

# Lesson 2

## Preventing Infectious Disease

### Overview

After exploring the distinction between infectious and noninfectious illness, students learn how infectious diseases can be spread. They discuss common modes of transmission, including person-to-person contact, as well as contact with food-borne and blood-borne pathogens, and review examples of infections that can be passed in these ways. Then they examine ways to prevent or stop the spread of infectious disease, and review their own health habits related to preventing infections.

**Time:** 60–90 minutes

*Note: If time is limited, the case studies activity sheet may be completed through class discussion and the assessment activity sheet may be completed as homework.*

### Lesson Objectives

**Students will be able to:**

1. Summarize direct and indirect ways common infectious diseases can be transmitted.
2. Describe how common food-borne diseases are transmitted.
3. Explain the relationship between injection drug use and transmission of blood-borne diseases such as HIV and hepatitis.
4. Summarize ways to prevent the spread of infectious diseases.

### National Health Education Standards

#### Standard 1: Comprehending Concepts

##### Performance Indicator

**1.12.1:** Predict how healthy behaviors can affect health status.

##### Performance Indicator

**1.12.3:** Analyze how environment and personal health are interrelated.

##### Performance Indicator

**1.12.5:** Propose ways to reduce or prevent injuries and health problems.

##### Performance Indicator

**1.12.8:** Analyze personal susceptibility to injury, illness or death if engaging in unhealthy behaviors.

##### Performance Indicator

**1.12.9:** Analyze the potential severity of injury or illness if engaging in unhealthy behaviors.

#### Standard 6: Goal Setting

##### Performance Indicator

**6.12.1:** Assess personal health practices and overall health status.

## Materials & Preparation

### Prepare

- Have **Infectious Diseases** (Slide 1), or make a transparency, if needed.
- Have chart paper and tape.

### Review

- **Infectious Disease Detective** (*Student Workbook* pages 4–5) and **Infectious Disease Detective Key**, pages 23–24.
- **Stop the Spread** (*Student Workbook* page 6), and Scoring Rubric, page 252.

## Health Terms

Review the teaching steps, slide and activity sheets for any terms or concepts your students may not know, and be prepared to explain them.

Examples:

- airborne
- bacteria
- blood borne
- direct contact
- disease
- feces
- food borne
- fungi
- germs
- hepatitis
- HIV (human immunodeficiency virus)
- host
- immune system
- immunization
- indirect contact
- infectious disease
- noninfectious disease
- norovirus
- parasite
- pathogen
- protozoa
- sterilize
- vaccine
- virus

## Support for Diverse Learners

*To ensure student success with comprehending concepts:*

- Pre-assess students' knowledge and understanding of key concepts related to infectious disease transmission prior to instruction.
- Pre-teach new concepts and terms. Write new terms on the board. Frequently use verbal checks for comprehension.

- Make copies of the **Infectious Diseases** slide and distribute to students.
- Post two signs in the room: Direct Contact and Indirect Contact. Give students examples of how selected diseases are transmitted, and have them stand under the sign that describes the type of transmission. Review and discuss answers.

*To ensure student success with reading:*

- Pair students with stronger reading skills or peer tutors with students who may need help completing the **Infectious Disease Detective** activity sheet.

*To ensure student success with writing:*

- Pair students with stronger writing skills or peer tutors with students who may need help completing the **Stop the Spread** activity sheet.

*To challenge accelerated learners:*

- Have students research and create presentations about how the immune system works. Different individuals or groups could report on the various ways the human body resists or fights infections, including mechanical barriers such as the skin and mucous membranes, the inflammatory response and the production of antibodies.
- Have students research emerging infections or diseases. They should identify and describe at least 1 emerging infection or disease and analyze the factors that have contributed to its development.

## Introduction

### ■ Get students ready for learning

#### **Transition**

On a piece of paper, write a few sentences about how being ill could affect a person's quality of life. How does a temporary sickness or infection, such as a cold or the flu, affect quality of life? What about a more serious or longer-lasting illness?

*Allow students to focus and work quietly for a minute or two. Call on student volunteers to share what they wrote.*

#### **Motivate**

How many of you have ever been sick with a cold, the flu or some other illness? How did you know you were ill? How did your body feel?

*Allow a few students to briefly share their experiences. Ask questions to engage the entire class as each student shares (e.g., How many of you have also been sick like this? Has anyone else felt this way when you were ill?)*

## Teaching Steps

### ■ Define infectious disease

#### **Survey**

What's the meaning of *disease*? Where do you think the meaning of this word comes from?

