

American Association of
Directors of Nursing Services

Common Carriers of Infection

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Learning Objectives

This learning activity should enable you to:

- List at least three types of pathogens
- Describe the four ways microorganisms are spread
- Outline the chain of infection
- Describe at least five ways to reduce the spread of infection

Related Learning Activities

To reinforce the theory presented in this learning activity, instruct the learners to:

- Review the facility's handwashing procedure
- Identify several residents who have infections and determine what the carrier of the infection could have been
- Conduct rounds on a nursing unit and identify opportunities for infections to be spread during routine activities

Content Outline

- Types of pathogens:
 - » *Bacteria*
 - » *Viruses*
 - » *Fungi*
 - » *Others*
- Microorganisms are spread through:
 - » *Direct contact*
 - » *Indirect contact*
 - » *Common vehicle*
 - » *Vector*

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They're lurking everywhere. You can't see them or smell them, yet you're in contact with them many times throughout the day. You may not be affected by them at all, or they can cause you to become deathly sick. What are these mysterious things?

If you said germs, you're right. Germs, formally called pathogens, are infection-causing organisms that can be seen only under a microscope.

Risk for infection is increased with catheters (bloodstream, endotracheal, and urinary), surgery, injections, and overuse or improper use of antibiotics. In addition, residents in nursing facilities are susceptible to healthcare-related infections, which include central line-associated blood infections (CLABSI), Clostridium difficile infections, pneumonia, Methicillin-resistant Staphylococcus aureus (MRSA) infections, surgical site infections, wound infections, and catheter-associated urinary tract infections (CAUTI). Communal living also increases the risk of infection and allows for infections to be easily transmitted among staff and residents.

Types of Pathogens

There are several major types of pathogens. The principal ones are:

Bacteria

Bacteria are one-cell *microorganisms* (living plants or animals that are visible only under a microscope). Most bacteria won't hurt you; however, a small percentage can cause illness. Infectious bacteria cause people to fall ill and they can spread quickly. Many bacteria release toxins that cause infections. Examples of bacterial infections include Streptococcus, E. coli, and Staphylococcus. Antibiotics are usually used to kill bacterial infections.

Viruses

Viruses are small organisms that must invade a living cell in order to replicate. A virus releases its DNA or RNA inside the cell. It is through its DNA or RNA that the virus is able to make copies of itself and take control of the cell, eventually leading to the cell's death while the virus continues to infect

other cells. Viruses are smaller than bacteria and fungi. They cause a variety of illnesses, such as the common cold, chickenpox, human immunodeficiency virus (HIV), and hepatitis. Although there are antiviral drugs to help treat them, viral infections are difficult to cure.

Fungi

Once thought to be plants, fungi are now classified in their own kingdom. Fungi spread through microscopic spores that are often present in the air and soil, where they can be transmitted through inhalation or direct contact. As a result, fungal infections often start in the lungs or on the skin. Common examples include mold, yeasts, and mushrooms. The infections produced by fungi are seldom life threatening. Examples include ringworm, athlete's foot, and vaginitis.

Others

Other microorganisms can cause infections. One example is *Rickettsia*, which is carried by lice, ticks, fleas, and other insects. *Protozoa* is another group of microorganisms, which can cause serious diseases such as malaria. Yet another type consists of *helminths*, which are small parasitic worms found in soil and water that are transmitted from hand to mouth; pinworms and tapeworms are examples.

Some of these microorganisms can cause serious disease, so it is important to prevent them from spreading.

Transmitting Microorganisms

Different types of microorganisms live in different types of environments (for example, inside the human body or on an object's surface). They can also be spread in different ways, such as through air, food, water, or via direct contact. The different ways in which microorganisms are spread fall under the following basic categories:

- Direct contact
- Indirect contact
- Common vehicle
- Vector

Let's look at some of the ways that infections can be spread in the average nursing facility.

