Infectious and Noninfectious Conditions

RISKS AND RESPONSIBILITIES

OBJECTIVES

- Explain how your immune system works to protect you and what you can do to boost its effectiveness.
- Describe the most common pathogens infecting humans today and the typical diseases each causes.
- Discuss the various sexually transmitted infections, their means of transmission, and actions that can be taken to prevent their spread.
- Discuss human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS), trends in infection and treatment, and the impact on special populations.
- Discuss noninfectious diseases, including asthma and lower back pain.
very moment of every day, you are in contact with microscopic organisms that have the ability to cause illness or even death. These disease-causing agents, known as pathogens, are found in air and food and on nearly every object and person with whom you come in contact. New varieties of pathogens arise all the time, and scientific evidence indicates that many have existed for as long as there has been life on the planet. Fossil evidence shows that infections, cancer, heart disease, and a host of other ailments afflicted the earliest humans. At times, infectious diseases have wiped out whole groups of people through epidemics such as the Black Death, or bubonic plague, which killed up to one-third of the population of Europe in the 1300s. A pandemic, or global epidemic, of influenza killed more than 20 million people in 1918, and strains of tuberculosis and cholera continue to cause premature death throughout the world.

In spite of our best efforts to eradicate them, these diseases continue to be a menace, and new diseases emerge all the time. The news isn’t all bad; even though we are bombarded by potential pathogenic threats, our immune systems are remarkably adept at protecting us. Millions of microorganisms live in and on our bodies all the time, usually in peaceful coexistence and to our mutual benefit. For people in good health and whose immune systems are functioning properly, these endogenous organisms are generally harmless; but, in sick people or those with weakened immune systems, these organisms can cause serious health problems.

Exogenous microorganisms are organisms that do not normally inhabit the body. When they do, however, they are apt to produce an infection and/or illness. The more easily these pathogens can gain a foothold in the body and sustain themselves, the more virulent, or aggressive, they may be in causing disease. By keeping your immune system strong, you will increase your ability to resist and fight off even the most virulent attacker.

Your Susceptibility to Disease

Factors You Cannot Control

Unfortunately, some of the factors that make you susceptible to a certain disease are beyond your control. The following are the most common:

- **Heredity.** Perhaps the single greatest factor influencing disease risk is genetics. Being born into a family in which heart disease, cancer, or other illnesses are prevalent increases a person’s risk. It is often unclear whether hereditary diseases are due to inherited genetic traits or to inherited insufficiencies in the immune system. Some believe that we may inherit even the quality of our immune system, so that some people are naturally “tougher” than others and more resilient to disease and infection.

- **Aging.** After age 40 we become more vulnerable to most chronic diseases. Moreover, as we age, our immune systems respond less efficiently to invading organisms, thus increasing risk for infection and illness. The very young are also at risk for many diseases, particularly if they are not vaccinated against them.

- **Environmental conditions.** Unsanitary conditions and the presence of drugs, chemicals, and hazardous pollutants and wastes in food and water probably have a great effect on our immune systems. A growing body of research points to changes in the environment (such as global warming) and natural disasters as significant contributors to increasing numbers of infectious diseases.\(^1\)

- **Organism resistance.** Some organisms, such as the foodborne organism that causes botulism (a severe type of food poisoning), are particularly virulent, and even tiny amounts may make the most hardy of us ill. Other organisms have mutated and become resistant to the body’s defenses as well as to medical treatments designed to protect against them. Still other, newer pathogens pose unique challenges that our bodily defenses are ill adapted to fight.

Factors You Can Control

The good news is that we all have some degree of personal control over many risk factors for disease. Too much stress, inadequate nutrition, a low level of physical fitness, lack of sleep, misuse or abuse of legal and illegal substances, poor personal hygiene, high-risk behaviors, and other variables significantly increase the risk for a number of diseases. Fortunately, many of these are within our control, at least partly. Table 13.1 lists actions you can take to keep your body’s defenses healthy.
Routes of Transmission

Pathogens enter the body in several ways. They may be transmitted by direct contact between infected persons, such as during sexual relations, kissing, or touching, or by indirect contact, such as by touching an object the infected person has had contact with. Table 13.2 lists common routes of transmission.

