

Infection Control Training Module

Learning Objectives

After completing this course, you will be able to:

1. Prevent the spread of germs and disease by using the correct techniques for hand hygiene.
2. Protect yourself and those you serve by recognizing the chain of infection.
3. Cite how to identify, label, and dispose of bio-hazardous waste.

Course Overview

Contagious diseases are spread every day. Oftentimes, they are transmitted unknowingly, leaving healthcare staff unprepared for outbreaks. This course provides basic information on the transmission of diseases, as well as how you can use precautions to prevent the spread of infection.

Before you begin this course, take a moment to reflect on the following questions:

1. How would you react in a situation where you are exposed to someone's blood?
2. Do you know how diseases can be transmitted?
3. How can you prevent the transmission of infections?
4. What is the single most important practice you can employ to prevent infection?

The Chain Of Infection

Transmission of infectious agents within a healthcare, office or home setting requires three elements:

1. A source of infectious agents;
2. A susceptible host or receiver; and
3. A method of transmission for the agent

This is known as the chain of infection.

Standard Precautions

How do these elements work together to create a Healthcare Acquired Infection (HAI)? Infectious agents (germs) transmitted during healthcare are primarily from human beings, but inanimate environmental sources also are implicated in transmission.

Human reservoirs (where germs reside) include patients, healthcare personnel, household members, and other visitors. These individuals may have active infections or may be in the asymptomatic (having no symptoms) and/or incubation period of an infectious disease.

Susceptible Hosts

Infection is the result of a complex inter-relationship between a potential host and an infectious agent.

1. The host is the place where germs grow, usually a human being.
2. Germs grow in blood, sputum, infected wounds and other bodily fluids.

Methods of Transmission

Infections can be caused by:

1. Bacteria;
2. Viruses;
3. Fungi; and/or
4. Parasites

More About the Methods of Transmission

The methods of transmission vary by type of organism. Some infectious agents may be transmitted by more than one route; some are transmitted primarily by direct or indirect contact.

Contact transmission is the most common method of transmission. It is divided into two subgroups: direct contact and indirect contact.

Direct transmission occurs when germs are transferred from one infected person to another person without a contaminated intermediate object or person. Opportunities for direct contact transmission between patients and healthcare personnel include:

1. Blood or other blood-containing body fluids from an infected patient directly enter a caregiver's body through contact with a mucous membrane or breaks (i.e., cuts, abrasions) in the skin.
2. Mites from a scabies-infested patient are transferred to the skin of a caregiver while s/he is having direct, ungloved contact with the patient's skin.
3. A healthcare provider develops a sore on a finger after contact with Herpes Simplex Virus (HSV) when providing oral care to a patient without using gloves.

Indirect Contact Transmission

Indirect transmission involves the transfer of an infection through a contaminated intermediate object or person. In the absence of a point-source outbreak, it is difficult to determine how indirect transmission occurs. However, extensive evidence cited in the Guideline for Hand Hygiene in Healthcare Settings suggests that the contaminated hands of healthcare personnel are important contributors to indirect contact transmission. Examples of opportunities for indirect contact transmission include:

1. Hands of healthcare personnel may transmit germs after touching an infected body site on one patient or a contaminated inanimate object, if hand hygiene (washing hands) is not performed before touching another patient.

2. Patient-care devices (e.g., electronic thermometers, glucose monitoring devices) may transmit pathogens if device is contaminated with blood or body fluids that are shared between patients without cleaning and disinfecting between patients contact.
3. Shared toys may become a vehicle for transmitting respiratory viruses among children.
4. Clothing, uniforms, laboratory coats, or isolation gowns used as personal protective equipment (PPE), may become contaminated with potential pathogens after care of a patient infected with an infectious agent. Although contaminated clothing has not been implicated directly in transmission, the potential exists for soiled garments to transfer infectious agents to successive patients.

Droplet Transmission

Droplet transmission is, technically, a form of contact transmission. Respiratory droplets are generated when an infected person coughs, sneezes, or talks. If another person breathes in these droplets, an infection can occur. Examples: common cold and flu.

Airborne Transmission

Airborne transmission occurs by distribution of either airborne droplets or small particles, which can be breathed in by another person. These airborne germs are lighter than droplets and can live for a long time in the air. Examples: tuberculosis, measles, chicken pox, smallpox and aspergillus (a certain type of mold).

Germs carried in this manner may be dispersed over long distances by air currents and may be inhaled by susceptible individuals who have not had face-to-face contact with (or been in the same room with) the infectious individual.

