Preventing Infectious Diseases

What’s Your Health IQ?

Indicate how frequently you engage in each of the following behaviors (1=never; 2=occasionally; 3=most of the time; 4=all of the time). Total your points, and then turn to p. 642.

1. I cover my mouth while sneezing or coughing.

2. I eat at least five servings of fruits and vegetables each day.

3. I exercise at least five times a week.

4. I have regular check-ups with my dentist and doctor.

5. I wash my hands before eating a meal.

6. When my doctor prescribes antibiotics, I follow and complete the prescription.

7. I drink 8 to 10 glasses of water each day.

8. I get extra sleep when I am sick.
SECTION 1
What Are Infectious Diseases?

SECTION 2
Protecting Yourself from Infectious Diseases

SECTION 3
Common Infectious Diseases

Visit these Web sites for the latest health information:

- go.hrwn.com
- www.scilinks.org/health
- www.cnnstudentnews.com

Check out articles related to this chapter by visiting go.hrwn.com. Just type in the keyword HH4 CH13.
What Are Infectious Diseases?

OBJECTIVES
Identify five different agents that can cause infectious diseases.
List four ways that infectious diseases spread.
Describe two different treatments for infectious diseases.
Name two ways you can help prevent the development of antibiotic resistant bacteria.

What Causes Infectious Diseases?

An infectious disease is any disease that is caused by an agent that has invaded the body.

KEY TERMS
- **infectious disease**: any disease that is caused by an agent that has invaded the body
- **pathogen**: any agent that causes disease
- **bacteria**: tiny, single-celled organisms, some of which can cause disease
- **virus**: a tiny disease-causing particle that consists of genetic material and a protein coat
- **fungus**: an organism that absorbs and uses nutrients of living or dead organisms
- **antibiotic resistance**: a condition in which bacteria can no longer be killed by a particular antibiotic

While walking to his friend’s house, Paul stepped on a rock and cut his foot. Because the cut was small, Paul just kept on walking. Paul didn’t know, however, that a hidden army of organisms was starting an attack on his cut.

What Causes Infectious Diseases?

An infectious disease (in FEs shuhs di ZEEZ) is any disease that is caused by an agent that has invaded the body. Infectious diseases may be passed to a person from another person, from food or water, from animals, or from something in the environment. Colds, the flu, head lice, and tuberculosis (TB) are examples of infectious diseases.

Figure 1
Infectious diseases are caused by many different pathogens, such as viruses, bacteria, fungi, protozoa, and animal parasites.
All infectious diseases are caused by pathogens. A **pathogen** is any agent that causes disease. Figure 1 shows some of the different kinds of pathogens that cause infectious diseases.

**Bacteria**  Individually, bacteria are too small to be seen without a microscope. **Bacteria** are tiny, single-celled organisms, some of which can cause disease. Bacteria live almost everywhere on Earth. Some bacteria are even found in the frozen Arctic and in the boiling waters of hot springs.

You have more than 300 kinds of bacteria living in your mouth right now! There’s no need to reach for the mouthwash, though, because most bacteria are harmless. Many are actually helpful. For example, bacteria living in your intestines make vitamins that you need to live. However, some kinds of bacteria make you sick when they grow on or inside your body. Some bacteria give off poisons, while other bacteria enter and damage cells. Tuberculosis, tetanus, and sinus infections are examples of diseases caused by bacteria.

**Viruses**  Viruses are even smaller than bacteria. **Viruses** are tiny disease-causing particles made up of genetic material and a protein coat. The genetic material in the virus contains the instructions for making more viruses. Viruses survive and replicate only inside living cells. They reproduce by taking control of body cells and forcing them to make many new viruses. After escaping from the cell, these new viruses seek out other cells to attack. Viral diseases include colds, the flu, measles, AIDS, and severe acute respiratory disease (SARS).

**Fungi**  Organisms that absorb and use the nutrients of living or dead organisms are called **fungi** (singular fungus). The mushrooms in your salad are fungi. They don’t cause disease, but other fungi do. Maybe you’ve had athlete’s foot, which is caused by a fungus that lives and feeds on your feet and makes them burn and itch. A fungus, not a worm, is also responsible for the scaly, circular rash known as ringworm.
Protozoans  Single-celled, microscopic organisms called protozoans are larger and more complex internally than bacteria. Protozoans account for diseases that are leading causes of death throughout some parts of the world. For example, malaria is a disease caused by protozoans. Malaria kills approximately 1 million people every year in tropical countries.

Parasites  Bacteria, viruses, fungi, and protozoans account for almost all the infectious diseases in the United States. Animal parasites, however, also cause a large number of diseases throughout the world. Animal parasites get their energy and nutrients by feeding on other living things. Examples of harmful animal parasites include head lice, tapeworms, and certain roundworms.

How Are Infectious Diseases Spread?

