



INFECTION CONTROL
CEU COURSEWORK
1 CEU

OBJECTIVE

Healthcare workers are required to participate in an annual training on infection prevention and control. At the end of this study guide participants will be able to:

1. Understand modes of transmission of bacteria and infections
2. Understand universal precautions
3. Practice proper hand washing techniques
4. Take action to prevention of the spread of disease in your workplace

TABLE OF CONTENTS

1. Introduction
2. Infectious Disease
3. Routes of Transmission
4. Bloodborne Diseases
5. Airborne Diseases
6. Droplet Precautions
7. Contact Precautions
8. Airborne Precautions
9. Safeguarding the Workplace
10. Hand Washing
11. Summary

1: INTRODUCTION

Infection prevention and control is essential to providing a quality and safe working environment for clients and for those that work in healthcare settings. Infection control also refers to the policies and procedures developed by an organization to minimize the risk of spreading infections and communicable diseases. Every health care worker plays a vital part in helping to minimize the risk of workplace infection. By applying standard precautions to all clients, then the risk of infection is minimized. Staff communication, managing accidents, and staff training/education are all important for infection prevention and control.

Please note that this manual contains basic infection control guidelines that are applicable to most workplace settings. Your organization may have additional guidelines and policies to follow specific to your work environment. Please consult with your designated representative before implementing any of the suggested infection control policies.

2: INFECTIOUS DISEASE

What is an Infectious Disease?

Infectious diseases are collectively a leading cause of death in the United States and around the world. From rare tropical variants to the common cold, infectious diseases are usually transmitted through being in contact with or near unsanitary conditions. Generally speaking, infectious disease is much more common in countries that do not have high quality medical care and do not offer sufficient educational resources about the transmission of disease.

Biological Causes

Infectious diseases are caused by microorganisms - those that we cannot see with the naked eye. These organisms attack the body and without treatment can kill the human host. Infectious diseases are not only caused by viruses, but they can also be caused by parasites, bacteria or a fungus. While most of these organisms in our body are benign and actually quite helpful, some can be serious and even life-threatening.

Symptoms

The wide scope of infectious diseases means that symptoms can range from relatively mild to extremely virulent. Additionally, some infections are rare and may not have current forms of treatment developed to fight them. Infectious disease can range from flu to HIV and the symptoms that a person will experience can be as mild as a cold or deadly.

Modern society has developed ways of fighting most infectious diseases. Prevention is key, through vaccination and/or proper hygiene. Those who have contracted the disease can be treated quickly and effectively with antibiotics, antifungals or antivirals.

The few major infectious diseases that we have not been able to treat effectively are subject to a great deal of research and testing to find an appropriate treatment programs.

Transmission

Infectious diseases are transmitted from person to person and sometimes between animals and people. The transmission can occur through various forms, including blood to blood contact, bodily fluid contact and through casual contact depending on the organism and how it responds outside the host. Transmission can either be quite difficult or very easy. The infectious diseases transmitted through air, water and casual contact can be transmitted the most quickly, while those that are transmitted through bodily fluid or blood to blood contact tend to spread more slowly.

3: ROUTES OF TRANSMISSION

Transmission of infectious agents within a healthcare setting requires three elements:

- a) A source of infectious agents
- b) A susceptible host with a portal of entry receptive to the agent
- c) A mode of transmission for the agent.

Contact

Infections spread by direct or indirect contact with patients or the patient-care environment (e.g., Herpes Simplex Virus, MRSA, Scabies/Lice, Pink eye, Respiratory illness). Direct contact is skin to skin contact. Indirect contact occurs through touching contaminated surfaces such as doorknobs, sink faucets or soiled linens. This is the most frequent mode of transmission in the healthcare setting.

Droplet

Infections spread by large droplets generated by coughs, sneezes, talking, etc. (e.g., influenza, pneumonia, whooping cough). They can be propelled a short distance before settling quickly onto a surface. They can cause infection by being deposited directly onto a susceptible person's mucosal surface (e.g., eyes, mouth, nose, or breaks in skin) or onto nearby environmental surfaces, which can then be touched by a susceptible person who infects themselves.

