, and wrists. Continue to rub your hands thoroughly until dry. Avoid using a towel or other means to hasten the drying process, which may limit the product's effectiveness.

Wash or Sanitize Your Hands!

Wash or sanitize your hands before:

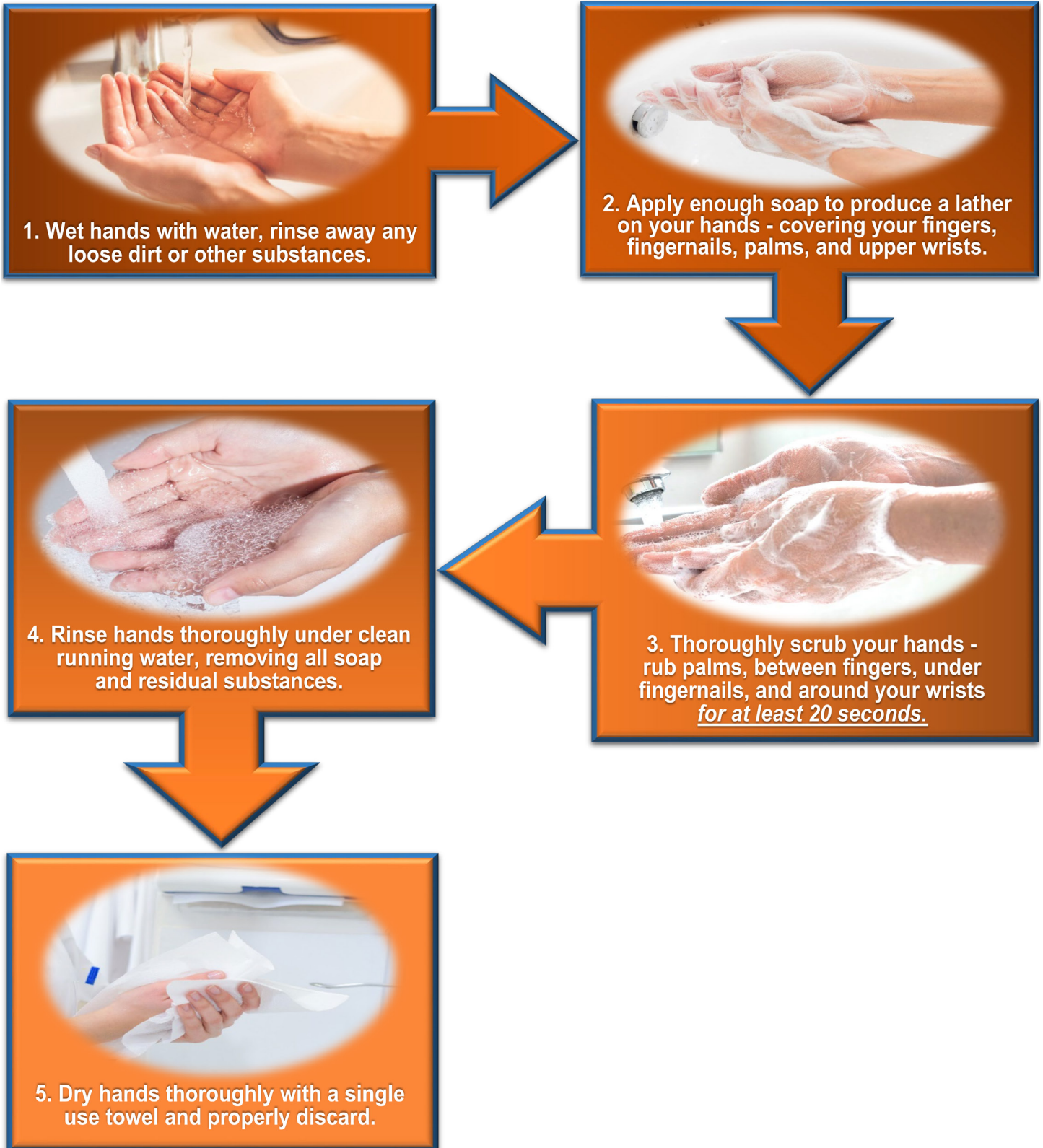
- Putting on exam gloves (care, cleaning, etc.)
- Touching your face (mouth, nose, eyes)
- Handling equipment or supplies
- Starting work or a new task
- Preparing or eating a meal
- Putting on your face mask or shield
- Closely interacting with anyone who may be sick
- Performing a first aid task