Before you can have the symptoms of a cold, the virus that causes the cold has to enter your body. This means that the virus has to travel from someone who has a cold to your body. Knowing how pathogens are spread will help you protect yourself against infectious diseases. Infectious diseases are spread in four main ways, as shown in Figure 2.

Person to Person  One way that pathogens can be spread is from person to person. For example, when you sneeze or cough, you send thousands of tiny drops of saliva and mucus into the air. The drops can remain in the air for quite a while and carry many pathogens with them. Anyone who breathes in one of these infected drops can become sick from the pathogens. Also, anyone who touches anything the drops fall on, such as a book, can become infected by the pathogens. Diseases such as the flu, colds, and measles are spread from person to person through the air.

Other ways pathogens can be spread from one person to another are by kissing, drinking from the same glass, and having sexual contact. Mononucleosis, commonly known as the “kissing disease,” is spread through person-to-person contact. Although the disease can be passed through kissing, it may also be spread by drinking from the same glass or eating the food of someone who is infected.

Food and Water  The food you eat and the water you drink can also bring pathogens into your body. Foodborne diseases are often spread when pathogens from an infected person or animal contaminate food. This is why people who work with food are required to wash their hands thoroughly. Foodborne disease can also be spread when the food itself is contaminated. For example, meat from infected animals may contain the eggs of parasitic worms. Foodborne diseases include hepatitis A and botulism.

In the United States, it is relatively safe to drink tap water. Water from streams and lakes, however, must be purified before the water can be used for drinking. Water can become contaminated if it is
Infectious diseases are spread in many ways. **ACTIVITY** List two ways that diseases can be spread in your home.
Proper Uses of Antibiotics

1. Antibiotics should not be taken for a viral infection, such as a cold or the flu.
2. Antibiotics should not be saved for the next time you get sick. Finish the prescription.
3. Antibiotics should not be taken by anyone other than the person for whom they were prescribed.

How Are Infectious Diseases Treated?

When you are sick from an infectious disease, your doctor will treat you based on what pathogen made you sick. For example, your doctor will treat a strep throat differently from athlete’s foot. This is because each type of pathogen has its own characteristics.

Treating Bacterial Diseases  Medicines used to kill or slow the growth of bacteria are called antibiotics. The discovery of these bacteria-killing compounds completely changed medicine. Before the discovery of antibiotics, even a small cut on your finger could lead to a deadly bacterial infection!

Antibiotics work by preventing the growth and division of bacterial cells. Eventually, antibiotics cause antibiotic sensitive bacteria to die. Some of the antibiotics in use today include penicillin, tetracycline, and streptomycin. Because antibiotics have no effect on viruses, they can’t be used to treat colds or other viral diseases.

Doctors and the public are worried about a growing problem called antibiotic resistance. Antibiotic resistance is a condition in which bacteria can no longer be killed by a particular antibiotic. As shown in Figure 3, improper use of an antibiotic promotes the growth of antibiotic-resistant bacteria. The antibiotic-resistant bacteria can spread to other people. Antibiotic resistance is a threat to everyone’s health. Today, people are dying from infections that would have been easy to treat 10 to 15 years ago.

You can help prevent antibiotic resistance. First, you should not ask your doctor for antibiotics if you have a viral disease. Second, if your doctor does give you a prescription to treat a bacterial infection, be sure to follow the prescription and finish your medication.
Treating Viral Diseases  Currently, there is less known about how to destroy viruses than bacteria. Unlike bacteria, viruses do not grow as living cells. Thus, viral infections cannot be treated with the same medications as bacterial infections can. Most antiviral medications concentrate on relieving symptoms and stopping the production of viruses inside the human cells. These medications must be taken early in the illness to have an effect.

Treating Fungal Infections  Fungal infections are usually not as common as bacterial or viral infections, but they can sometimes be serious. Fungal infections of the skin, such as athlete’s foot, can usually be treated with an over-the-counter antifungal medicine. Other fungal infections such as candidiasis (yeast infection), however, are more serious and often require stronger prescription medicines.

Treating Protozoan Infections  Prevention is the best way to protect yourself from protozoan infections. Simple precautions such as maintaining good hygiene and sanitation keep many protozoans from being able to survive, reproduce, and spread. It is important for a person who has a protozoan infection to see a doctor to receive treatment with prescription medicines.

Treating Parasitic Infections  Although parasites such as roundworms and tapeworms are found throughout the world, head lice are more common in the United States. To prevent infection from head lice, people should not share combs and brushes with others or wear other people’s clothes. Fortunately, head lice can usually be treated with medicated shampoos.
Your head aches, your throat burns, and your muscles feel like you've just been tackled by a football team. When you've got the flu, you feel as if you'll never get better. But in a couple of weeks, your symptoms are usually gone. What happened? Although you were not aware of it, during those 2 weeks, your body was able to get rid of the flu virus and allowed you to recover.