Airborne

Infections that occur when bacteria or viruses travel on dust particles or on small respiratory droplets when people sneeze, cough, laugh, or exhale. They can remain infectious while suspended in the air (e.g., TB, chicken pox, measles). These germs may be inhaled by susceptible individuals who have not had face-to-face contact with an infected person.

4: BLOODBORNE DISEASES: HIV/AIDS, HEPATITIS B, HEPATITIS C

The Centers for Disease Control and Prevention (CDC) estimates that 5.6 million workers in the health care industry and related occupations are at risk of occupational exposure to bloodborne pathogens, including Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), Hepatitis C Virus (HCV), and others. All occupational exposure to blood or other potentially infectious materials (OPIM) place workers at risk for infection with bloodborne pathogens. (*OSHA.gov*)

The Occupational Safety and Health Administration (OSHA) defines **Blood** as human blood, human blood components and products made from human blood. OSHA defines **Bloodborne Pathogens** as pathogenic microorganisms that are present in human blood and can cause disease in humans.

According to the Occupational Safety and Health Administration (OSHA), **Other Potentially Infectious Materials (OPIM)** includes the following:

- Semen
- Saliva in dental procedures
- Vaginal secretions

- Any body fluid visibly contaminated with blood
- Cerebrospinal fluid
- Fluids where it is difficult to differentiate the fluid
- Pleural fluid
- Amniotic fluid
- Pericardial fluid

According to the Red Cross; Bloodborne pathogens, such as bacteria and viruses, are present in blood and body fluids and can cause disease in humans. Bloodborne pathogens can be spread through direct contact, indirect contact, respiratory, and vector-borne transmission. Some infections that can be transmitted through contact with blood and body fluids include HIV, Hepatitis B, C, Staph and Strep infections, Pneumonia, TB, Syphilis, Measles, Chicken Pox, and Herpes. (Red Cross, 2011)

According to the Red Cross, bloodborne pathogens are spread through:

- Direct contact - caused by infected blood or body fluid from one person enters another person's body at a correct entry site, such as infected blood splashing in the eye.
- Indirect contact - such as when a person's skin touches an object that contains the blood or body fluid of an infected person, such as picking up soiled dressings contaminated with an infected person's blood or body fluid.
- Respiratory droplet transmission - a person inhales droplets from an infected person, such as through a cough or sneeze.
- Vector-borne transmission - A person's skin is penetrated by an infectious source, such as an insect bite.

Blood is the single most important source of exposure to HBV, HCV, and HIV in healthcare settings. Exposures by needlesticks and punctures or cuts with other sharp objects are most frequently sustained by those occupational groups that handle sharps.

Hepatitis B Virus

Hepatitis B is a virus that infects the liver and over time can damage the liver. It is spread by blood and body fluids of an infected person. Hepatitis B is found in semen and vaginal secretions. The virus can be transmitted during unprotected sexual intercourse and from mother to infant during birth. Saliva of people with Hepatitis B can contain the Hepatitis B virus, but in very low concentrations compared with blood. Punctures of the skin with blood-contaminated needles, lancets, scalpels, or other sharps can transmit Hepatitis B. Also, splashes to skin bearing minute scratches, abrasions, burns, or even minor rashes, splashes to mucous membranes in the mouth, nose, or eyes can transmit Hepatitis B. Hepatitis B is not transmitted by casual contact. For example, hospital employees who have no contact with blood, blood products, or blood-contaminated fluids are at no greater risk than the general public. However, the virus can spread through intimate contact with carriers in a household setting. Why this happens is not completely understood. Somehow, the virus can find its way into the bloodstream of fellow family members possibly because of frequent physical contact with the small cuts or skin rashes. The virus can also spread through biting and possibly by the sharing of toothbrushes or razors. The virus is not spread through sneezing, coughing, hand holding, hugging, breastfeeding, sharing eating

utensils, water or food. The virus can survive outside the body for at least 7 days and still able to cause infection. (Canadian Center for Occupational Health and Safety (CCOHS), 1997)

In mild cases, the signs and symptoms are those of a minor infection. In severe cases, they are extreme reactions resulting from liver failure. The extent of the illness depends on the original size of the dose of the virus, the route of exposure, and the specific response of the infected individual.