Wash or sanitize your hands after:

- Removing exam gloves (care, cleaning, etc.)
- Touching any object of uncertain cleanliness
- Exiting a public building
- Taking off your face mask or shield
- Using a toilet, touching handles or fixtures in a restroom
- Interacting with anyone who does not live in your household or residence
- Coughing, sneezing, or after leaving the presence of a person who was coughing or sneezing

Table 2 - Basic Hand Washing

The Important Task of Washing your Hands



Precautions To Take When Sick

Flu-like symptoms are associated with several illnesses that infect the respiratory system and are spread by airborne respiratory droplets. Respiratory droplets can only travel through the air if their broadcast is unimpeded. During the COVID-19 pandemic emergency, it became the general recommendation for everyone to wear a non-medical mask (covering the mouth and nose) when in public, specifically to reduce the number of respiratory droplets anyone may broadcast. Even though some pathogens can be transmitted in aerosols generated while talking (as is the case with COVID-19), the microbial load will be at its highest within respiratory droplets produced by coughing and sneezing for all diseases that are airborne. If you have Flu-like symptoms and will be around others, the following measures are recommended:

- If others are near you when you need to cough or sneeze, turn your body away from them if possible
- Direct your cough or sneeze into the bend of your elbow or tissue (discard the tissue properly)
- Wash your hands after coughing or sneezing (as soon as possible)
- Avoid any direct contact with others, including hand holding, hand shaking, high-fives, hugs, etc.
- Maintain 6 feet or more distance from others whenever possible
- Consider wearing a non-medical face mask, especially if you are uncertain about your exact illness

The CDC advises that employees who arrive at work with Flu-like symptoms or those who become ill during the work day should be separated from other employees and sent home. The workstation and any equipment that may have been handled by the ill employee should be properly sanitized. If you know that you are sick with any contagious illness, even if you do not have significant symptoms, it is always recommended to stay at home until you are better or have been advised by a physician that you are no longer contagious. Your employer will provide you with specific information concerning sick leave policies and procedures that apply to your position. The CDC recommends that anyone with Flu-like symptoms or a fever that is 100 degrees Fahrenheit or higher (37.8 degrees Celsius or higher) should stay at home and avoid contact with others. When taking your temperature, follow the directions provided for the device you are using. Take your temperature before you take any fever reducing medications (such as ibuprofen or acetaminophen) to ensure an accurate result. You should wait a minimum of 24 hours after your temperature returns to normal and other symptoms subside before returning to work or other functions away from home.

Always consult with your physician if you are unsure if you have an illness or to obtain treatment for the symptoms you are experiencing. The Flu and a few other illnesses can be confirmed or ruled out at most doctor's offices. If you do have the Flu, you will be contagious for up to 5 days after the onset of symptoms. For other respiratory infections, you may be contagious for much longer. For example, if you have COVID-19 you may be advised to self-quarantine for at least 14 days after symptoms subside (or following possible exposure, even if asymptomatic).

Six Ways to Keep your Immune System Strong

- ✓ Get plenty of sleep (8-10 hours per night)
- ✓ Get regular exercise or try to be physically active every day
- ✓ Avoid stress and take care of your mental and emotional well being
- ✓ Avoid excess alcohol consumption and if a smoker, work on quitting
- ✓ Visit your physician regularly and keep up on all recommended vaccinations
- ✓ Eat healthy foods to take in nutrients needed for your immune system to function properly

FOR YOUR REVIEW

Summary

Microbes, such as bacteria, viruses, fungi, and parasites that cause disease are pathogens (germs). Pathogens can be present in blood, bodily fluids, the air, or contaminate surfaces. Some pathogens can be transferred by animal or insect bite or sting, or they may contaminate food or water and be ingested. Bloodborne diseases of primary concern are Hepatitis B and C virus and human immunodeficiency virus (HIV). Airborne diseases of concern include tuberculosis, chickenpox, measles, mumps, seasonal influenza, and COVID-19.