How Your Body Fights Disease

Your body has many ways of fighting disease-causing bacteria, viruses, and other pathogens. Your body uses your skin and chemicals to fight pathogens. Your body also has more specialized defenses, such as the inflammatory response and the immune system. Because of these defenses, your body is able to protect itself from the pathogens that are continually attacking it.

Physical Barriers

To make you sick, most pathogens have to enter your body, start growing, and cause damage. Luckily for most of us, this infection process is not easy! As shown in Figure 4, your body's first line of defense helps to keep many pathogens from entering your body. Your body's first line of defense includes

- **Skin** Your skin keeps pathogens from entering your body.
  
  Your skin also uses chemicals, such as sweat and oil, to kill pathogens that have settled on your skin. Your skin is always repairing and rebuilding itself by quickly closing any gaps (cuts) that pathogens could get through.
Mucous membranes  The soft tissues that line the nose, mouth, throat, digestive tract, urethra, and vagina are all mucous membranes. Like the skin, mucous membranes form a barrier to pathogens. Mucous membranes make a slimy material known as mucus. One function of mucus is to trap pathogens. Bacteria you breathe in may get caught in mucus lining the tubes that carry air to the lungs. Tiny, hairlike structures called cilia grow from the lining of these tubes. Like an escalator, the waving cilia move the mucus and its bacterial passengers to the back of your throat. Then, by swallowing, you send these bacteria into your stomach where they are destroyed.

Chemicals  Many of the chemicals your body makes destroy pathogens. For example, sweat is acidic, and inhibits the growth of bacteria. Your stomach secretes acids that not only help you digest your food but also kill bacteria. Tears contain a protein that kills bacteria.

**Inflammatory Response**  Sometimes pathogens are able to cross the protective barriers that are your skin and mucous membranes. This can happen, for example, when you cut or burn yourself. Inflammation is a second way your body protects itself from pathogens. Inflammation is a reaction to injury or infection that is characterized by pain, redness, and swelling.

When the protective barriers are broken and a part of your body becomes infected, the area around the injury becomes inflamed, and gets hot. This is caused by the small blood vessels that expand to bring more blood to the injured area. Sometimes, a yellowish substance called pus builds up around the injury. Pus includes dead and injured body cells that were fighting the bacteria and dead and injured bacteria. The inflammatory response shows that your body is attacking pathogens.
**Immune System** Even though the skin and mucous membrane barriers and the inflammatory response are very effective, they can’t protect against all pathogens. So your immune system gets ready for action. The immune system is made up of certain types of blood cells and certain proteins called antibodies. The blood cells and antibodies move through the blood vessels and are within your organs.

These infection-fighting cells also move through the **lymphatic system**, a network of vessels that carry a clear fluid called **lymph** throughout the body. The lymphatic system picks up fluid from all over the body. This system often sweeps up bacteria or viruses and carries them to your **lymph nodes**. You can feel one set of lymph nodes in your neck just below your ears and jaw. Lymph nodes are filled with white blood cells that scan the lymph for pathogens. **White blood cells** are cells in the blood whose primary job is to defend the body against disease. Certain white blood cells produce antibodies that then bind to specific pathogens and warn other white blood cells to destroy the pathogens. When you are sick, your lymph nodes often swell because of the growing number of white blood cells fighting the infection.

The immune system’s defenses take time to defeat pathogens. The cells of the immune system typically attack a specific pathogen. In contrast, the body’s other defenses—skin, mucous membranes, and inflammation—work to react to and fight any pathogen.

**What You Can Do to Stay Well**

Your immune system is always working to keep you well. But there are several things you can do to stay well. Here are a few tips.

- **Protect yourself.** Keeping your body healthy helps your immune system to fight infectious diseases.
- **Eat a healthy, balanced diet.** A lack of certain nutrients in your diet can weaken your immune system. Extreme dieting or fasting can reduce your defenses.
- **Drink water.** Drink 8 to 10 glasses of water a day to keep your immune system working effectively.
- **Reduce your stress levels.** While everyone feels stress at some time, stress that lasts weeks or months can weaken your immune system and may leave you more vulnerable to illnesses such as colds.
- **Exercise regularly.** Get at least 60 minutes of activity daily such as walking, running, cycling, or even doing housework.
- **Get regular medical checkups.** Seeing your doctor and dentist regularly can help prevent you from getting sick.
- **Try to avoid close contact with sick people.** When you must be exposed to people who are sick, wash your hands often. Do not share personal items, such as hairbrushes, or share drinks from the same container.
- **Get enough sleep.** Sleep is important to keep your body functioning properly.
Get Vaccinated  One of the most important ways to stay healthy is to stay up to date on all your vaccinations. **Vaccines** are substances usually prepared from killed or weakened pathogens or from genetic material and that is introduced into a body to produce immunity. When a vaccine is injected or swallowed, the immune system responds to the vaccine material by making white blood cells called memory cells. In the future, if the pathogen against which the vaccine was made enters the body, the memory cells and their antibodies fight the pathogen before it can cause disease.