The hands are probably the greatest source of infectious disease transmission. You may also autoinoculate yourself, or transmit a pathogen from one part of your body to another. For example, you may touch a sore on your lip that is teeming with viral herpes and then transmit the virus to your eye when you scratch your itchy eyelid.

Your best friend may be the source of animal-borne pathogens. Dogs, cats, livestock, and wild animals can spread numerous diseases through their bites or feces or by carrying infected insects into living areas and transmitting diseases either directly or indirectly. Although interspecies transmission of diseases (diseases passed from humans to animals and vice versa) is rare, it does occur.

Physical and Chemical Defenses: Your Body Responds

Perhaps our single most critical early defense system is the skin. Layered to provide an intricate web of barriers, the skin allows few pathogens to enter. Enzymes, complex proteins manufactured by the body that appear in body secretions such as sweat, provide additional protection, destroying microorganisms on skin surfaces by producing inhospitable pH levels. In either case, microorganisms that flourish at a selected pH will be weakened or destroyed as these changes occur.

The internal linings of the body provide yet another protection. Mucous membranes in the respiratory tract and other
linings of the body trap and engulf invading organisms. Cilia, hairlike projections in the lungs and respiratory tract, sweep invaders toward body openings, where they are expelled. Tears, nasal secretions, ear wax, and other secretions found at body entrances contain enzymes designed to destroy or neutralize pathogens. Finally, any organism that manages to breach these initial lines of defense faces a formidable specialized network of defenses thrown up by the immune system.

The Immune System: Your Body Fights Back

Immunity is a condition of being able to resist a particular disease by countering the substance that produces the disease. Any substance capable of triggering an immune response is called an antigen. An antigen can be a virus, a bacterium, a fungus, a parasite, a toxin, or a tissue or cell from another organism. When invaded by an antigen, the body responds by forming substances called antibodies that are matched to that specific antigen, much as a key is matched to a lock. Antibodies belong to a group of large molecules known as immunoglobulins, nine chemically distinct protein substances, each of which plays a role in neutralizing, setting up for destruction, or actually destroying antigens.

antigen  Substance capable of triggering an immune response.
antibodies  Substances produced by the body that are individually matched to specific antigens.

Once an antigen breaches the body’s initial defenses, the body begins a process of antigen analysis. It considers the size and shape of the invader, verifies that the antigen is not part of the body itself, and then produces a specific antibody to destroy or weaken the antigen. This process, which is much more complex than described here, is part of a system called humoral immune responses. Humoral immunity is the body’s major defense against many bacteria and the poisonous substances, called toxins, that they produce.

Cell-mediated immunity is characterized by the formation of a population of lymphocytes (specialized white blood cells) that can attack and destroy the foreign invader. These lymphocytes constitute the body’s main defense against viruses, fungi, parasites, and some bacteria, and they are found in the blood, lymph nodes, bone marrow, and certain glands. Other key players in this immune response are macrophages (a type of phagocytic, or cell-eating, white blood cell).

Two forms of lymphocytes in particular, the B lymphocytes (B cells) and T lymphocytes (T cells), are involved in the immune response. They are named according to the area of the body in which they develop: most B cells are manufactured in the soft tissue of the hollow shafts of the long bones. T cells, in contrast, develop and multiply in the thymus, a multilobed organ that lies behind the breastbone. T cells assist the immune system in several ways. Regulatory T cells help direct the activities of the immune system and assist other cells, particularly B cells, to produce antibodies. Dubbed “helper T cells,” these cells are essential for activating B cells, other T cells, and macrophages. Another form of T cell, known as the killer T cell or cytotoxic T cell, directly attacks infected or malignant cells. Killer T cells enable the body to rid itself of cells that have been infected by viruses or transformed by cancer; they are also responsible for rejecting tissue and organ grafts. The third type of T cells, suppressor T cells, turns off or suppresses the activity of B cells, killer T cells, and macrophages. Suppressor T cells circulate in the bloodstream and lymphatic system, neutralizing or destroying antigens, enhancing the effects of the immune response, and helping to return the activated immune system to normal levels.

After a successful attack on a pathogen, some of the attacker T and B cells are preserved as memory T and B cells, enabling the body to recognize and respond quickly to subsequent attacks by the same kind of organism at a later time.