For disease transmission to occur, three conditions must be met. The pathogen must be present in adequate quantity to cause disease (microbial load). A person must be susceptible to the pathogen (without immunity). The pathogen must enter the body through an opening such as the eyes, nose, mouth, mucous membrane, skin cuts, abrasions, bites, needlestick, or contaminated puncture.

Regular thorough washing of your hands with standard soap and running water is an excellent way to avoid becoming infected with any pathogen. The CDC recommends that a person scrub their hands for at least 20 seconds with soap, followed by thorough rinsing and drying. Alcohol based hand sanitizers (containing 60% or more ethyl alcohol) are also recommended when hand washing with soap and water is not available or practical.

If you are ill with Flu-like symptoms or you know that you have a contagious disease, it is recommended that you stay home and avoid contact with others until advised by your physician that you are no longer contagious. If you have Flu-like symptoms and cannot avoid interacting with others, you should take steps to minimize the possibility of spreading your infection to others by impeding any broadcast of respiratory droplets and frequent hand washing. This is especially important if you do not know the nature of your illness. You should always consult with your physician about any illness you may have, including getting tested for the Flu if you have Flu-like symptoms. If your physician confirms that you have the Flu, they may advise that you avoid contact with others for up to 5 days from the onset of symptoms and at least 24 hours following your fever breaking. If you have another illness, your physician will provide you with an appropriate treatment plan and advise how long you may be contagious to others.

Key Terms

- Acquired immunity
 - Aerosol generating procedure
 - Airborne pathogens
 - Asymptomatic
 - Bloodborne pathogens
 - Disease susceptibility
 - Flu-like symptoms
 - Innate immunity
 - Pathogen
-

Chapter Two

Preventing Disease Transmission While At Work



Learning Outcomes

After reading this chapter and completing any related course work, you should be able to:

- Identify 5 disease prevention practices
- Describe the purpose of the OSHA protection standards
- Provide examples of personal equipment (PPE) available to responders
- Describe what is meant by standard precautions
- Explain the purpose of an exposure control plan
- Understand your facility's exposure control plan
- Demonstrate how to safely remove soiled medical exam gloves

Chapter Overview

- OSHA Protection Standards (pg 11)
- Disease Prevention Practices (pg 11)
- Standard Precautions and Personal Protective Equipment (pg 13)
- If An Exposure Occurs (pg 15)
- For Your Review (pg 16)

OSHA Protection Standards

Your job may have the potential for contact with blood or ***other potentially infectious material (OPIM)***. The federal ***Occupational Safety and Health Administration (OSHA)*** established regulations to protect employees from on-the-job exposure to bloodborne and airborne pathogens and other potentially infectious material. This includes reducing or removing hazards from your workplace that may place you in contact with infectious materials. The regulations that apply are known as:

- OSHA's ***Bloodborne Pathogens Standard*** 29 CFR 1910.1040
- OSHA ***Respiratory Protection Standard*** 29 CFR 1910.334
- Other federal, state, or local laws, executive orders, regulations, standards, or guidelines may also apply

If you have work duties or tasks with a potential for occupational exposure to blood and OPIM, or exposure to airborne pathogens, you must receive training to reduce or eliminate these hazards through protective measures. Training is required annually, or earlier if your job responsibilities, equipment or practices change.