Having a disease or being immunized for it may give many years of protection, but periodic boosters may be needed. **Boosters** are extra doses of a vaccine that help the body maintain the production of memory cells for a particular disease.

It is also possible to be immunized for diseases that develop new strains, such as the flu. However, every time a new strain of the flu virus appears, a new vaccine must be developed to protect against it. Thus, people must get a flu vaccine every year for maximum protection against the illness.

Keeping vaccinations up to date throughout life can help a person avoid many infectious diseases.

**Analyzing DATA**

### Vaccinations

1. In the “Vaccine” column are listed the diseases that each vaccination protects against.

2. The age ranges indicate the age when each vaccination should be received. The blue boxes indicate that the vaccine can be received anytime during that period.

#### Sample Vaccination Schedule for Several Diseases

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheria, tetanus, pertussis (DTaP)</td>
<td>Birth–6 mos</td>
</tr>
<tr>
<td>MMR</td>
<td>IPV (3 doses)</td>
</tr>
</tbody>
</table>

**Your Turn**

1. At what ages must a person receive the MMR vaccination?

2. What three diseases does the DTaP vaccination protect against?

3. At what age should a person receive his or her first varicella vaccination?

4. **CRITICAL THINKING** Why do you think people must be vaccinated for polio more than once?
What to Do When You Are Sick

Think back to the last time you had a cold. Do you remember how you felt? You probably had a runny nose and a sore throat and were weak and tired. These are the typical symptoms of a cold.

**Symptoms of Infection** are the changes that you notice in your body or mind that are caused by a disease or disorder. Common symptoms of infection include fever, rash, sore throat, headache or muscle aches, fatigue, tired eyes, nausea, vomiting, and diarrhea.

Some symptoms are caused by the pathogens themselves as they multiply within your body. For example, the *Salmonella* bacteria that may be in raw eggs or in raw or undercooked chicken and meats cause diarrhea when they invade cells lining the intestine.

Some other symptoms are part of your body's response to infection. Fever, for instance, is an increase in body temperature. Sometimes fever is caused by the invading microorganisms, but sometimes it is a defense against pathogens. For example, some bacteria can't function or survive at higher temperatures, so your body temperature rises in an attempt to stunt their growth.

**Taking Care of Yourself** Following a few simple rules can make your illness less unpleasant.

- Unless you have no other choice, stay home when you’re sick. You’ll get more rest, and you won’t pass your illness to others.
- Drink plenty of fluids such as water and juice.
- Be sure to follow all the directions the doctor gives. Take all the medicine prescribed to you.
- Throw away any tissues you use right away. Wash your hands frequently.

**Five Signs That You Need to Seek Medical Care**

1. You have difficulty in breathing.
2. You have severe pain somewhere.
3. Your temperature is 101°F or more and lasts for more than 2 days.
4. You have a cut that does not heal properly.
5. Mucus from your nose, throat, or lungs is thick and yellowish green.
How to Prevent the Spread of Disease

Infectious diseases in the United States are common and can spread quickly. As a result, it is important that everyone works to prevent the spread of disease. There are several things you can do to prevent the spread of disease.

Get Vaccinated  Public vaccination programs have been largely responsible for preventing the spread of infectious diseases. Vaccines can help protect people against certain diseases for long periods of time. Vaccines are particularly important for fighting viral diseases because few drugs can stop a virus once it has begun to reproduce inside the body. Scientists are currently developing vaccines for more infectious diseases.

Keep Clean  Even with medical advancements, maintaining good hygiene is still one of the best ways you can help prevent the spread of disease. For example, bathing and washing with soap daily helps protect against infection by washing away many bacteria.

real life

Activity

OBSERVING UNHEALTHY BEHAVIORS

Materials  
✔ pen or pencil  
✔ paper

Procedure  
1. Choose two students in your class to observe.  
2. Write the following behaviors down the left side of the paper: “moving an object with hands,” “tapping feet,” “touching pencil or pen to mouth,” and “touching any part of the face with the hands.”  
3. Note the time, and then begin observing your subjects.

4. Use tick marks to record the number of times that each subject performs the activities on your list. Continue observing for 10 minutes. Add up the number of tick marks for each behavior.  
5. Record your results on the board.

Conclusions  
1. Summarizing Results  
   Calculate the average number of times subjects engaged in each of the observed behaviors.  
2. Analyzing Results  
   Which behavior did the subjects engage in the most? Which behavior did they engage in the least?

3. CRITICAL THINKING  
   What are some consequences of the behaviors you observed on the spread of infectious diseases? Why might these behaviors be unhealthy?  

4. CRITICAL THINKING  
   Based on your results and analyses, what recommendations would you make that could improve individual health and help reduce the spread of diseases from person to person?
The most effective way to wash your hands is to count to ten while rubbing your hands in the soap and then rinse well. When should you wash your hands?