*Allow a few students to share their ideas.*

#### **Explain**

The word *disease* literally means “not at ease.” It refers to any destructive process that can affect a living organism. Most often, people use *disease* to describe an illness or infection that disrupts the function of or causes harm to the body.

## Survey

What are some illnesses or diseases you've heard of?

List student responses on the board. Be sure the list includes both infectious (e.g., cold, flu, HIV, chicken pox) and noninfectious diseases (e.g., asthma, diabetes, heart disease, cancer).

## Explain

One way that experts understand diseases is to look at how people get them. Some of the diseases you named are illnesses you can catch or get from other people or from things in the environment. Some of them are not.

## Prepare

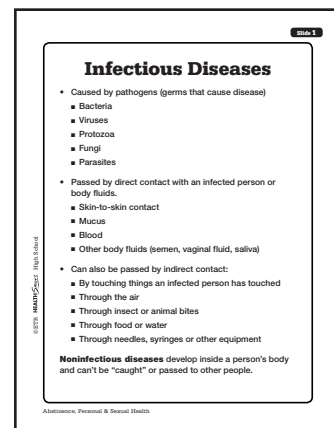
Show the **Infectious Diseases** slide.

## Explain

**Infectious diseases** are those that can be passed by contact with *pathogens* (germs), or organisms that cause disease. When someone gets one of these types of germs in his or her body, we say that this person has been infected with the disease. An infection occurs when pathogens enter the body, multiply and begin to damage body cells. If the body is not able to resist or fight off the infection, disease will develop.

Pathogens that cause disease include bacteria, viruses, protozoa, fungi or parasites.

- **Bacteria** are single-cell living organisms that are found in the air, soil, water, and inside the bodies of other living things. Many play a helpful role, such as helping to digest food or break down waste materials. Others can cause disease in humans, plants and animals. Examples of diseases caused by bacteria include strep throat, tetanus and tuberculosis.
- **Viruses** are made up of genetic material surrounded by a coating of protein. They are not living organisms and cannot reproduce without the aid of a living *host* cell. (Host cells are cells in which the virus is found.) Diseases caused by viruses include the common cold, chicken pox, warts, hepatitis, mumps, measles and HIV/AIDS.



Slide 1

- **Protozoa** are animals that consist of a simple, single cell. They play a useful role in the food chain. Some eat harmful bacteria. Others are parasites and can transmit disease to their host. Diseases caused by protozoa include malaria, sleeping sickness and dysentery.
- **Fungi** are living organisms that share characteristics of both plants and animals. Mushrooms, yeast and molds are all types of fungi. Examples of fungal diseases include yeast infections, ringworm and athlete's foot.
- **Parasites** are any living organisms that live on or inside another living organism and get food, shelter or other things they need to survive from that host. While the parasite benefits from the connection, the host is often harmed. Some parasites enter a person's body through contaminated water or food and cause diarrhea or other digestive problems. Other types of parasites can spread diseases to their hosts, such as ticks, which can carry Lyme disease and Rocky Mountain spotted fever, and mosquitoes, which can spread malaria.

There are two ways infectious disease can spread.

**Direct contact** means that the pathogen is transmitted by person-to-person contact. Other people get the disease from contact with the infected person. Depending where the pathogen is, this can happen through touching an infected person's skin, or when infected blood, mucus or other body fluids get inside another person's body.

**Indirect contact** means that the infected person's skin or body fluids don't directly touch or enter the other person through human-to-human contact. The pathogen gets on or travels through something else, and then the healthy person comes in contact with that thing. For example:

- If someone with a cold rubs his or her nose and then opens a door, the cold virus can be transferred to the doorknob. The pathogen can be transferred if another person touches the object and then touches his or her own nose or mouth. This can happen with tissues, eating utensils and many other objects.
- If an infected person coughs or sneezes without covering the nose and mouth, droplets of mucus or saliva containing the pathogen can go into the air and be breathed in by another person.
- Animals or insects can pass pathogens from one person to another if they bite someone who's infected and then bite or sting another person.

- Pathogens can get into a person’s body if the person eats or drinks contaminated food or water.
- Needles, syringes or other equipment used by or on an infected person can contain traces of blood or other infected body fluids. If these items aren’t properly *sterilized* (made free of germs) before being used by or on someone else, the pathogen can get into the other person’s body.

**Noninfectious diseases** develop inside a person’s body, and can’t be “caught” or passed to other people. You’ll be learning more about these types of diseases in the next lesson. Today, we’re going to focus on infectious disease.