OSHA's standards require that your employer protect you when you are doing your job. This includes:

- Identifying duties that you will perform that fall within the protection offered by the standards
- Establishing an exposure control plan that includes protective measures to follow to minimize the chance of disease transmission
- Seeking your input into engineering and work practice controls
- Offering access to the Hepatitis B vaccination
- Creating a system of record keeping that tracks required training and exposure incidents
- Creating protocols to follow in the event of an exposure incident
- Implementing a schedule for cleaning and decontaminating the workplace
- Implementing a system to identify and properly dispose of soiled material
- Ensuring confidentiality of your medical records and any exposure incidents

Disease Prevention Practices At Work

Disease prevention practices that are specifically used in the workplace, are made up of:

- Administrative controls, including:
 - Overall policies and procedures
 - Exposure control plan
- Engineering controls, including:
 - Hand and eyewash stations
 - Biohazard containers and equipment used to clean up a contaminated area
- Work practice controls, including:
 - Standard precautions
 - Personal protection equipment

The general recommendations presented in the first chapter, such as frequent hand washing and steps to take if you find that you are sick may also be incorporated into your workplace controls to prevent disease transmission.

Administrative Controls

Administrative controls designed to prevent or minimize occupational exposure to pathogens include the programs and policies that support and direct the overall disease prevention plan. For example, your facility will have regular maintenance and cleaning schedules as well as policies describing how specific areas or items are to be cleaned or sanitized. There are also policies and procedures for both identifying hazards and the steps to take to eliminate or minimize those hazards. Your facility's various employee safety training programs, vaccination program, and exposure control plan are other examples of administrative controls. Your organization will provide you with specific information that applies to your position and the tasks you may be asked to perform.

Engineering Controls

Efforts implemented to minimize disease transmission through workspace design or equipment use are known as **engineering controls**. Examples include self-sheathing needles, hand and eye washing stations, biohazard waste containers, sharps containers, and spill clean-up kits (**Figure 2.1**). When washing stations are not feasible, other options must be available, such as antiseptic hand sanitizers or eye irrigation bottles.

If you are cleaning up a spill mixed with sharp objects such as broken glass and needles, do not pick these up with your hands. Use a broom, dustpan or cardboard to properly remove the broken glass and deposit it in the proper container (**Figures 2.2**). Use a disinfectant to clean the surface of any remaining blood. If you must make a disinfectant, prepare a mixture of 1 part bleach to 9 parts water. Flood the area and allow it to stand for approximately 15 minutes. Wipe up the remaining solution and dispose of it in a labeled biohazard container. Your facility may have designated disinfectants and cleaning agents to use for various tasks and situations, including biohazard clean up.



Figure 2.1 Engineering controls involve workplace design and equipment to minimize the chances for disease transmission.



Figure 2.2a Deposit sharp objects such as broken glass and needles in puncture proof containers.



Figure 2.2b Deposit all soiled materials in properly labeled biohazard bags.

Work Practice Controls

Behaviors (practices) that are required to implement engineering controls are known as **work practice controls**. Properly using washing stations, sharps containers, and waste containers are examples of work practice controls. Specific work practice controls include protocols that:

- Provide steps for removing soiled medical exam gloves (**Table 2**)
- Provide steps for cleaning up sharp items and contaminated spills
- Require hands to be immediately washed after removing soiled medical exam gloves
- Require that you clean and disinfect equipment and surfaces if soiled

Standard Precautions and Personal Protective Equipment

Standard precautions are standardized safety measures that assume that all bodily fluids may be infectious, so precautions must always be taken. Standard precautions can be applied to engineering and work practice controls and specifically require the use of appropriate **personal protective equipment (PPE)**.

PPE will be available to you so that you can safely perform your job as a responder (**Figure 2.3**). PPE prevents blood, OPIM, and, when appropriate, airborne pathogens from coming into contact with your exposed skin, body openings, or mucous membranes.



Figure 2.3 Personal protective equipment (PPE) is provided to keep you safe when providing care.

PPE that you may be provided with, depending on your job and assigned duties, may include:

- Breathing devices
- Face masks
- Suction devices
- Gowns
- Medical exam gloves
- Eye protection

If you have cleaning or other responsibilities, you may be provided with additional or different PPE that has been determined to be appropriate for these tasks. PPE designed to prevent or reduced the likelihood of physical harm may also be provided to you when other work related hazards are identified by your employer. As with the training you are receiving designed to help prevent disease transmission, any other training on how to properly use other protective PPE will be provided to you if applicable and appropriate.