- before eating or preparing a meal
- after handling uncooked meats or raw vegetables
- after going to the bathroom or changing a baby’s diaper
- after touching or playing with animals or working outdoors
- after you sneeze or cough into your hand
- after coming into contact with a sick person

**Don’t Share Personal Items** You should also avoid sharing personal items, such as toothbrushes. Avoid sharing the same food or drink with others. Sharing these things increases the chance that you might pass an illness to another person or contract a disease from someone who is infected.

**Cover Your Mouth!** You should cover your mouth when you sneeze or cough. After sneezing, you should wipe your nose with disposable tissues and throw them away immediately. This practice helps reduce the chance that others will become infected.

**Be On Guard Outdoors** Following a few simple rules while outdoors can greatly reduce your chances of contracting a disease from animals or insects.

- When in long grass, wear long-sleeved shirts and pants.
- Use a safe and effective insect repellant when necessary.
- Avoid contact with animals that behave strangely.
- Avoid drinking and swimming in remote streams, rivers, or lake waters.

---

**SECTION 2 REVIEW**

**Using Key Terms**

1. Define the term *inflammation*.
2. Define the term *vaccine*.
3. Name the term for a “cell in the blood whose primary job is to defend the body against disease.”

**Understanding Key Ideas**

4. Name two physical barriers that your body has to guard against pathogens.
5. Identify which of the following is *not* a part of the body’s immune system.
   a. antibodies
   b. white blood cells
   c. lymph nodes
   d. heart

6. Identify which of the following activities can help you stay well.
   a. avoiding exercise
   b. getting enough sleep
   c. sharing a toothbrush
   d. sharing a drink

7. Describe how vaccinations work to protect the body from illness.

8. **LIFE SKILL** Setting Goals State three things you can do to help yourself when you are sick.

9. **LIFE SKILL** Practicing Wellness List four times when you should wash your hands.

**Critical Thinking**

10. Explain why it is important that your body has several different defenses to protect you from pathogens.
amelia could not believe that she was home in bed and sick with pneumonia. She did not understand how she could have become sick. After all, she ate a healthy diet, exercised regularly, and always had her yearly checkups at the doctor. Why was she sick?

Diseases Affect Everybody
No matter how healthy we are, we all become ill from infectious diseases sometime during our lives. There are so many different pathogens in so many places that it is impossible to avoid them. Sometimes, the illness may be minor. At other times, however, serious complications may arise. Although the young and the elderly are most susceptible to infectious diseases, we are all capable of being infected.

Our best defense against pathogens is to avoid behaviors that increase our chances of becoming infected. In general, the more you know about preventing a disease and identifying its symptoms, the better your chances are of avoiding it.
Common Bacterial Diseases

Bacteria are found on almost everything around us, from our books and clothes to our food. Many bacteria, however, prefer to live in dark, warm, and moist places such as inside our bodies. In the human body, bacteria can grow and multiply quickly. As a result, it is not surprising that diseases caused by bacteria are very common.

Tetanus

Symptoms
severe muscle spasms

Transmission
tetanus causing bacteria are commonly found in soil; can enter body through cuts or wounds

Prevention
series of vaccinations during childhood; boosters every 5 to 10 years as an adult

Treatment
antibiotics
Tetanus immune globulin

Strep throat

Symptoms
sore throat, fever, and yellow or white specks on tonsils

Transmission
spread by contact with mucus from an infected person

Prevention
avoiding contact with infected person

Treatment
antibiotics

Copyright © by Holt, Rinehart and Winston. All rights reserved.
Maybe you’ve had strep throat or a sinus infection, or maybe you have gotten food poisoning after eating chicken that wasn’t thoroughly cooked. Bacteria are responsible for causing these illnesses, in addition to meningitis, salmonellosis, and many others.

**Meningitis**

an inflammation of the membranes covering the brain and spinal cord; can also be caused by viruses or sometimes by fungi or parasites

**Symptoms**
severe headache, fever, stiff neck, sensitivity to light, and nausea

**Transmission**
pathogen is spread by contact with saliva or mucus from an infected person

**Prevention**
vaccination for some bacterial forms of meningitis, avoiding contact with infected persons

**Treatment**
antibiotics, if bacterial disease is caught early

---

**Sinus infections**

**Symptoms**
headache; tenderness of the sinuses; thick, greenish mucus; and feeling of pressure in your head

**Transmission**
bacteria are spread by contact with mucus from the nose or throat of an infected person

**Prevention**
avoiding infected person and allergens, such as cigarette smoke and other air pollutants

**Treatment**
antibiotics

---

**Salmonellosis**
a bacterial infection of the digestive system, usually spread by eating contaminated foods

**Symptoms**
headache, cramps, diarrhea, nausea, vomiting

**Transmission**
eating food from an infected animal or food contaminated by an infected person

**Prevention**
thorough cooking of animal food products, hand washing, refrigeration

**Treatment**
over the counter medicines to treat symptoms, sometimes requires antibiotics
You have probably contracted one or more viral diseases before. Maybe you have suffered through a few colds and the flu. Some viral diseases, such as the flu, can often be handled by your body, while others, such as hepatitis, are more serious. In Table 1, you’ll learn about the symptoms, transmission, prevention, and treatment of several viral diseases.