## Review

Which of the illnesses and diseases you named earlier are infectious?

*Go through the list of illnesses/diseases on the board and circle the ones students identify as infectious. Be prepared to clarify the definition of infectious and noninfectious disease for students and correct any misinformation, as needed.*

Can you think of any other infectious diseases that weren’t named earlier?

*Add students’ suggestions to the list on the board, circling each one as you do so. Suggest the following and add them to the list if needed:*

- cold and flu
- hepatitis
- food poisoning (norovirus)
- HIV

## ■ Clarify modes of transmission

### Explain

Before we look at ways to stop the spread of infection, let’s focus a bit more on the different ways the germs that cause infections can be transmitted. There are many different modes of transmission. Let’s look at the list of infectious diseases and review how people can get some of the main ones.

### Review

*Refer students to the examples of infectious diseases circled on the list on the board. Go through the examples, asking students:*

- Is this disease transmitted by direct or indirect contact?

- What are the specific ways it can be transmitted? Is it passed through the air? through food? through contact with blood?

*Be sure to cover the following diseases to further explain transmission of airborne, food-borne and blood-borne diseases:*

- **Cold or flu:** Transmission can be direct—through touching or kissing—or indirect—from breathing in *airborne* (carried in the air) particles containing the virus, or from touching tissues, doorknobs or other objects that have the virus on them.
- **Food poisoning:** Transmission happens through contaminated food or water. This could be direct, if the food is spoiled and has bacteria growing in it, or hasn't been cooked properly. It could also be indirect, if the food contains a virus or other pathogen transferred from someone who prepared the food. This can happen when people don't wash their hands after going to the bathroom and then prepare food, or if cooking utensils, cutting boards and other kitchen surfaces aren't cleaned properly.
- **Hepatitis:** *Hepatitis* is a virus that infects and can damage the liver. There are many different types that can be transmitted in different ways.
  - Hepatitis A is usually transmitted indirectly when contaminated *feces* (bowel movements) get into water or food. This usually happens because the person preparing the food didn't wash his or her hands thoroughly after going to the bathroom. It can also happen if a water supply has flowed through or come in contact with contaminated feces.
  - Hepatitis B and C are transmitted by blood. This transmission can be direct—for example, if someone touches an infected person's blood—or indirect—for example, if blood from a person with hepatitis B or C is left in a needle that another person uses for injecting drugs or vitamins, tattooing, piercing, or any other reason.
  - Hepatitis B can also be transmitted directly by semen or vaginal fluids.
- **HIV:** *HIV* stands for *human immunodeficiency virus*. It's the virus that causes AIDS. It's transmitted directly through infected semen or vaginal fluids during sexual intercourse with a person who has HIV. It can also be transmitted through blood, particularly if people share needles for injecting drugs or any other reason with someone who has HIV. HIV is *not* transmitted directly from day-to-day contact. It's safe to touch, hug, shake hands or share eating utensils with someone who has HIV.



## Explain

Infectious diseases vary in how easily they are transmitted. For example, you can't get HIV from casual, everyday contact with someone who has the virus, but you could get a cold or the flu in this way.

## ■ Examine ways to prevent infectious disease

### Create

When you know how infectious diseases are transmitted, you can understand ways to prevent their spread. People can prevent infectious diseases by breaking the chain of infection at any point. You're going to think about strategies that could help prevent or stop infection from spreading. Think of both ways you could prevent becoming infected in the first place, and ways you could stop an infection from spreading to others. Try to think of specific examples that will help explain your ideas.

*Put students into small groups or pairs and allow time for them to brainstorm ways to stop or prevent infection.*

*Call on pairs or groups to share their ideas. Help them group the ideas based on whether they represent a way to prevent an infection from starting, or a way to stop further spread if a person has become infected.*

#### Ways to prevent infection:

- **Eliminate the source of the pathogen.** Examples: Throw away spoiled food. Drain a pond with contaminated water. Quarantine or isolate an infected animal or person.
- **Handle and dispose of body fluids appropriately.** Examples: Properly and promptly clean up blood, vomit or feces. Dispose of body fluids in special containers marked for that purpose.
- **Safely handle and dispose of contaminated items.** Examples: Sterilize needles and other equipment. Never reuse needles or syringes. Throw away sharp items in sealed containers.
- **Keep food safe.** Examples: Cook foods to the proper temperature. Keep hot foods hot and cold foods cold. Refrigerate leftovers. Throw away food that looks or smells spoiled. Don't use the same cutting board to cut raw meat and then cut vegetables or other foods.