Guidelines for using PPE to prevent infection include:

- Follow standard precautions when using PPE - assume all body fluids are potentially infectious
- If wearing soiled gloves, avoid handling items or equipment such as radios and never eat or drink
- Never touch unprotected body parts, especially your mouth, nose, or eyes while performing your tasks
- Change gloves before providing care to additional individuals or performing the next task
- Wear protective coverings to protect from infectious droplets or blood splatter from serious bleeding
- If your PPE becomes excessively soiled or damaged, safely remove and put on fresh PPE as soon as possible

Table 2 Proper Glove Removal



1. Pinch the outside of the glove near the wrist.



2. Peel downward and the glove will turn inside out. Secure this glove in your gloved hand.



3. Slide your finger(s) under the wrist of the remaining glove.



4. Peel downward and the glove will turn inside out over top the first glove. Dispose properly.

Thoroughly wash your hands after removing and properly disposing your gloves*

- Wet hands and rinse away any loose dirt or other substances
- Apply enough soap to produce a lather on your hands, covering your fingers, fingernails, palms, and wrists
- Thoroughly scrub your hands for at least 20 seconds, being sure to cover all surfaces
- Rinse hands thoroughly under clean running water, removing all soap and residual substances
- Dry your hands thoroughly with a single use, clean towel and properly discard

**Use an alcohol based hand sanitizer (60% or more ethyl alcohol) if you are unable to wash your hands with soap and water.*

About Gloves

Regardless of the type of medical exam gloves you use (non-latex or latex), none have been found to be impermeable to bacteria and viruses. And all gloves have the potential to fail (tear). This is why hand washing immediately after glove removal is recommended. Because of increased concerns of latex allergies, you are most likely to have non-latex gloves available for use as PPE. This protects both the employee and any individuals with whom they may come into contact.

If An Exposure Occurs

Disease prevention strategies are designed to minimize the likelihood of an exposure while you are on the job. If you suffer an **occupational exposure**, follow the guidelines below for immediate care and report the incident according to your facility's **exposure control plan** (Figure 2.4).

If you suffer an exposure, immediately take the following steps:

1. Clean the contaminated area, including any penetrating injuries involving cuts or punctures thoroughly with soap and water
2. If you are splashed with blood or OPIM around or in your mouth, nose, or eyes, flush the area thoroughly with water
3. Report the exposure incident to your supervisor immediately and to the EMS personnel if they are arriving to take over care of the guest
4. Document with your supervisor what happened. Include the time, date, and circumstances of the exposure as well the immediate actions taken post exposure
5. Seek immediate follow-up care with a qualified health care professional according to your facility's exposure control plan. The evaluation will determine the best course of treatment



Figure 2.4 Facilities are required to create exposure control plans specific to their needs.

Exposure Control Plan

Your facility is responsible for maintaining an exposure control plan. This written plan outlines protective measures used at your facility to eliminate or minimize exposure incidents. If an exposure does occur, the exposure control plan states how to report the exposure and what to do next. The plan also details how your employer will maintain records according to OSHA requirements (Figure 2.5).

See **Appendix A** for a sample exposure control plan.



Figure 2.5 If you suffer an exposure, report it to your supervisor who will instruct you according to the facility's exposure control plan.

FOR YOUR REVIEW

Summary

The federal Occupational Safety and Health Administration (OSHA) established regulations to protect employees from on-the-job dangers in a variety of areas. Included among these dangers is the potential for certain jobs, positions, or tasks to have an occupational exposure to pathogens which may be bloodborne, airborne, or come from other potentially infectious material (OPIM). The OSHA regulations require your employer to protect you when you are doing your job.

Administrative controls include the programs and policies that support and direct the overall disease prevention plan. Employee safety training programs, cleaning schedules, and vaccination program are examples of administrative controls.

Engineering controls are efforts implemented to minimize disease transmission through workspace design or equipment use. Installing emergency eye wash stations and having sinks available with soap and running water for hand washing are examples of engineering controls.