Blood-Borne Transmission

A person's skin prevents germs from entering into the body, but if the skin is broken because of even a tiny cut, it is possible for infected blood from another individual to enter. Germs can live in the bloodstream and in other body fluids that contain blood components, such as seminal fluid.

Mucous membranes, found in the mouth, vagina, or rectum may also allow germs to spread through contact with blood and/or secretions containing blood. Unprotected sexual contact can lead to this method of transmission. Examples: HIV, Hepatitis B, Hepatitis C.

Review: Blood Borne Transmission

How do germs travel?

1. Droplet
2. Airborne routes
3. Bloodborne
4. Contact transmission (via direct contact - without a contaminated object, or indirect contact through an object or person)

What three elements are required to transmit infections, known as the **Chain of Infection**?

1. A source of infectious agents
2. A susceptible host or receiver
3. A method of transmission for the agent

Hand Hygiene - Breaking The Chain Of Infection

How do we break the chain of infection? Through thorough hand hygiene! Hand hygiene is the single most important practice to reduce the transmission of infections in healthcare settings, homes and the workplace.

The term “hand hygiene” includes hand washing with plain or antimicrobial containing soap and water and use of alcohol and non-alcohol based products (sprays, gels, rinses, foams) that do not require the use of water. If your hands are visibly soiled you should always wash your hands with soap and water.

For You Information (Fyi): Top Ten Reasons Healthcare Workers Don’t Wash Their Hands

According to the Joint Commission Center for Transforming Healthcare, these are the top reasons healthcare workers do not practice hand hygiene:

1. Ineffective placement of dispensers or sinks
2. Hand hygiene compliance data are not collected or reported accurately or frequently
3. Lack of accountability and just-in-time coaching
4. Safety culture does not stress hand hygiene at all levels
5. Ineffective or insufficient education
6. Hands full
7. Wearing gloves interferes with providing care
8. Perception that hand hygiene is not needed if wearing gloves
9. Healthcare workers forget
10. Distractions

When Should You Wash? Hands rub or wash hands with soap and water before and after every contact with a client. You should also wash your hands:

1. Before putting gloves on and after taking them off
2. Before preparing or eating food
3. Before preparing medication
4. After using the toilet
5. After sneezing or coughing into hands
6. After contact with objects that might be contaminated
7. After any accidental exposure to body fluids, mucous membranes, or skin with cuts and sores
8. After handling an animal or animal waste
9. Before and after treating a cut or wounds

Five Steps to Proper Hand-Washing

1. Hands should be washed using soap and warm, running water.
2. Hands should be rubbed vigorously during washing for at least 20 seconds with special attention paid to the backs of the hands, wrists, between the fingers and under the fingernails.
3. Hands should be rinsed well while leaving the water running.
4. With the water running, hands should be dried with a single-use towel.
5. Turn off the water using a paper towel, covering washed hands to prevent re-contamination.

Three Steps to Using an Alcohol Hand Rub

When using a hand rub:

1. Apply product to the palm of one hand.
2. Rub hands together.
3. Rub the product over all surfaces of hands and fingers until hands are dry.

Precautions to Prevent Transmission of Infectious Agents

There are two tiers of precautions to prevent transmission of infectious agents: Standard Precautions and Transmission-Based Precautions.

Standard Precautions

1. Standard Precautions should be used in the care of all clients in all healthcare, office and home settings, regardless of the suspected or confirmed presence of an infectious agent. You cannot tell by looking at someone that they have an infection.

2. Standard Precautions are designed to protect people from diseases carried by the blood and other bodily fluids. They are called standard because they apply to everyone. Standard Precautions include a group of infection prevention practices that apply to everyone, regardless of suspected or confirmed infection status. These include:
 - a. Proper Hand hygiene. The use of Personal Protective Equipment (PPE) including gloves, gown, mask, eye protection, or face shield. (PPE refers to a variety of barriers and respirators used alone or in combination to protect mucous membranes, airways, skin, and clothing from contact with infectious agents. The selection of PPE is based on the nature of the patient illness and/or the likely methods of transmission.)
 - b. Gloves. Wear gloves (clean, non-sterile gloves are adequate) when touching blood, body fluids, secretions, excretions, and contaminated items. Put on clean gloves just before touching mucous membranes and non-intact skin. Change gloves between tasks and procedures on the same patient after contact with material that may contain a high concentration of microorganisms. Remove gloves promptly after use, before touching non-contaminated items and environmental services, and before going to another patient.
3. Gown
 - a. Wear a gown (a clean, non-sterile gown is adequate) to protect skin and to prevent soiling of clothing during procedures and patient-care activities that are likely to generate splashes or sprays of blood, bodily fluids, secretions or excretions.
 - b. Select a gown that is appropriate for the activity and amount of fluid likely to be encountered. Remove a soiled gown as promptly as possible and wash hands to avoid transfer of microorganisms to other patients or environments.