- **Protect yourself.** Examples: Wash your hands frequently. Always use sterile equipment. Bandage any wound or break in your skin promptly. Wear latex gloves when cleaning blood or other body fluids. Wear a mask that covers your nose and mouth when around people who are ill. Don't let another person's body fluids enter your body. Never share needles for any reason. Be up to date on recommended vaccines or *immunizations* (preparations given to provide immunity to a disease), such as vaccines for measles, mumps and rubella, and a yearly flu shot.

### Community Connection

Invite a pediatrician to speak to the class about how immunizations work and which ones are recommended for children and teens.

#### Ways to stop the spread of infection:

- **Don't spread germs to others.** Examples: Don't hug or kiss other people when you're sick. Cover your nose and mouth when you sneeze or cough. Wear a mask that covers the nose and mouth when sick. Bandage any wound or break in the skin promptly.
- **Don't spread germs to objects.** Examples: Wash hands frequently when sick. Try not to touch doorknobs, railings or other objects that other people touch. Dispose of tissues immediately after use. Wash plates, cups and other eating utensils with soap and hot water.
- **Don't spread germs to food.** Examples: Wash your hands after using the bathroom. Don't use fingers to eat from a jar, bag or box of food. Don't put a used utensil back into a jar or other container of food.
- **Keep your immune system strong by following healthy habits.** (The *immune system* is the body's system of defense against disease.) Examples: Get enough rest and sleep. Eat healthy foods. Be physically active. Take steps to reduce or manage stress. Practice good hygiene. Get proper treatment for infections or other illnesses.

## ■ Students review health habits

### Review

Direct students to turn back to their completed **Assessing My Health Habits** activity sheet and ask them to privately review their responses for questions 1 through 6.

These are some health habits related to preventing infectious disease. How are you doing in this area? Could you improve any of these habits?

Are there other actions you could add to help prevent infectious diseases?

*Allow student volunteers to share their observations and ideas.*

## ■ Students analyze case studies

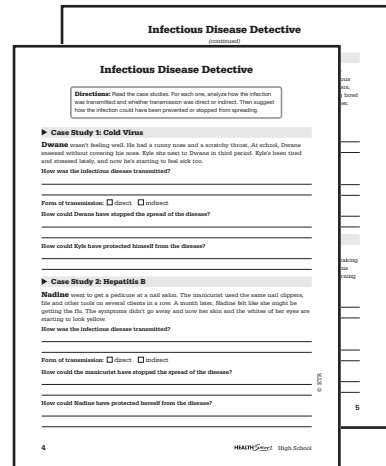
### Complete & Share

*Put students into small groups of 2 or 3 and direct them to turn to **Infectious Disease Detective** on page 4 of the Student Workbook.*

Read the case studies in your groups. For each one, analyze how the infection was transmitted and what could have been done to prevent or stop the spread of the infection.

*Allow time for groups to complete the activity sheet. Then review the diseases one at a time and have each group share the ways they've suggested to prevent and stop the spread.*

*Provide corrective feedback, as needed, using the **Infectious Disease Detective Key**.*



Workbook pages 4–5

## Assessment & Closure

### ■ Students demonstrate learning

#### Complete & Share

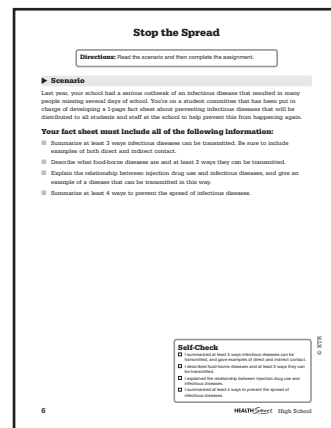
*Direct students to turn to the **Stop the Spread** activity sheet on page 6 of the Student Workbook.*

*Review the directions with students and allow time for them to complete the activity sheet.*

#### ■ End the lesson

#### Close

What's one behavior that you plan to do today to reduce your risk of getting an infectious disease?



Workbook page 6

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*Allow a number of students to share their answers.*

## **Assess**

*Collect students' **Stop the Spread** activity sheets and completed fact sheets, and evaluate their work for this lesson.*

### **Assessment Evidence**

#### **Objective 1**

**Students summarized direct and indirect ways common infectious diseases can be transmitted by:**

- Completing the **Stop the Spread** activity sheet.

#### **Objective 2**

**Students described how common food-borne diseases are transmitted:**

- Completing the **Stop the Spread** activity sheet.