Once people have survived certain infectious diseases, they become immune to those diseases, meaning that in all probability they will not develop them again. Upon subsequent attack by the same disease-causing microorganisms, their memory T and B cells are quickly activated to come to their defense. Figure 13.1 provides a summary of the immune response.

Autoimmune Diseases  Although white blood cells and the antigen–antibody response generally work in our favor by neutralizing or destroying harmful antigens, the body sometimes makes a mistake and targets its own tissue as the enemy, builds up antibodies against that tissue, and

TABLE 13.2 Routes of Disease Transmission

<table>
<thead>
<tr>
<th>Mode of Transmission</th>
<th>Aspects of Transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contact</td>
<td>Either direct (e.g., skin or sexual contact) or indirect (e.g., infected blood or body fluid)</td>
</tr>
<tr>
<td>Food- or waterborne</td>
<td>Eating or coming in contact with contaminated food or water or products passed through them</td>
</tr>
<tr>
<td>Airborne</td>
<td>Inhalation; droplet spread as through sneezing, coughing, or talking</td>
</tr>
<tr>
<td>Vectorborne</td>
<td>Transmitted by an animal, such as a mosquito, tick, snail, or bird, by means of its secretions, biting, or egg laying; transmission depends on how infectious the organism is</td>
</tr>
<tr>
<td>Perinatal</td>
<td>Similar to contact infection; happens in the uterus or as the baby passes through the birth canal</td>
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</tbody>
</table>
Antigens invade the body by breaking through one of our protective barriers. They take over body cells in order to replicate.

**PHASE 1**

Antigens invade the body by breaking through one of our protective barriers. They take over body cells in order to replicate.

**PHASE 2**

Helper T cells recognize the invading antigens and trigger the production of killer T cells and B cells.

**PHASE 3**

Killer T cells destroy infected cells. B cells produce antibodies that attach to antigens and mark them for destruction by macrophages.

**PHASE 4**

When the threat is over, suppressor T cells stop the activity of B cells, killer T cells, and macrophages. Memory B and T cells are reserved so the body can respond quickly to future attacks by the same antigen.

**FIGURE 13.1 The Immune Response**

Attempts to destroy it. This is known as *autoimmune disease* (*auto* means “self”). Common autoimmune disorders are rheumatoid arthritis, systemic lupus erythematosus (SLE), and myasthenia gravis.

In some cases, the antigen–antibody response completely fails to function. The result is a form of *immunodeficiency syndrome* such as that found in HIV and AIDS (see the section on HIV/AIDS in this chapter).

**Fever**

If an infection is localized, pus formation, redness, swelling, and irritation often occur. These symptoms indicate that the invading organisms are being fought systematically. Another indication is the development of a fever, or a rise in body temperature above the average norm of 98.6°F. Fever is frequently caused by toxins secreted by pathogens that interfere with the control of body temperature. Although extremely elevated temperatures are harmful to the body, a mild fever is believed to act as a form of protection: raising body temperature by 1 or 2 degrees provides an environment that destroys some disease-causing organisms. A fever also stimulates the body to produce more white blood cells, which destroy more invaders.

**Pain**

Although you may not usually think of pain as a defense mechanism, it is a response to injury and plays a valuable role in the body’s response to invasion. Pain tends to be the earliest sign that an injury has occurred and often causes the person to slow down or stop the activity that was aggravating the injury, thereby protecting against further damage. Because it is often one of the first warnings of disease, persistent pain should not be overlooked or masked with short-term pain relievers.
PART FIVE Preventing and Fighting Disease

Vaccines: Bolstering Your Immunity

Recall that once people have been exposed to a specific pathogen, subsequent attacks will activate their memory T and B cells, thus giving them immunity. This is the principle on which vaccination is based.

A vaccine consists of killed or weakened versions of a disease-causing microorganism or an antigen that is similar to but less dangerous than the disease antigen. It is administered to stimulate the person’s immune system to produce antibodies against future attacks—without actually causing the disease (or by causing a very minor case of it). Vaccines typically are given orally or by injection, and this form of artificial immunity is termed artificially acquired active immunity, in contrast to naturally acquired active immunity (which is obtained by exposure to antigens in the normal course of daily life) or naturally acquired passive immunity (as occurs when a mother passes immunity to her fetus via their shared blood supply or to an infant via breast milk).