More than half of Hepatitis B infections occur and pass without noticeable symptoms. Sometimes, only mild symptoms such as a general discomfort occur. Rarely is medical attention needed. Often, the infection disappears without treatment. In fact, laboratory testing is often the only way of determining whether someone has had Hepatitis B.

When symptoms develop, the earliest ones often include a general discomfort, joint pain, abdominal pain, fatigue, lack of appetite, skin rash or possibly nausea, vomiting or other flu-like symptoms.

In relatively few cases, these symptoms are followed by jaundice causing skin and white of eyes to yellow and urine to darken--typical signs of a malfunctioning liver. An accumulation of a waste product, called bilirubin, in the blood causes this yellowish color. Jaundice and other symptoms usually subside gradually within 3 to 4 weeks and most patients fully recover, becoming immune in the process.

People with serious cases of Hepatitis B require hospitalization. A very small proportion of these patients develop a critical form of the disease called "Fulminant" Hepatitis B. This condition results from a sudden breakdown of liver function. Fulminant Hepatitis B is extremely serious. Over half of the victims of fulminant Hepatitis B die from the disease. (CCOHS, 1997)

Hepatitis C Virus

Hepatitis C is an infectious liver disease caused by the Hepatitis C Virus (HCV). Infections of Hepatitis C occur only if the virus is able to enter the blood stream and reach the liver.

For reasons that are not completely understood, about half of all people who develop Hepatitis C never fully recover and can carry the virus for the rest of their lives. These people have chronic Hepatitis C, and some may eventually develop cirrhosis of the liver and liver failure. (CCOHS, 1997)

The symptoms of Hepatitis C infection include fever, nausea and vomiting, loss of appetite, stomach pain, extreme fatigue, and yellowing of the skin and eyes (jaundice).

Some people who are infected with Hepatitis C virus have no symptoms and can infect others without knowing it. These persons are at risk of becoming ill at some time in the future. It has been estimated that it may take up to 10 years to develop symptoms.

The Hepatitis C virus is spread primarily by exposure to blood. Some people who get Hepatitis C do not know how they were infected with the virus.

People may get Hepatitis C by sharing needles to inject drugs, through exposure to blood in the workplace, from unsterile equipment used for body piercing, tattoos or acupuncture, exposure to dental or medical practices with poor infection control practices or by sharing personal care items

including nail clippers, razors, and scissors with infected people. The risk of getting this virus from a blood transfusion is minimal but still exists. All donated blood is now screened for the Hepatitis C virus.

Hepatitis C has been transmitted between sex partners and among household members. However, the degree of this risk still needs to be accurately defined. An infected mother can pass HCV to her child at birth.

There is no evidence that Hepatitis C virus is spread by casual contact. Sneezing, coughing and hugging do not pose the risk for Hepatitis C. In addition, there is no evidence that Hepatitis C virus is spread by food or water. (CCOHS, 1997)

There is currently no vaccine for Hepatitis C. The risk of Hepatitis C can be significantly reduced by implementing infection control guidelines suitable for the specific workplace.

Human Immunodeficiency Virus (HIV)

The Human Immunodeficiency Virus (HIV) is a virus that infects the immune system. Acquired Immune Deficiency Syndrome (AIDS) is the most advanced stage of the HIV infection. HIV causes the immune system to become vulnerable to other infections. There is presently no cure or vaccine for HIV. It takes, on average, 10 years for the initial HIV infection to progress to AIDS. (CCOHS 1997)

HIV can pass from one person to another in the following ways:

- By unprotected sexual intercourse with infected persons
- By using contaminated needles
- Via transfusion of infected blood or blood products
- From an infected mother to her infant before or during birth
- Via organ transplant from an infected donor

HIV is not found in vomit, feces, nasal secretions, tears or urine unless these fluids are visibly contaminated with blood.