<table>
<thead>
<tr>
<th>Type</th>
<th>Symptoms</th>
<th>Transmission</th>
<th>Prevention</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flu</td>
<td>headache, sore muscles, sore throat, fever, vomiting, fatigue, and cough</td>
<td>spread by contact with saliva or mucus of an infected person and by personal contact</td>
<td>vaccination and avoiding contact with infected person</td>
<td>rest and plenty of fluids; no specific treatments; see doctor if symptoms become severe</td>
</tr>
<tr>
<td>Cold</td>
<td>scratchy, sore throat; sneezing and runny nose; and mild cough</td>
<td>spread by contact with saliva or mucus of an infected person</td>
<td>washing hands regularly and avoiding contact with infected person</td>
<td>rest and plenty of fluids; no specific treatments; see doctor if symptoms become severe</td>
</tr>
<tr>
<td>Mumps</td>
<td>pain and swelling of glands in the throat, fever, and headache</td>
<td>spread by contact with infected airborne droplets and personal contact</td>
<td>vaccination</td>
<td>see doctor; rest and plenty of fluids; no specific treatments</td>
</tr>
<tr>
<td>Measles</td>
<td>fatigue, runny nose, cough, slight fever, small white dots in mouth, and rash covering body</td>
<td>spread by contact with saliva or mucus of infected person</td>
<td>vaccination</td>
<td>see doctor; rest and plenty of fluids; no specific treatments</td>
</tr>
<tr>
<td>Mononucleosis</td>
<td>fever, swollen lymph nodes, sore throat, and weakness</td>
<td>spread by contact with saliva or mucus of an infected person</td>
<td>avoiding drinking from the same glass and eating from the same food as other people</td>
<td>see doctor; rest and plenty of fluids; no specific treatments</td>
</tr>
<tr>
<td>Hepatitis</td>
<td>inflammation of the liver, jaundice (yellowing of the skin), fever, and darkening of the urine</td>
<td>spread by contact with bodily fluids of infected person and by eating infected food or water</td>
<td>vaccination for hepatitis A and B, washing hands regularly, and avoiding contact with infected person</td>
<td>see doctor; rest and medications for hepatitis A; no cure for hepatitis B and C</td>
</tr>
</tbody>
</table>
Other Common Infections

When we think of infections, we often think of infections caused by bacteria or viruses. We may forget that there are several other kinds of pathogens in our environment, such as fungi, protozoa, and parasites.

**Fungal Infections**  Fungi are an important source of food and drugs, but some kinds of fungi can actually be harmful. Athlete’s foot, jock itch, and ringworm are examples of infections caused by fungi. These infections occur most often when the specific type of fungus comes into contact with skin that is warm and moist. With fungal infections, the skin can become itchy and red and lesions may appear.

The best way to prevent fungal infections is to keep clothing, such as socks and underwear, dry and to maintain good personal hygiene. If a fungal infection does arise, over-the-counter medications will usually kill the fungus. If the symptoms continue or become severe, it is important to see a doctor immediately.

**Protozoan Infections**  Protozoa are most often found in water and soil. About 20,000 kinds of protozoa exist, but only a small number of them cause disease. Some infections caused by protozoa include amebic dysentery, malaria, and African sleeping sickness. **Amebic dysentery** (uh MEE bik DIS uhn TER ee) is an inflammation of the intestine caused by an ameba. Symptoms of amebic dysentery include nausea, diarrhea, and sometimes fever.

The most widespread and serious of the protozoan infections worldwide is malaria. Worldwide, several million people are infected with malaria each year. Approximately one million people die from malaria each year. Malaria is caused by a protozoan that is passed from one person to another by mosquitoes. Symptoms include fever, chills, headache, fatigue, and nausea. Malaria can be prevented and treated with antimalarial drugs prescribed by a doctor.

**Parasitic Infections**  Diseases can also be caused by animal parasites. Animals such as hookworms, flukes, pinworms, and tapeworms can live inside the body and cause disease. Examples of animal parasites that live on the body are lice, leeches, ticks, and fleas. Animal parasites can be spread to and infect the body in several ways. Eating infected food, drinking infected water, having contact with infected soil, and being bitten by infected insects are some of the ways that a person can contract a parasitic infection.

Body lice are one of the most common parasitic infections in the United States. Body lice can often be seen with the naked eye and often cause itchiness and sores on the head. The best way to treat body lice is through a combination of using over-the-counter medications, washing linens, soaking brushes and combs in hot water and soap, and vacuuming carpet and furniture.
Because it is so easy for diseases to travel from one country to another, it is important that the effort to improve public health be a global one.