Depending on the virulence of the organism, vaccines containing live, attenuated, or dead organisms are given for a variety of diseases. Childhood vaccinations are key, but so are adult vaccinations. Figure 13.2 shows the recommended schedule for adult vaccinations.

Living with Allergies

An allergy occurs as part of the body’s attempt to defend itself against a specific antigen or allergen by producing specific antibodies. When foreign pathogens such as bacteria or viruses invade the body, the body responds by producing antibodies to destroy these invading antigens. Under normal conditions, the production of antibodies is a positive element in the body’s defense system. However, for unknown reasons, in some people the body overreacts by developing an overly elaborate protective mechanism against relatively harmless substances. The resulting hypersensitivity reaction to specific antigens in the environment is fairly common, as anyone who has awakened with a runny nose or itchy eyes will testify. Most commonly, these hypersensitivity, or allergic, responses occur as a reaction to environmental antigens such as molds, animal dander (hair and dead skin), pollen, ragweed, or dust. Once excessive antibodies to these antigens are produced, they trigger the...

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**Figure 13.2 Recommended Adult Immunization Schedule, by Vaccine and Age Group, 2007**

Note that there are important explanations and additions to these recommendations that should be consulted by checking the latest schedule (available on the Centers for Disease Control and Prevention website).


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vaccination  Inoculation with killed or weakened pathogens or similar, less dangerous antigens to prevent or lessen the effects of some disease.

allergy  Hypersensitive reaction to a specific antigen or allergen in the environment, in which the body produces excessive antibodies to that antigen or allergen.
Hay Fever

Hay fever, or pollen allergies, is common throughout the world and is one of the most common chronic diseases in the United States. Hay fever attacks, which are characterized by sneezing and itchy, watery eyes and nose, make countless people miserable for weeks at a time every year. As with other allergies, hay fever results from an overzealous immune system, and it appears to run in families. Many trees, grasses, and weeds produce pollen that is associated with hay fever in some people. Avoiding the environmental triggers is the best way to prevent hay fever. If you can’t prevent it, shots or antihistamines often provide relief.

Types of Pathogens and Diseases They Cause

We can categorize pathogenic microorganisms into six major types: bacteria, viruses, fungi, protozoa, parasitic worms, and prions. Figure 13.4 shows examples of several of these pathogens.

Bacteria

Bacteria (singular: bacterium) are simple, single-celled microscopic organisms. There are three major types of bacteria, as classified by their shape: cocci, bacilli, and spirilla. Although there are several thousand known species of bacteria (and many thousands more that are unknown), just over 100 known species of bacteria cause disease in humans.
100 cause diseases in humans. In many cases, it is not the bacteria themselves that cause disease but rather the toxins that they produce. The following are the most common bacterial infections.

**Staphylococcal Infections**  Staphylococci are normally present on our skin at all times and usually cause few problems, but when there is a cut or break in the epidermis, or outer layer of the skin, staphylococci may enter and cause a localized infection. If you have ever suffered from acne, boils, styes (infections of the eyelids), or infected wounds, you have probably had a “staph” infection. Although most such infections are readily defeated by your immune system, resistant forms of staph bacteria are on the rise. These bacteria pose serious risks to people infected and must be treated with heavy doses of antibiotics. Some health experts worry that in time, our ability to kill staph organisms will be compromised as organisms grow stronger and our arsenal of agents to kill them dwindles. Keeping wounds clean and sterile is a crucial part of reducing the risk of staph infections.

At least one staph-caused disorder, toxic shock syndrome (TSS), is potentially fatal. To date, most cases of TSS have occurred in menstruating women or after surgery among both men and women. If you are a menstruating woman, you can reduce the likelihood of toxic shock syndrome by taking the following precautions: (1) avoid superabsorbent tampons, except during the heaviest menstrual flow; (2) change tampons at least every 4 hours; and (3) use pads at night instead of tampons.