All workers who are in contact with contaminated blood or other body fluids are at risk. Exposure to HIV in the workplace occurs through:

- skin and mucous membrane contact with blood and other body fluids of an infected person
- accidents with needles or other sharp instruments contaminated with the blood of an infected person (CCOHS, 1997)

5: AIRBORNE DISEASES

According to OSHA, airborne transmission occurs through very small particles or droplet nuclei that contain infectious agents and can remain suspended in air for extended periods of time. When they are inhaled by a susceptible individual, they enter the respiratory tract and can cause infection. Since air currents can disperse these particles or droplet nuclei over long distances, airborne transmission does not require face-to-face contact with an infected individual. Airborne transmission only occurs with infectious agents that are capable of surviving and retaining infectivity for relatively long periods of time in airborne particles or droplet nuclei. Only a limited number of diseases are transmissible via the airborne route. Two examples of airborne transmissible agents include *Mycobacterium tuberculosis* which causes tuberculosis (TB) and the rubella virus which causes measles. (OSHA.gov)

Some examples of airborne diseases include:

- Tuberculosis
- Chicken-pox
- Measles
- Shingles in a person whose immune system is weak
- There are many ways to protect staff and other patients from airborne diseases.
- Patients who have airborne diseases will be discharged and/or transferred to another facility until there are free from the airborne disease.
- Staff will be notified of any airborne diseases to ensure proper care is given to individual.

Tuberculosis

According to the CDC, TB is a contagious and potentially life-threatening infectious disease caused by a bacterium called *Mycobacterium tuberculosis*. The TB bacteria are spread from person to person through the air. People with TB disease of the lungs or larynx release the bacteria into the surrounding area when they cough, sneeze, talk, or otherwise expel air, dispersing droplets that contain *M. tuberculosis*. These droplets can dry into tiny particles called droplet nuclei that remain suspended in air for long periods of time. Other people can breathe the infectious particles into their lungs and become infected. Infection usually requires prolonged sharing of airspace with a person actively spreading TB bacteria into the area. The risk of developing active TB disease is greatest in the first few years after infection, but some risk remains throughout life. TB is preventable and, in most cases, treatable. (CDC, 2012)

People with active TB disease feel tired and weak. They cough constantly, sometimes bringing up blood. They also suffer chest pain, night sweats, fever, and fatigue. They have no appetite, and lose weight. Many people become short of breath. Among older people, males typically experience worse symptoms than females. The incubation period for TB infection is about 4 to 12 weeks, after which a skin test will show positive or, in some cases, a lesion will appear on a Chest X-ray. (Worksafe BC)

http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/bk129.pdf

6: DROPLET PRECAUTIONS

Droplet transmission can spread diseases when a person coughs, sneezes or through talking. The droplets travel about 3-6 feet before drying out or falling onto a surface. These droplets can be deposited on the host's nasal mucosa, conjunctivae or mouth.

Examples of conditions transmitted through droplets include:

- Bronchiolitis
- Meningitis
- Pneumonia
- Viral infections including influenza, mumps and rubella

Droplet precautions include hand washing to keep everyone's hands clean and to avoid spreading germs through touching other people or objects in the patient's room, such as door knobs, light switches, or patient care equipment. Wearing a surgical mask when working with the client to protect yourself as well to keep droplets from getting into the nose or mouth.

7: CONTACT PRECAUTIONS

Contact precautions apply to clients with any of the following conditions:

- Presence of stool incontinence, draining wounds, uncontrolled secretions, pressure ulcers, or bags/tubes draining fluids, or presence of a rash.

Wear gloves if touching the patient or patient belongings/immediate environment. Wear a gown if substantial contact with client or their environment is anticipated. Make sure to perform proper hand hygiene, disinfect room accordingly and instruct client to use separate bathroom if available and client has infectious diarrhea.

8: AIRBORNE PRECAUTIONS

Airborne precautions applies clients with known or suspected infection that include but not limited to the following infections:

- Tuberculosis
- Measles
- Chickenpox (until lesions are crusted over)

Airborne Precautions are intended to prevent transmission of infectious agents that remain infectious over long distances when suspended in the air. In addition to Standard Precautions, Airborne precautions require respiratory protection, wear a fit-tested NIOSH-approved N95 or higher level respirator for protection when entering the room or home of a patient who is suspected or confirmed to have an airborne disease. If available, place patient in an isolation room, try to have them enter a separate entrance to avoid reception area. Provide a surgical face mask for client to place on themselves. Initiate protocol to transfer client to healthcare facility that can properly manage client. Once client leaves area, the room should remain vacant for at least one hour before anyone enters.