Precautions: Application Apply To Everyone

The application of Standard Precautions during patient care is determined by the nature of the patient interaction and the extent of anticipated blood, body fluids, secretions or excretions. Standard Precautions also protect clients by ensuring that healthcare personnel do not carry infectious agents to patients on their hands or via equipment used during patient care.

Needlesticks - How to Prevent Exposure to Bloodborne Pathogens

Through Needlesticks Healthcare workers are at risk for exposure to Bloodborne pathogens, including Hepatitis B virus (HBV), Hepatitis C virus (HCV), and human immunodeficiency virus (HIV). Exposures occur through needlesticks or cuts from other sharp instruments contaminated with an infected patient's blood or through contact of the eye, nose, mouth, or skin with a patient's blood.

Prevention - How Can Needlesticks Be Prevented?

Many needlesticks and other cuts can be prevented by using safer techniques, which include: not recapping needles by hand, disposing of used needles in appropriate sharps disposal containers and using medical devices with safety features designed to prevent injuries.

Using appropriate barriers when there is contact with blood. Safety barriers include but not limited to:

1. Gloves
2. Eye and face protection
3. Gowns

Respiratory Hygiene/Cough Etiquette

The transmission of Severe Acute Respiratory syndrome (SARS) in emergency departments by patients and their family members during the widespread SARS outbreaks in 2003 highlighted the need for vigilance and prompt implementation of infection prevention measures at the first point of encounter within a healthcare, home or office setting. This is called Respiratory Hygiene/Cough Etiquette and is a new component of Standard Precautions.

Safe Injection Practices

1. Wear gloves during finger stick glucose monitoring and during any other procedure that involves potential exposure to blood or body fluids.
2. Change gloves between patient contacts.
3. Change gloves that have touched potentially blood-contaminated objects or finger stick wounds before touching clean surfaces.
4. Remove and discard gloves in appropriate receptacles after every procedure that involves potential exposure to blood or body fluids, including finger stick blood sampling.
5. Perform hand hygiene (i.e., hand washing with soap and water or use of an alcohol-based hand rub) immediately after removal of gloves and before touching other medical supplies intended for use on other residents.

If you experience a needle stick, wash the affected area with soap and water immediately. Complete an Incident Report and notify health care professional as soon as possible.

Transmission-Based Precautions

Transmission-based precautions are always used along with Standard precautions. Transmission-based precautions are for clients who are known or suspected to be infected.

There are three types of transmission-based precautions:

Contact Precautions: direct and indirect contact. Examples of such illnesses that require contact precautions include:

1. MRSA (Methicillin Resistant Staphylococcus Aureus)
2. Scabies
3. Chickenpox
4. Herpes
5. Lice

How Do You Institute Contact Precautions?

Practice strict hand washing after removal of gloves and after removing all other personal protective equipment used for patient care. Equipment should not be shared (unless it is properly disinfected) between patients. Examples of patient designated equipment include, but are not limited to: electronic thermometer, blood pressure cuff, portable manometer, stethoscope, etc.

1. Droplet Precautions - Droplets infected with germs can cause infections. They can come from a sneeze or a cough and talking. The germs are not carried very far because droplets are heavy. Infections that can be spread through droplets and require droplet transmission based precautions include:
 - a. Pneumonia
 - b. Influenza
 - c. Meningitis
 - d. Mumps

Transmission via large droplets requires close contact (within 3 feet or less) between the source patient and the susceptible individual. Droplets (due to their large size) do not remain suspended in air and travel short distances, three feet or less.

2. Airborne Precautions - Airborne germs are found in tiny droplet, nuclei which are much smaller than droplets, are spread by coughing, sneezing, talking, or breathing. Droplet nuclei are so small that they can travel long distances, remain in the air for a long time, and are tiny and light enough to travel through a ventilation system.
3. Infections that can be spread through the air and require airborne transmission-based precautions include:
 - a. Tuberculosis
 - b. Chickenpox
 - c. Measles (rubella)
 - d. Shingles

Airborne Transmission Precautions

Wear respiratory protection (N95 respirator) when entering the room of a patient with known or suspected pulmonary tuberculosis. Susceptible persons should **not** enter the room of patients known or suspected to have measles (rubella) or varicella (chickenpox) if other caregivers are available. If susceptible persons must enter the room of a patient known or suspected to have measles or chickenpox, they should wear respiratory protection (N95 respirator).