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Direct Contact

A common way for microorganisms to be spread is directly from one person to another. This can occur through a friendly handshake, a kiss, and sexual contact. Anytime any part of your body comes in contact with any part of another person's body, pathogens can be transferred. This underscores the importance of frequent handwashing, because you are in contact with other people all day.

Blood can carry microorganisms, as can other body fluids. Blood transfusions are now carefully screened, so the risk of contracting infections from this source is low. However, contact with another person's blood (e.g., contact with a bleeding wound) can carry many risks.

Dressings are another way that pathogens can spread from one person to another. As the drainage on the dressings is considered body fluid, you should be sure to wear gloves when handling them.

Indirect Contact

Pathogens can travel from one person to another indirectly. One way that this can occur is through droplets that are expelled during sneezing and coughing. Droplets are also spread when people talk, laugh, and sing.

Pathogens of an infected person can be carried to other people through objects that the infected person has used. Blood pressure equipment, combs, and urinals can be carriers of microorganisms.

You come in contact with infection-causing organisms every day.

Common Vehicle

Water, air, food, and blood can be contaminated with a pathogen. When spread in these vehicles, the pathogen can come in contact with many people.

Perhaps you recall hearing about legionnaires' disease, which infected a large group of people who had stayed in the same hotel. This infection was caused by an organism called *Legionella* that traveled through the building's air system. In any setting, contaminated air currents can cause infections to spread.

Vector

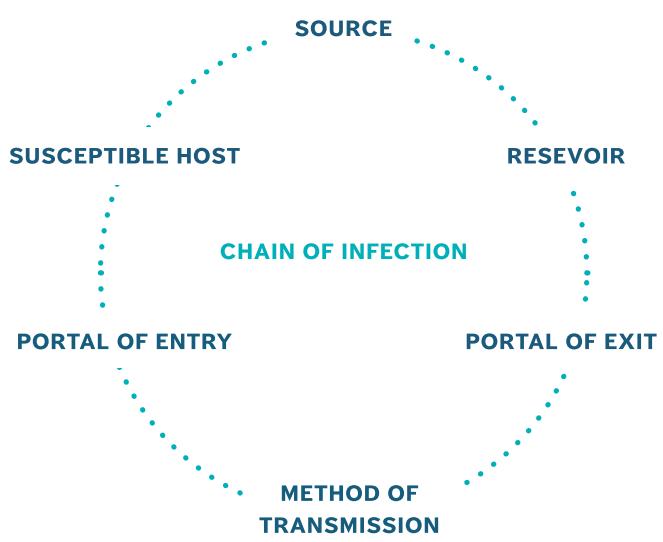
A vector is a living organism, such as an animal or insect, that carries a disease. The risk for infections being spread in this manner is the reason why it is important to control pests.

Conditions for Infections to Spread

In order for pathogens to invade the body and cause infections, several factors must be present:

- The microorganism must be present in great enough numbers and strength to cause an infection.
- An area (*reservoir*) must exist where the organisms can pool and grow (e.g., tissues, feces).
- A *portal of exit* must exist, meaning there must be a way for the pathogen to leave its reservoir and go to another site.
- There must be a *mode of transmission* by which the pathogens are carried (e.g., direct contact, indirect contact, common vehicle, vector).
- An area must exist for the pathogen to enter the body; this is known as the *portal of entry*.
- The person that the pathogen reaches must be a *susceptible host*.

The diagram below shows this *chain of infection*.



Common Carriers of Infection

All of the factors must be present in order for an infection to develop. From this you may gather that if any of the parts of the chain of infection are missing, the infection will not spread. There are some factors in the chain of infection that you cannot change. For instance, some pathogens will travel regardless of your careful efforts, and some people will be in such poor health that they are at very high risk for infection. However, there are some actions you can take to reduce the risk of infections' being spread.