9: SAFEGUARDING THE WORKPLACE—STANDARD PRECAUTIONS

The CDC recommends Standard Precautions (formerly known as Universal Precautions) for the care of all patients, regardless of their diagnosis or presumed infection status. Always follow Standard Precautions because you cannot tell by looking at a person whether they have a contagious disease or not.

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) non-intact skin
- 4) mucous membranes.

Standard precautions are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infection in hospitals. Standard precautions include the use of: hand washing, appropriate personal protective equipment such as gloves, gowns, masks, whenever touching or exposure to patients' body fluids is anticipated. (CDC.gov)

Infection Control Measures to consider include:

- Early recognition and reporting any signs of infection to your supervisor
- Use hand washing guidelines
- PPE: use personal protective equipment (gloves, gowns, masks, goggles/eye protection)
- Cleaning and disinfection of your environment and equipment as well as patient environment
- Disposing of sharps in puncture-resistant, leak-proof, labeled containers
- Avoid touching eyes, nose or mouth
- Cover your nose/mouth with a tissue when you sneeze
- Cough/sneeze into your sleeve if you do not have a tissue
- Always clean your hands after you cough or sneeze

According to the CDC, when evaluating occupational exposures to fluids that might contain hepatitis B virus (HBV), hepatitis C virus (HCV), or human immunodeficiency virus (HIV), health care workers should consider that all **blood**, body fluids, secretions, and excretions except **sweat**, may contain transmissible infectious agents. (CDC.gov)

Personal Protective Equipment



The CDC states that, Personal Protective Equipment (PPE) refers to wearable equipment that is intended to protect HCP from exposure to or contact with infectious agents. Examples include gloves, gowns, face masks, respirators, goggles and face shields. The selection of PPE is based on the nature of the patient interaction and potential for exposure to blood, body fluids or infectious agents. Examples of appropriate use of PPE for adherence to Standard Precautions include: use of gloves in situations involving possible contact with blood or body fluids, mucous membranes, non-intact skin or potentially infectious material; use of a gown to protect skin and clothing during

procedures or activities where contact with blood or body fluids is anticipated; use of mouth, nose and eye protection during procedures that are likely to generate splashes or sprays of blood or other body fluids. Hand hygiene is always the final step after removing and disposing of PPE. (CDC.gov)

Environmental cleaning

Complete guidance for the cleaning and disinfection of environmental surfaces, including for cleaning blood or body substance spills, is available in the Guidelines for Environmental Infection Control in Health-Care Facilities available at:

http://www.cdc.gov/hicpac/pdf/guidelines/eic_in_HCF_03.pdf) and the Guideline for Disinfection and Sterilization in Healthcare Facilities (available at: http://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf)

The CDC guide to Cleaning Spills of Blood and Body Substances as follows:

- Wear protective gloves and use appropriate PPE (e.g., use forceps to pick up any sharps and discard in sharps container).
- If the spill contains large amounts of blood or body fluids (e.g., >10 mL), clean the visible matter with disposable absorbent material and discard in appropriate containers for biohazardous waste.
- Decontaminate the area using an EPA-registered disinfectant with specific label claims for bloodborne pathogens (e.g., HIV, HBV, HCV) or a freshly diluted bleach-based product (preferably EPA-registered), in accordance with manufacturer's instructions, and allow the surface to dry.
- If a bleach-based product is used:
 - Use a 1:100 dilution to decontaminate nonporous surfaces
 - If the spill involves large amounts of blood or body fluids, use a 1:10 dilution for first application of germicide *before cleaning*, then followed by cleaning and subsequent decontamination with 1:100 dilution application (CDC, 2011)

The CDC guide to Waste Disposal is as follows:



- Puncture-resistant, leak-proof sharps containers are located in designated patient-care area, (for example, exam room)
 - All sharps are disposed of in the designated sharps container; do not bend, recap, or break used syringe needles before discarding them into the container.
 - Filled sharps containers are disposed of in accordance with state regulated medical waste rules.
- Regular trash and regulated medical waste (e.g., biohazardous material and chemical hazardous waste are disposed of in their designated containers.