Work practice controls are behaviors (practices) that are required to implement engineering controls. Standard precautions are standardized safety measures that assume that all bodily fluids may be infectious, so precautions must always be taken. Personal protective equipment (PPE) may include items, such as gloves, masks, eye protection, gowns, suction devices, and rescue breathing devices. Different or additional PPE may be appropriate as well. The PPE you are provided will depend on the task assigned and the level of protection the task requires. If you are provided PPE to use or wear while performing a task, you should do so, in accordance with your site specific training.

Even with the best workplace controls and precautions, exposure to pathogens while working remains possible. With this in mind, it is important to understand your organization's exposure control plan. If you suffer an occupational exposure, follow your exposure control plan for reporting the incident to your supervisor and follow-up (post exposure) evaluation. Your employer is required to provide you with a written exposure control plan. This plan outlines the protective measures that will be used at your facility to minimize or eliminate exposure incidents as well as what to do if an exposure occurs.

Key Terms

- Bloodborne pathogens standard
 - Engineering controls
 - Exposure control plan
 - Occupational exposure
 - Occupational Safety and Health Administration (OSHA)
 - Other potentially infectious material (OPIM)
 - Pathogen
 - Personal protective equipment (PPE)
 - Standard precautions
 - Work practice controls
-

Appendix A

SAMPLE BLOODBORNE PATHOGENS EXPOSURE CONTROL PLAN (ECP) FOR EMPLOYEES OF _____ Effective Date: _____

The management of _____ is committed to preventing incidents which result in employee injury and illness, and to comply with the OSHA Bloodborne Pathogens Standard 1910.1030. Through this written exposure control plan, we share assigned responsibility and hereby adopt this plan as an element of our program provided for safety of our employees. A copy of this plan is available to all employees.

A. Purpose

The purpose of this exposure control plan is to:

1. Eliminate or minimize employee occupational exposure to blood or other potentially infectious materials (OPIM) including all body fluids.
2. Identify employees occupationally exposed to blood or OPIM in the performance of their regular job duties.
3. Provide employees with educational and operational material and training relative to blood and OPIM.
4. Comply with the OSHA Bloodborne Pathogens Standard.

B. Exposure Determination

_____ has performed an exposure determination for all common job classifications that may be reasonably anticipated to incur occupational exposure to blood or OPIM at this facility. This exposure determination is made without regard to the use of personal protective equipment (PPE). The following job classifications may be reasonably anticipated to incur occupational exposures to blood or OPIM:

C. Implementation Schedule and Methodology

1. Standard Precautions

_____ embraces "standard precautions," a defined method of infection control that requires the employer and employee to assume that all human blood and specified human body fluids are infected with bloodborne pathogens. Where it's difficult or impossible to identify body fluids, all are to be considered potentially infectious.

2. Engineering and work practice controls

The following engineering and work practice controls will be used by all employees to eliminate or minimize occupational exposures at this facility:

- a) Contaminated disposable sharps will be disposed of in an appropriate “sharps” container.
 - b) Any contaminated materials (i.e. towels, uniforms, paper products, re-usable equipment) will be disposed of appropriately for appropriate cleaning or in a red biohazard bag for regulated waste.
 - c) Employees will wash hands with soap and water or alcohol wipe disinfectants after contact with any blood or OPIM.
 - d) Flush eyes and mucous membranes immediately after potential contamination with blood or OPIM.
 - e) Clean surfaces with an appropriate disinfectant if contaminated.
 - f) Utilize personal protective equipment (PPE) that is provided in all trauma bags and located _____
_____:
- Gloves – hypoallergenic gloves are used when providing emergency care, handling any items contaminated with blood or OPIM, or when cleaning surfaces contaminated with blood or OPIM.
 - Goggles – used for eye protection when providing emergency care or cleaning up spills that have potential for splashing.
 - Resuscitation Masks – used when providing emergency care.
- _____ are responsible for training employees and issuing of appropriate, readily accessible PPE without cost to employees.

3. Housekeeping

Work surfaces shall be cleaned and appropriately decontaminated with an appropriate disinfectant in the following instances:

- a) When surfaces are overtly contaminated.
- b) Immediately when blood or OPIM is spilled.