**Working Toward a Healthy Future**

Today you can travel almost anywhere in the world in just a few hours. International air travel not only has made it easier for people to see the world but also has made it easier for diseases to spread from country to country. Because diseases can be spread so easily, it is important for everyone throughout the world to work together to fight disease.

Because diseases can be spread so quickly and easily, doctors have had difficulty controlling infectious diseases. Government scientists at the Centers for Disease Control and Prevention (CDC) and the National Institutes of Health (NIH) are now watching for new diseases that may enter the country.

It is important to have an efficient and effective public health system to prevent or manage an infectious disease outbreak. Even though great progress has been made in the ability to protect the public’s health, the methods and financial resources needed for such progress are not available in many parts of the world. As a result, public health problems and priorities vary throughout the world.

Public health organizations also work to control or eliminate diseases. Health organizations are working hard to control or eliminate diseases such as measles, mumps, rubella, and polio. Smallpox is an example of a disease that has been declared eradicated in nature. However, even with advances in medicine and great effort, eliminating a disease is very difficult.

Even if we are able to control or eliminate many diseases, new diseases may be discovered and diseases that we have under control may become resistant to our medicines. Thus, we must maintain healthy habits and lifestyles to ensure global health for the future.

---

**SECTION 3**

**REVIEW**

*Answer the following questions on a separate piece of paper.*

**Using Key Terms**

1. **Describe** the symptoms of salmonellosis.
2. **Identify** the term for “inflammation of the liver.”
3. **Define** the term *amebic dysentery*.

**Understanding Key Ideas**

4. **Identify** why anyone can become affected by an infectious disease.
5. **Identify** one method used to prevent tetanus.
   a. antibiotics
   b. skin test
   c. series of vaccinations
   d. muscle spasms
6. **Identify** three symptoms of bacterial meningitis.
7. **Classify** the following as bacterial diseases or viral diseases.
   a. strep throat
   b. tuberculosis
   c. measles
   d. mononucleosis
8. **Describe** the symptoms of hepatitis.
9. **Identify** the most widespread disease caused by protozoa.
10. **Name** three ways to treat body lice.

**Critical Thinking**

11. **LIFE SKILL** Using Community Resources Explain why it is important to have organizations in every community that help treat and prevent the spread of disease.
## Highlights

### Key Terms

<table>
<thead>
<tr>
<th>SECTION 1</th>
<th>Infectious disease (316)</th>
<th>Pathogen (317)</th>
<th>Bacteria (317)</th>
<th>Virus (317)</th>
<th>Fungus (317)</th>
<th>Antibiotic resistance (320)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SECTION 2</th>
<th>Inflammation (323)</th>
<th>Lymphatic System (324)</th>
<th>White Blood Cells (324)</th>
<th>Vaccine (325)</th>
<th>Symptom (326)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>SECTION 3</th>
<th>Meningitis (331)</th>
<th>Salmonellosis (331)</th>
<th>Hepatitis (332)</th>
<th>Amoebic Dysentery (333)</th>
</tr>
</thead>
</table>

### The Big Picture

- An infectious disease is any disease that is caused by an agent that has invaded the body.
- Infectious diseases can be caused by several kinds of pathogens, such as bacteria, viruses, fungi, protozoa, or parasites.
- Infectious diseases can be spread from one person to another or through food, water, the environment, or animals.
- Specific types of pathogens have specific treatments. Antibiotics are used to treat bacterial infections. Viral diseases cannot be treated with antibiotics.
- Antibiotic resistance is a growing problem that is a threat to everyone's health.

- The body's first line of defense against pathogens includes the skin, mucous membranes, and body chemicals.
- Inflammation protects your body from pathogens that cross the body's first line of defense. The injured area swells and turns red.
- The immune system uses immune cells to target and kill specific pathogens.
- Eating a balanced diet, reducing stress, exercising regularly, and keeping up to date on all your vaccinations are things a person can do to help maintain his or her health.
- When you are sick, it is important to stay home, rest, and follow the directions of your doctor.
- Being vaccinated, washing hands frequently, and not sharing personal items help prevent the spread of disease.

- Infectious diseases can affect everyone, especially the young and the elderly.
- Bacteria are found everywhere and are a common cause of disease. Strep throat, salmonellosis, and sinus infections are common bacterial diseases.
- Although there are no cures for many viral diseases, rest and fluids can help speed recovery. The common cold, flu, hepatitis, mononucleosis, and chickenpox are diseases caused by viruses.
- Diseases caused by fungi, protozoa, and animal parasites are treated differently than diseases caused by bacteria and viruses are. Worldwide, protozoa are the cause of several serious infections, such as malaria.
- Increases in world travel and poverty in many parts of the world have made it more difficult for doctors to fight infectious diseases.
- Public health organizations work to control or eliminate diseases.
Using Key Terms

amebic dysentery (333) meningitis (331)
antibiotic resistance (320) pathogen (317)
bacteria (317) salmonellosis (331)
fungus (317) symptom (326)
hepatitis (332) vaccine (325)
infectious disease (316) virus (317)
inflammation (323) white blood cell (324)
lymphatic system (324)

1. For each definition below, choose the key term that best matches the definition.
   a. a bacterial infection of the digestive system, usually spread by eating infected food.
   b. a network of vessels that carries a clear fluid called lymph throughout the body.
   c. any agent that causes disease.
   d. a reaction to injury or infection, characterized by pain, redness, and swelling.
   e. a change that a person notices in his or her body or mind that is caused by a disease or disorder.
   f. blood cells whose primary job is to defend the body against disease.