- All trash and waste containers are emptied at least daily by designated personnel
 - Wear appropriate PPE.
 - Handle, transport, and dispose regulated waste, including antineoplastic and hazardous drugs, in accordance with state and local regulations.
- Use biohazard bags to dispose of contaminated materials, such as used gloves and bandages
- Place all soiled clothing in marked plastic bags for disposal or cleaning.
- Biohazard warning labels are required on any container holding contaminated materials. (CDC, 2011)

What to do when an employee is exposed

- 1) Needle sticks
- 2) Splash in eye or mouth
- 3) Exposure to non-intact skin, or contact with unprotected hands

When an employee is exposed to blood or potentially infectious body fluids the employee should:

- Cleanse area and flush contaminated skin with antimicrobial soap and water immediately
- For exposure to eyes, nose, and/or mouth should be thoroughly flushed with a lot of tepid to warm water
- If splashed in or around the eyes, irrigate with clean water, saline or sterile irrigants for 20 minutes
- Remove all contaminated clothing as soon as possible
- Report incident to supervisor immediately
- Consent for HIV and HBV infectivity will be needed
- Medical exam by workman's compensation physician

10: HAND WASHING

Hand hygiene Recommendations

Adapted from the Centers for Disease Control and Prevention

Hand washing is easy to do and it's one of the most effective ways to prevent the spread of many types of infection and illness in all settings—from your home and workplace to child care facilities and hospitals. Clean hands can stop germs from spreading from one person to another and throughout an entire community. (CDC.gov)

When should you wash your hands?

- **Before**, during, and after preparing food
- **Before** eating food
- **Before** and after caring for someone who is sick
- **Before** and after treating a cut or wound
- **After** using the toilet

- **After** changing diapers or cleaning up a child who has used the toilet
- **After** blowing your nose, coughing, or sneezing
- **After** touching an animal, animal feed, or animal waste
- **After** touching garbage
- **After** being in contact with any body fluids (blood, saliva, semen, urine, feces, vaginal secretions, mucous membranes, non-intact skin)

How should you wash your hands?

- **Wet** your hands with clean, running water (warm or cold), turn off the tap, and apply soap.
- **Lather** your hands by rubbing them together with the soap. Be sure to lather the backs of your hands, between your fingers, and under your nails.
- **Scrub** your hands for at least 20 seconds. Need a timer? Hum the "Happy Birthday" song from beginning to end twice.
- **Rinse** your hands well under clean, running water.
- **Dry** your hands using a clean towel or air dry them. (CDC.gov)

Other hand washing tips:

- Wash your hands before you apply gloves, after you take them off, and between contacts that might contaminate other surfaces.
- Wash your hands between patients.
- If soap and water are not available, use an alcohol-based antimicrobial agent or waterless antiseptics only in special circumstances.

According to the CDC, washing hands with soap and water is the best way to reduce the number of microbes on them in most situations. If soap and water are not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol. Alcohol-based hand sanitizers can quickly reduce the number of microbes on hands in some situations, but sanitizers do **not** eliminate all types of germs.

Hand sanitizers are not as effective when hands are visibly dirty or greasy.

How do you use hand sanitizers?

- Apply the product to the palm of one hand (read the label to learn the correct amount).
- Rub your hands together.
- Rub the product over all surfaces of your hands and fingers until your hands are dry. (CDC.gov)

11: SUMMARY

Infection control in the workplace begins by assuming that everyone is potentially infectious. Techniques that will assist in the spread of infection include routine hand washing or the use of alcohol hand gel/rub, and keeping the workplace environment clean. Personal protective equipment such as gloves, gowns, eye goggles and face shields should be provided if necessary. Employers should update their infection and control plan annually to reflect any changes to reduce or eliminate possible exposure for the staff and clients.

According to 65d-30, we must report communicable diseases to the Department of Health in accordance with Sections 381.0031 and 384.25, F.S.

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