4. Contaminated laundry

- a) Laundry that is or may be soiled with blood or OPIM shall be treated as if it were contaminated.
- b) The _____ will ensure that all contaminated laundry is cleaned and laundered in such a way that any bloodborne pathogens present are inactivated or destroyed. If this is not possible then items will be disposed of appropriately.
- c) The _____ shall ensure that all employees use PPE while handling contaminated laundry.
- d) Contaminated laundry will be placed and transported in bags as appropriate.

5. Regulated Waste

- a) Regulated waste that is being disposed of shall be placed in closable, leakproof containers or bags that are labeled or color-coded. If outside contamination is likely to occur, a second leakproof container or bag that is closable and labeled or color-coded shall be placed over the outside of the first bag and closed to prevent leakage during handling, storage, and transport.
- b) Contaminated sharps, regardless of where they were used or found, shall be placed in closable, leakproof, puncture-resistant, disposable containers that are labeled or color-coded. These containers shall be located in the immediate area of use or where sharps are likely to be found.

6. Hepatitis B Vaccine

_____ will offer the Hepatitis B vaccination series at no cost to employees who may be reasonably anticipated to have the potential for occupational exposure. _____ are responsible for the Hepatitis B vaccination program. All medical evaluations and procedures shall be performed at _____ located close to the facility in which the employees work. _____ shall make the following available to those employees that have been determined to be at risk:

- a) Hepatitis B vaccination
- b) HBV antibody testing if desired

Participation in pre-screening is not a prerequisite. If an employee declines vaccination, a waiver statement is signed. If in the future the employee desires the vaccination it will be provided at no charge.

7. Post-Exposure Evaluation/Follow-up

If an employee has an exposure incident, it is to be reported to _____.

_____ will offer post-exposure follow-up at no cost to exposed employees.

_____ shall provide the exposed employee with an opportunity to have a confidential medical evaluation and follow-up subsequent to a reported occupational exposure incident to blood or OPIM. This process includes:

- a) Documentation of an exposure incident.
- b) Identification and documentation of the individuals involved in the incident unless infeasible or prohibited by law.
- c) Collection & testing of blood for HBV and HIV serological status that include both of the following:
 - The exposed employee's blood shall be collected as soon as feasible and tested after consent is obtained.
 - If the exposed employee consents to baseline blood collection, but not to HIV testing, the sample shall be preserved for not less than 90 days. If within 90 days the employee elects to have the baseline sample tested, such testing shall be done as soon as feasible.
- d) Post exposure prophylaxis provided when medically indicated, as recommended by the US Public Health Service.
- e) Counseling on risk reduction and the risks & benefits of HIV testing.
- f) _____ shall ensure that the health care professional who is responsible for the vaccination is provided with a copy of the process described above as well as the:
 - Description of the affected employee's duties
 - Documentation of circumstances leading to the exposure
 - Results of the source individual's blood testing
 - Medical records relevant to the treatment of the exposed employee.
 - Description of the PPE used or what should have been used.

g) _____ shall provide the employee with a copy of the evaluating health care professional's written opinion within 15 working days of the completion of the evaluation. This report is limited to:

- The health care professional's recommended limitations upon the employee's use of personal protective clothing or equipment.
- If the Hepatitis B Vaccine is indicated and if the employee has received the vaccine.

- A statement that the employee has been informed of the results of the medical evaluation and that the employee has been told about any medical conditions which have resulted from the exposure that require further evaluation or treatment. The written opinion shall not reveal specific findings or diagnoses that are unrelated to the employee's ability to wear protective clothing, use protective equipment, and receive vaccinations. Such findings and diagnoses shall remain confidential.

8. Labels & Signs

_____ shall ensure that biohazard labels are on each container of regulated waste. The labels shall be fluorescent orange or orange-red, and include the universal biohazard symbol. Red bags or containers with the universal biohazard symbol may be substituted for labels. Regulated waste disposal must be handled in accordance with the regulations of the local Health Department.