**Streptococcal Infections**  At least five types of the streptococcus microorganism are known to cause bacterial infections. Group A streptococci (GAS) cause the most common diseases, such as streptococcal pharyngitis (“strep throat”) and scarlet fever, which is often preceded by a sore throat. Group B streptococci can cause illness in newborn babies, pregnant women, older adults, and adults with other illnesses such as diabetes or liver disease. One particularly virulent group of GAS can lead to a disease known as necrotizing faciitis (often referred to as “flesh-eating strep”); a rare, but serious, disease that leads to death in about 30 percent of all cases, even with vigorous antibiotic treatment.

**Meningitis**  Meningitis is an infection and inflammation of the meninges, the membranes that surround the brain and spinal cord. Some forms of bacterial meningitis are contagious and can be spread through contact with saliva, nasal discharge, feces, or respiratory and throat secretions. Pneumococcal meningitis, the most common form of meningitis, is the most dangerous form of bacterial meningitis. Approximately 6,000 cases of pneumococcal meningitis are reported in the United States each year. Meningococcal meningitis, a virulent form of meningitis, has risen dramatically on college campuses in recent years. College students living in dormitories have a higher risk of contracting this disease than those who live off campus.

The signs of meningitis are sudden fever, severe headache, and a stiff neck, particularly causing difficulty touching your
chin to your chest. Pneumococcal meningitis symptoms may include nausea and vomiting, confusion and disorientation, drowsiness, and poor appetite. Persons who are suspected of having meningitis should receive immediate, aggressive medical treatment. The infection can progress quickly, and early treatment is critical to the outcome. Vaccines are available for some types of meningitis.

**Pneumonia** In the early twentieth century, pneumonia was a leading cause of death in the United States. This lung disease is characterized by chronic cough, chest pain, chills, high fever, fluid accumulation, and eventual respiratory failure. One of the most common forms of pneumonia is caused by bacterial infection and responds readily to antibiotic treatment in the early stages. Other forms are caused by viruses, chemicals, or other substances in the lungs and are more difficult to treat. Although medical advances have reduced the overall incidence of pneumonia, it continues to be a major threat in the United States and throughout the world. Vulnerable populations include the poor, older adults, and people already suffering from other illnesses.

**Tuberculosis** A major killer in the United States in the early twentieth century, tuberculosis (TB) was largely controlled in America by 1950 as a result of improved sanitation, isolation of infected persons, and treatment with drugs such as rifampin or isoniazid. Though many health professionals assumed that TB had been conquered, that appears not to be the case. During the past 20 years, several factors have led to an epidemic rise in the disease: deteriorating social conditions, including overcrowding and poor sanitation; failure to isolate active cases of TB; a weakening of public health infrastructure, which has led to less funding for screening; and migration of TB to the United States through immigration and international travel. In 2006, there were 13,767 active cases of tuberculosis in the United States. It is estimated that one-third of the world’s inhabitants (over 2 billion humans) carry the TB bacterium, Mycobacterium tuberculosis, and infection is spreading at the rate of 1 person per second. An estimated 15 million people live with active TB, and 2 million people die from it each year.

Tuberculosis is caused by bacterial infiltration of the respiratory system that results in a chronic inflammatory reaction in the lungs. Airborne transmission via the respiratory tract is the primary and most efficient mode of transmitting TB. Symptoms include persistent coughing, weight loss, fever, and spitting up blood. Infected people can be contagious without actually showing any symptoms themselves and can transmit the disease while talking, coughing, sneezing, or singing. Fortunately, TB is fairly difficult to catch, and prolonged exposure, rather than single exposure, is the typical mode of infection. Treatments are effective for most nonresistant cases and usually include rest, careful infection-control procedures, and drugs to combat the infection.

**Peptic Ulcers** An ulcer is a lesion or wound that forms in body tissue as a result of some irritant. A peptic ulcer is a chronic ulcer that occurs in the lining of the stomach or the section of the small intestine known as the duodenum. The lining of these organs becomes irritated, the protective covering of mucus is reduced, and the gastric acid begins to digest the dying tissue, just as it would a piece of food. Research indicates that most peptic ulcers result from infection by a common bacterium, Helicobacter pylori. The disorder, which affects more than 4 million Americans every year, generally responds to antibiotics.