#### **Objective 3**

**Students explained the relationship between injection drug use and transmission of blood-borne diseases such as HIV and hepatitis by:**

- Completing the **Stop the Spread** activity sheet.

#### **Objective 4**

**Students summarized ways to prevent the spread of infectious diseases by:**

- Completing the **Stop the Spread** activity sheet.

*(Scoring Rubric, page 252)*

# Infectious Disease Detective Key

**Directions:** Read the case studies. For each one, analyze how the infection was transmitted and whether transmission was direct or indirect. Then suggest how the infection could have been prevented or stopped from spreading.

## ► Case Study 1: Cold Virus

**Dwane** wasn't feeling well. He had a runny nose and a scratchy throat. At school, Dwane sneezed without covering his nose. Kyle sits next to Dwane in third period. Kyle's been tired and stressed lately, and now he's starting to feel sick too.

**How was the infectious disease transmitted?**

*Most likely through the air when Dwane sneezed. It could also have spread when Kyle touched something in the classroom that Dwane had touched or that had gotten virus on it.*

**Form of transmission:**  direct  indirect

**How could Dwane have stopped the spread of the disease?**

*Stay home from school when sick. Cover his nose when sneezing. Wear a mask over his nose and mouth. Wash his hands often during the day.*

**How could Kyle have protected himself from the disease?**

*Wash his hands often during the day. Keep his immune system healthy by getting enough sleep and dealing with stress.*

## ► Case Study 2: Hepatitis B

**Nadine** went to get a pedicure at a nail salon. The manicurist used the same nail clippers, file and other tools on several clients in a row. A month later, Nadine felt like she might be getting the flu. The symptoms didn't go away and now her skin and the whites of her eyes are starting to look yellow.

**How was the infectious disease transmitted?**

*Most likely from blood left on the clippers or other tools by a previous client. There's also a slight possibility it might have come from person-to-person contact with the manicurist, if she had hepatitis B, and if both the manicurist and Nadine had cuts or open sores.*

**Form of transmission:**  direct  indirect (most likely)

**How could the manicurist have stopped the spread of the disease?**

*Clean and sterilize all reusable tools and equipment after each use. Frequently clean surfaces and work areas. Wash her hands between clients. Wear disposable gloves and change them for every service.*

**How could Nadine have protected herself from the disease?**

*Get immunized for hepatitis B. Bring her own nail tools to the salon and ask the manicurist to use them. Choose a different salon that follows proper procedures for disease prevention.*

**Teacher Page**

# Infectious Disease

## Detective Key *(continued)*

### ► Case Study 3: Food Poisoning (Norovirus)

**Dana** has a job as a server at a local restaurant. She was sick over the weekend, but by Monday she felt good enough to go to work. During her shift, Dana started feeling nauseous again and went to the restroom to throw up a little. In a hurry to get back to the customers, she left the restroom without washing her hands. The servers make the salads from a big bowl of lettuce and cut tomatoes that are kept on the counter. Dana made a salad for a customer. She served the salad and the customer ate it. A few hours later, Dana's customer started feeling sick to his stomach.

**How was the infectious disease transmitted?**

*Dana didn't wash her hands before preparing the food.*

**Form of transmission:**  direct  indirect

**How could Dana have stopped the spread of the disease?**

*Don't go to work when ill. Go home from work after throwing up. Wash hands well with soap and hot water after using the restroom or preparing food. The restaurant could require workers to wear plastic gloves while making the salad.*

**How could the customer have protected himself from the disease?**

*Don't eat the salad. Ask to switch to another server's station if he noticed that Dana was sick.*

### ► Case Study 4: Athlete's Foot/Jock Itch

**All of the team members** go barefoot in the school locker room. Since last week, Jacob's feet and the spaces between his toes have been burning and itching. He's been taking extra care to wash them well and always dries them first before toweling off the rest of his body when he takes a shower. But today after basketball practice, he noticed that the burning and itching had started happening in his groin area too.

**How was the infectious disease transmitted?**

*Contact with a contaminated floor in the locker room.*

**Form of transmission:**  direct  indirect

**How could the school or other team members have stopped the spread of the disease?**

*Disinfect the locker room floor and other surfaces. Wear shower sandals or shoes in the locker room. Keep feet clean and dry.*

**How could Jacob have protected himself from the disease?**

*Wear shower sandals or shoes in the locker room. Keep feet clean and dry. Dry the groin area before the feet after bathing or showering. Put on socks before underwear. Use an antifungal cream to clear up the foot infection before it can spread.*