9. Training

_____ shall ensure that training is provided prior to the initial assignment where tasks could present occupational exposure to blood or OPIM. Training shall be repeated every 12 months, or when there are any changes to tasks, PPE, or procedures affecting an employee's occupational exposure. Training shall be tailored to the education level and language of the affected employees. Training shall be through traditional classroom-based instruction or blended learning instruction and include the following:

- a) Overview of the OSHA Bloodborne Pathogen Standard.
- b) Epidemiology (Incidence and control) and signs/symptoms of bloodborne diseases.
- c) Modes of transmission of bloodborne pathogens.
- d) Description of tasks that may involve exposure.
- e) Explanation of the use and limitations of the methods used at the facility to reduce exposure.
 - Engineering controls
 - Work practice controls
 - Personal protective equipment
- f) information about the types, use, location, removal, handling, decontamination, and disposal of personal protective equipment.
- g) Explanation of how the personal protective equipment was selected.
- h) Information about the Hepatitis B vaccination (including efficacy, safety, method of administration, and benefits), as well as an explanation that the vaccination will be provided at no charge to the employee
- i) Explanation of the procedures to follow if an exposure incident occurs, including the method of reporting and medical follow up
- j) Information on the post-incident evaluation and follow up required for all exposure incidents

10. Record keeping

- a) **Medical Records** - Medical records shall be retained by _____ in its' employee files in accordance with 29 CFR 1910.1030. All records shall be kept confidential and shall be retained from the first day of employment plus 30 years.
- b) _____ shall ensure that all contracts with _____ for Hepatitis B vaccinations and post-exposure evaluations and follow ups stipulate OSHA record keeping and retention requirements.

c) To comply with OSHA requirements all medical records shall include:

- Employee name
- Social security number
- Copy of the employee's HBV vaccination status, including the dates of the vaccination
- Copy of all results of examinations, medical testing, and follow-up procedures
- Copy of the information provided to the healthcare professional, including a description of the employee's duties as they relate to an exposure incident, and documentation of the routes and circumstance of an exposure.

d) **Training Records** - Training records shall be retained by _____ in its' employee files for three years from the date of training and shall include:

- Dates of the training sessions.
- Outline describing the material presented.
- Name and qualification of person(s) conducting the training.
- Names and job titles of those attending the training sessions.

e) **Availability of Records** – If an employee requests access to his or her personal medical or training records _____ shall provide such access in a reasonable time, place, and manner in accordance with 29 CFR 1910.1030.

f) **Transfer of Records** - If _____ ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the _____ shall contact the Director of the National Institute for Occupational Safety and Health (NIOSH) prior to cessation of business for instruction on the final disposition of the records.

g) _____ shall review this Bloodborne Exposure Control Plan for effectiveness annually, or sooner if needed to incorporate changes to the standard or changes in the workplace.

By signing below, I acknowledge that I have read and understand the Employee Control Plan provided by _____.

Print First Name

Print Last Name

Signature

Date

Facility

HEPATITIS B VACCINE STATEMENT

___ ATTESTMENT STATEMENT:

I have already received the Hepatitis B Vaccine Series.

Date of vaccine (if known): _____

___ DECLINATION STATEMENT:

I understand that due to my occupational exposure to blood or other potentially infectious materials (OPIM) I may be at risk of acquiring Hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with the Hepatitis B vaccine, at no charge to myself. However, I decline the Hepatitis vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or OPIM and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

___ ACCEPTANCE STATEMENT:

I understand that due to my potential occupational exposure to blood or other potentially infectious materials (OPIM), I may be at risk of acquiring hepatitis B virus (HBV) infection. I accept this opportunity to receive the HBV vaccine series. If you choose to obtain the vaccination you will be given the opportunity to discuss the benefits and potential side effects of the vaccine with a Licensed Health Care Professional. Vaccination is at no charge to you and done at a time that is convenient for you.

Employee's Printed Name

Employee's Signature

Date

If declining the vaccine, the statement should be witnessed:

Witness Printed Name

Witness Signature

Date