Let's Review

Q: What are the tiers of precautions to prevent the spread of infections?

A: Standard Precautions and Transmission Based Precautions

Biohazardous Waste

In this section you will learn the nuts and bolts of biohazardous waste, including what it is and how to handle it. Let's get started!

What is Biohazardous Waste?

Biohazardous waste is waste material from a facility or medical office that involves blood or body fluids that contains or may reasonably be expected to contain enough germs that exposure to the waste by an individual could result in the transmission of an infectious disease. Biohazardous waste includes: Used sharps (needles, syringes, blades, pipettes, broken glass, and blood vials), body fluids or materials mixed with body fluids, bandages, and other materials that have come in contact with body fluids such as personal protective equipment.

Representatives on Integral Care Infection Prevention Control Committee requested clarification about what is considered hazardous waste.

Urine, stool, and vomitus, along with tears and saliva, are not considered hazardous waste. These are body fluids that can be considered infectious, but can be cleaned up with gloves and deposited in the toilet or waste basket, just as you would do at home. They should not be touched with your bare hands; however, they do not require a nurse or maintenance staff to clean up. Nor do they need to be deposited in the red bag hazardous waste containers. Wash your hands after removing your gloves. Gloves go into regular trash.

Blood is considered a hazardous waste at 100cc or more, this is essentially 3 shot glasses in quantity. Small amounts of blood such as on a band aid, dressing or other material can be handled with gloves and put into a regular plastic lined waste basket and disposed of quickly if you feel someone may be likely to be looking through that waste basket. The contents of the waste basket do not need to go into the red bag waste. 100cc is a significant amount of loss and should be brought to the attention of a care provider.

How Should I Handle Biohazardous Waste?

1. Handle it as little as possible.
2. Always hold it away from your clothing.
3. If laundry is visibly soiled, use gloves when removing it so that you do not touch any blood or other material.
4. Always put soiled laundry into laundry bags with lids.
5. Wash your hands frequently.
6. There are special procedures for disposing of any materials that may contain blood or other sources of germs so that these germs are not spread to others. If the clinic or facility uses cloths, towels or other laundry, you should treat all facility laundry as if it contains germs.

Sharps Containers

Sharps containers must be closable, puncture resistant, leak proof on sides and bottom. Each sharps container must either be labeled with the universal biohazard symbol and the word "biohazard" or be color-coded red. Sharps containers shall be maintained upright throughout use, replaced routinely, and not be allowed to overfill.

Summary

1. Hand hygiene is the single most important practice to reduce the transmission of infections in the healthcare setting.
2. Biohazardous waste materials must be properly packaged and labeled for disposal. Warning labels should also be provided for refrigerators and freezers, and other containers used to store or transplant blood or other potentially infectious materials. All sharp instruments such as needles and finger sticks that have come in contact with blood or other body fluids must be put into special sharps containers.
3. Some canisters and containers for blood and/or body fluids are designed for disposal with the waste material in them. If they are made of glass or another breakable material, they are treated as large sharps and disposed of in large, rigid, biohazard containers.
4. Specimens sent to the lab for analysis must be in a specimen container or bag with a "Biohazard" label. NEVER over-fill a sharps container. Remove the container when it is 3/4 full or sooner depending on the policy of your facility. NEVER manually recap needles.

References

CDC: Center for Disease Control: Isolation Guidelines 2007.

<http://www.osha.gov/SLTC/bloodbornepathogens/index.html>

http://www.cdc.gov/ncidod/dhqp/pdf/bbp/Exp_to_Blood.pdf

<http://www.cdc.gov/ncidod/dhqp/index.html>

<http://medlineplus.gov>

Measuring Hand Hygiene Adherence: Overcoming the Challenges

(http://www.jointcommission.org/Library/Publications/hh_monograph.htm)

Centers for Disease Control and Prevention: Hand Hygiene in Healthcare Settings

(www.cdc.gov/handhygiene/)

World Health Organization Save Lives: Clean Your Hands Campaign

(<http://www.who.int/gpsc/5may/tools/en/index.html>)

CDC Get Smart Campaign

<http://www.cdc.gov/getsmart/>

What Every Healthcare Executive Should Know: The Cost of Antibiotic Resistance

<http://www.jcrinc.com/MDRO-Toolkit/>

CDC MDRO Guidelines

http://www.cdc.gov/nhsn/mdro_cdad.html

The Joint Commission Center for Transforming Healthcare

<http://www.centerfortransforminghealthcare.org/>