**Viruses**

Viruses are the smallest known pathogens, approximately 1/500th the size of bacteria. More than 150 viruses are known to cause disease in humans, although their role in various cancers and chronic diseases is still unclear. Essentially, a virus consists of a protein structure that contains either ribonucleic acid (RNA) or deoxyribonucleic acid (DNA). Viruses are incapable of carrying out any life processes on their own. To reproduce, they must enter a cell of a host and exploit that cell to make copies of the virus, which are then released to infect other host cells.

Viral diseases can be difficult to treat because many viruses can withstand heat, formaldehyde, and large doses of radiation with little effect on their structure. Some viruses have incubation periods (the length of time required to develop fully and cause symptoms in their hosts) that last for years, which delays diagnosis. Drug treatment for viral infections is also limited. Drugs powerful enough to kill viruses generally kill the host cells too, although some medications block stages in viral reproduction without damaging host cells.

**The Common Cold** Colds are responsible for more days lost from work and more uncomfortable days spent at work than any other ailment. Caused by any number of viruses (some experts claim there may be over 100 different...
viruses responsible), colds are **endemic** (always present to some degree) throughout the world. Current research indicates that otherwise healthy people carry cold viruses in their noses and throats most of the time. These viruses are held in check until the host’s resistance is lowered. In the true sense of the word, it is possible to “catch” a cold—from the airborne droplets of another person’s sneeze or from skin-to-skin or mucous membrane contact—although the hands are the greatest avenue for transmitting colds and other viruses. Contrary to common thinking, you won’t “catch” a cold from getting a chill, but the chill may lower your immune system’s resistance to the cold virus or other pathogens.

**Influenza** In otherwise healthy people, **influenza**, or flu, is usually not life-threatening. However, in combination with disorders such as respiratory or heart disease or among people over age 65 or under age 5, the flu can be very serious. Little can be done to treat flu patients once the infection has become established.

To date, three major varieties of flu virus have been discovered, with many different strains existing within each variety. If you contract one form of influenza you may develop immunity to it, but you will not necessarily be immune to other forms of the disease. See Figure 13.5 for tips on how to distinguish the flu from other illnesses.

Some vaccines have proven effective against certain strains of flu virus, but they are totally ineffective against others. In spite of minor risks, people over age 65, pregnant women, people with heart or lung disease, and people with certain other illnesses should be vaccinated. Flu shots take 2 to 3 weeks to become effective, so people at risk should get these shots in the fall before the flu season begins. Because the vaccine contains a weakened version of the live virus, people who receive the vaccine may pose a risk to anyone with a weakened immune system who is around them.8

**Infectious Mononucleosis** Initial symptoms of mononucleosis, or “mono,” include sore throat, fever, headache, nausea, chills, and pervasive weakness/fatigue. As the disease progresses, lymph nodes may enlarge, and other signs may appear, such as spleen enlargement, body rashes, aching joints, and jaundice (yellowing of the whites of the eyes and the skin).

Caused by the **Epstein-Barr virus**, mono is readily detected through a blood test. Because many viruses are caused by transmission of body fluids, many people once believed that young people contracted mono through kissing (hence its nickname, “the kissing disease”). However, mono is not highly contagious and does not appear to be easily spread through normal, everyday personal contact; kissing is actually not a common mode of transmission. Treatment of mono is often a lengthy process that involves bed rest, balanced nutrition, and medications.

**Hepatitis** One of the most highly publicized viral diseases is **hepatitis**, a virally caused inflammation of the liver. Hepatitis symptoms include fever, headache, nausea, loss of appetite, skin rashes, pain in the upper right abdomen, dark yellow (with brownish tinge) urine, and jaundice. In some regions of the United States and among certain segments of the population, hepatitis has reached epidemic proportions. Internationally, viral hepatitis is a major contributor to liver disease and accounts for high morbidity and mortality. Currently, there are seven known forms, with hepatitis A, B, and C having the highest rate of incidence.