Reducing the Spread of Infection

Handwashing

One of the most important actions you can take is to practice hand hygiene. Your hands come in contact with many, many people and objects and are easily contaminated. The pathogens you carry on your hands can be spread to other people and objects and can cause you to become infected. Review your facility's handwashing procedure and follow it strictly. The box below describes some of the times when you should remember to wash your hands.

Wash your hands . . .

- Before and after caring for a resident
- After touching items in a resident's room
- After having contact with another person's blood, vomitus, vaginal discharge, semen, pus, sputum, secretions, drainage, urine, and feces
- Before and after handling or eating food
- After coughing, sneezing, or blowing your nose
- After urinating or having a bowel movement

Follow Precautions

In addition to handwashing, there are special measures you should take to prevent the spread of infection from residents' blood, body fluids, mucous membranes, and breaks in skin. These include:

- Wearing gloves whenever coming in contact with blood, body fluids, secretions, urine, and feces; touching open skin areas and mucous membranes; or handling contaminated items
- Wearing a mask, eye protection, face shield, and gown when there is a chance that blood, body fluids, secretions, urine, and feces could splash or spray on you

- Making sure disposable items are properly disposed of and not reused
- Ensuring soiled linens are properly handled and contained for laundering
- Cleaning and disinfecting equipment and surfaces according to the facility's procedures

In addition, when isolation precautions are ordered, follow them completely, 100% of the time. Follow the posted procedures for bagging items, collecting specimens, and transporting residents.

Pathogens can travel on equipment that many residents use.

Promote Good Health

A healthy body is in a better position to resist infection. A good diet, adequate fluid intake, exercise, and intact skin help the body to be healthy. By helping residents to be in the best possible state of health, you can help them reduce their risk for infection. Likewise, be sure to follow good health practices yourself to help yourself resist infections.

Proper Use of Antibiotics

Today there are many antibiotic-resistant organisms, also known as superbugs. Bacteria and other microorganisms can become resistant to antibiotics over time and learn to survive the very medications developed to harm them. Frequent or improper use of antibiotics causes more antibiotic-resistant strains of bacteria to form, making infections harder to treat. Improper antibiotic use is a growing health concern; the Centers for Disease Control and Prevention (CDC) has additional information related to antibiotic stewardship in long-term care: <https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html>

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KNOWLEDGE CHECK:

1. Yeast infections are caused by which type of pathogen?

- a. Bacteria
- b. Virus
- c. Fungi
- d. Protozoa

2. An infection-causing organism has gotten into the air-conditioning system of the facility and is being carried to every room. This is an example of an infection spread by which of the following?

- a. Direct contact
- b. Indirect contact
- c. Common vehicle
- d. Vector

3. Mr. James is on isolation for a respiratory infection. A co-worker has taken the blood pressure cuff from Mr. James's room and is using it to obtain blood pressures from the other residents on the unit. This action could cause Mr. James's infection to be spread to other residents through which of the following?

- a. Direct contact
- b. Indirect contact
- c. Common vehicle
- d. Vector

4. True or false? It is advised that you wear gloves every time you come in contact with any resident.

- a. True
- b. False

5. Mice and roaches can carry diseases. They are examples of which type of route of spreading an infection?

- a. Direct contact
- b. Indirect contact
- c. Common vehicle
- d. Vector

For 6–10, fill in the blank with the word that describes the link in the chain of infection.

6. The place where a pathogen enters the body is known as the _____ of _____.

7. The _____ of _____ is the way in which pathogens are carried.

8. A _____ is an area where organisms can pool and grow.

9. The person who becomes infected by a pathogen is a susceptible _____.

10. The chain begins with a _____ of infection, such as a bacteria or virus.

	Source
9.	Host
8.	Reservoir
7.	Mode of transmission
6.	Portal of entry
1. c 2. c 3. b 4. b 5. d	

KNOWLEDGE CHECK ANSWERS

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WORD SEARCH:

Find 13 words related to the spread of infections.



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WORD SEARCH SOLUTION:

Find 13 words related to the spread of infections.