2. Explain the relationship between the key terms in each of the following pairs.
   a. hepatitis and virus
   b. bacteria and antibiotic resistance
   c. amebic dysentery and meningitis

Understanding Key Ideas

Section 1

3. Which of the following do not cause infectious diseases?
   a. bacteria
   b. white blood cells
   c. fungi
   d. viruses

4. Describe the differences between bacteria and viruses.

5. List four ways that infectious diseases can be spread.

6. What kinds of diseases can antibiotics cure?

7. What are three ways that you can help prevent the spread of antibiotic resistant bacteria?

Section 2

8. Which of the following is part of the body’s first line of defense?
   a. the skin
   b. red blood cells
   c. white blood cells
   d. immune system

9. Which of the following is part of the body’s inflammatory response?
   a. sleeping
   b. swelling
   c. sweating
   d. tears

10. What are three activities we can do to stay well?

11. Name three signs that indicate you need to seek medical care.

12. Describe the role of white blood cells in developing immunity from pathogens.

13. What are three things you should do when you are sick?

14. What are three things you can do to prevent the spread of infectious diseases?

Section 3

15. Which of the following statements describes why all people can become infected by an infectious disease?
   a. Pathogens are in so many places.
   b. Bacteria live inside our bodies.
   c. The elderly are more susceptible to infectious diseases than the young are.
   d. none of the above

16. What is the best way to keep from being infected with strep throat?

17. Tetanus is a ______ disease.
   a. viral
   b. fungal
   c. parasitic
   d. bacterial

18. Which of the following are symptoms of measles?
   a. inflamed liver
   b. swollen glands
   c. muscle spasms
   d. rash covering body

19. Worldwide, what is the most common protozoan disease?

20. CRITICAL THINKING Explain why it is important to have an efficient public health system if an outbreak of a disease occurs.
Interpreting Graphics

Study the figure below to answer the questions that follow.

Top Four Infectious Disease Killers in the World

<table>
<thead>
<tr>
<th>Disease</th>
<th>Number of Deaths (in millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute respiratory infections</td>
<td>3.5</td>
</tr>
<tr>
<td>AIDS</td>
<td>2.5</td>
</tr>
<tr>
<td>Diarrheal diseases</td>
<td>2.0</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>1.5</td>
</tr>
</tbody>
</table>


21. What is the number of deaths due to acute respiratory infections?

22. What is the total number of deaths due to AIDS and tuberculosis?

23. CRITICAL THINKING Why do you think acute respiratory infections are the cause of such a large number of deaths?

Activities

24. Health and You Contact your doctor, and ask for a copy of your immunization record. Make a list of diseases you have been vaccinated for, and research when you need your next booster shots.

25. Health and Your Community Choose a disease listed on pp. 326 and 327 and research that disease. Explore what measures are being taken by public health organizations to prevent the disease. Write a one-page report to explain your findings.

26. Health and You Work with a partner to create a list of all of the objects that come into contact with your eyes, nose, and mouth each day that could contain pathogens.

Action Plan

27. Assessing Your Health Establishing healthy patterns of living can help reduce the chance of spreading disease. Explain five habits that you can begin now to help keep you from spreading infectious diseases.

28. In this passage, the word adequate means
   A wrong.
   B unfortunate.
   C enough.
   D expensive.

29. What can you infer from reading this passage?
   E Tanita does not like band practice.
   F Tanita did not take enough medicine to completely cure her infection.
   G Tanita works at a bank.
   H none of the above

30. Write a paragraph describing why Tanita might have become sick again. Explain what might happen if she takes the same antibiotic again.

31. Write a paragraph describing how Tanita could have prevented herself from getting strep throat in the beginning.

Standardized Test Prep

Read the passage below, and then answer the questions that follow.

Tanita went to the doctor 2 weeks ago for a sore throat. Her doctor told her that she had strep throat and that she needed to take antibiotics for 2 weeks and rest. After a few days of rest and taking her medicine, Tanita felt much better. She decided that she had taken an adequate amount of antibiotics to cure her strep throat. So she decided to stop taking the pills and went back to school. Yesterday, however, after band practice, she began to have a fever and sore throat again. Tanita couldn't understand why she felt bad again. After all, she had taken medicine and rested, as her doctor ordered.