- **Hepatitis A (HAV).** HAV is contracted from eating food or drinking water contaminated with human excrement. Handlers of infected food, people who ingest seafood from contaminated water, and people who use contaminated needles are also at risk. Fortunately, individuals infected with hepatitis A do not become chronic carriers, and vaccines for HAV are available.9
- **Hepatitis B (HBV).** This disease is spread primarily through body fluids shared through unprotected sex, but it also is contracted through sharing needles when injecting drugs, needlesticks on the job, or, in the case of a newborn baby, from an infected mother. Although 30 percent of people who are infected have no symptoms, symptoms can include jaundice, fatigue, abdominal pain, loss of appetite, nausea and vomiting, and joint pain. HBV can lead to chronic liver disease or liver cancer. HBV infection has been on the decline, largely because of a vaccine for HBV that has been available since 1982 and is now available on most college campuses for a modest cost.10 However, because the vaccine can be costly and is not widely available globally, over 350 million people worldwide are chronic carriers.11 A combination series vaccine for HAV and HBV is also an option for certain high-risk populations, such as day care workers, health care workers, and people traveling to regions of the world where HAV or HBV is prevalent.
- **Hepatitis C (HCV).** HCV infections are on an epidemic rise in many regions of the world as resistant forms of the virus are emerging. Some cases can be traced to blood transfusions or organ transplants. Over 85 percent of people infected develop chronic infections, and if the infection is left untreated, the person may develop cirrhosis of the liver, liver cancer, or liver failure. Liver failure due to chronic hepatitis C is the leading cause of liver death.
transplants in the United States. Currently, there is no vaccine for HCV, although efforts are underway to develop one.

In the United States, hepatitis continues to be a major threat in spite of a safe blood supply and massive efforts at education about hand washing (for HAV) and safer sex (primarily for HBV). Treatment of all forms of viral hepatitis is somewhat limited.

Measles  Measles is a viral disorder that often affects young children. Symptoms, appearing about 10 days after exposure, include an itchy rash and a high fever. Rubella

(German measles) is a milder viral infection that is believed to be transmitted by inhalation, after which it multiplies in the upper respiratory tract and passes into the bloodstream. It causes a rash, especially on the upper

measles  A viral disease that produces symptoms including an itchy rash and a high fever.

rubella (German measles)  A milder form of measles that causes a rash and mild fever in children and may cause damage to a fetus or a newborn baby.
Extremities. It usually runs its course in 3 to 4 days and is not generally a serious health threat. The major exceptions to this are newborns and pregnant women. Rubella can damage a fetus, particularly during the first trimester, by creating a condition known as congenital rubella, in which the infant may be born blind, deaf, cognitively impaired, or with heart defects. Immunization has reduced the incidence of both measles and rubella. Infections in children not immunized against measles can lead to fever-induced problems such as rheumatic heart disease, kidney damage, and neurological disorders.

Try it Now!

Wash your hands to prevent infection. How can you clean your hands properly? Wet your hands with warm water, and lather up with soap; scrub your hands for about 20 seconds—try counting to 20 or saying the alphabet. Rinse well and dry your hands. Start following this basic procedure today whenever you use the bathroom, eat or prepare food, blow your nose, cough, or sneeze.

Other Pathogens

Fungi Our environment is inhabited by thousands of species of fungi, multicellular or unicellular organisms that obtain their food by infiltrating the bodies of other organisms, both living and dead. Many fungi are useful to humans, such as edible mushrooms, penicillin, and the yeast used in making bread, but some species of fungi can produce infections. Candidiasis (a vaginal yeast infection), athlete’s foot, ringworm, and jock itch are examples of fungal diseases. With most fungal diseases, keeping the affected area clean and dry plus treating it with appropriate medications will generally bring prompt relief.

Protozoa Protozoa are microscopic, single-celled organisms that are generally associated with tropical diseases such as African sleeping sickness and malaria. Although these pathogens are prevalent in nonindustrialized countries, they are largely controlled in the United States. The most common protozoal disease in the United States is trichomoniasis, which we will discuss later in this chapter’s section on sexually transmitted infections. A common waterborne protozoan disease in many regions of the country is giardiasis. People who drink or are exposed to the Giardia pathogen may suffer intestinal pain and discomfort weeks after infection. Protecting water supplies is the key to prevention.

Parasitic Worms Parasitic worms are the largest of the pathogens. Ranging in size from the small pinworms typically found in children to the relatively large tapeworms found in all warm-blooded animals, most parasitic worms are more a nuisance than a threat. Of special note today are the worm infestations associated with eating raw fish in sushi restaurants. Cooking fish and other foods to temperatures sufficient to kill the worms and their eggs can prevent this.

Prions A prion is a self-replicating, protein-based agent that can infect humans and other animals. One such prion is believed to be the underlying cause of spongiform diseases such as “mad cow disease.”

Emerging and Resurgent Diseases

Although our immune systems are remarkably adept at responding to challenges, microbes and other pathogens appear to be gaining ground. Old scourges are back, and new ones are emerging. Within the past decade, rates for infectious diseases have rapidly increased, particularly for reemerging diseases such as tuberculosis. This trend can be attributed to a combination of overpopulation, inadequate health care systems, increasing poverty, extreme environmental degradation, and drug resistance. As international travel increases (over 1 million people per day cross international boundaries), with germs transported from remote regions to huge urban centers within hours, the likelihood of infection by pathogens previously unknown on U.S. soil increases. Today’s arsenal of antibiotics appears to be increasingly ineffective. Penicillin-resistant strains of diseases are on the rise as bacteria become able to outlast and outsmart even the best of our antibiotic weapons, and viruses are constantly mutating, making them potentially more lethal. See the Health Headlines box on page 396 for more on antibiotic resistance.

Tiny Invaders, Lethal Threats

“Mad Cow Disease” The American cattle industry is under new scrutiny, with confirmed U.S. cases of bovine spongiform encephalopathy (BSE, or “mad cow disease”). Evidence indicates that there is a relationship between ongoing outbreaks in Europe of BSE and a disease in humans...
known as new variant Creutzfeldt-Jakob disease (nvCJD). 14 Both disorders are invariably fatal brain diseases with unusually long incubation periods measured in years, and both are caused by unconventional transmissible agents known as prions.

BSE is thought to be transmitted when cows are fed slaughterhouse leftovers from sheep and other cows as a protein source. Failure to treat this protein by-product sufficiently to kill the BSE organism allows it to infect the cows, and the disease is believed to be transmitted to humans through the meat. The resultant variant of BSE in humans, nvCJD, is characterized by progressively worsening neurological damage and eventual death.

While scientists continue to investigate the presence of BSE in U.S. cattle, the United States Department of Agriculture (USDA) has cut back on its testing of beef cattle. USDA officials say that there is a very low risk to humans, amid bans on U.S. beef from countries around the world. To date, there have been no known human infections from U.S. beef. People living in the United States who have developed the disease are generally believed to have been infected during international travel.

**West Nile Virus** Until 1999, few Americans had heard of West Nile virus (WNV), which is spread by the bite of an infected mosquito. Today, only Alaska and Hawaii remain free of the disease. During 2006 over 4,260 cases of WNV were reported, with over 119 deaths nationwide. 15

Most people who become infected with West Nile virus will have mild symptoms or none at all. Rarely, WNV infection can result in severe and sometimes fatal illness. Symptoms include fever, headache, and body aches, often with skin rash and swollen lymph glands, and a form of encephalitis (inflammation of the brain). There is no vaccine or specific treatment for WNV, but avoiding mosquito bites is the best way to prevent it. Strategies to prevent mosquito bites include using a bug repellent with DEET (diethyl toluamide) and wearing long-sleeved clothing and long pants when outdoors; staying indoors during dawn, dusk and other peak mosquito feeding times; and removing any standing water sources around the home.

**Ebola Hemorrhagic Fever** Another emerging disease, Ebola hemorrhagic fever (Ebola HF) is a severe, often fatal disease in humans and nonhuman primates (monkeys, gorillas, and chimpanzees). Researchers believe the Ebola virus is animal-borne and normally occurs in animal hosts that are native to the African continent. 16 The virus is spread via direct contact with blood or secretions and may also be airborne. With an incubation period of 2 to 21 days, the course of the disease is quick and characterized by fever, headache, joint and muscle aches, sore throat, and weakness, followed by diarrhea, vomiting, and stomach pain. 17 Fortunately, Ebola is not as prevalent worldwide as are many other diseases.

**Severe Acute Respiratory Syndrome** Severe acute respiratory syndrome (SARS) is a viral respiratory illness that first emerged in Asia in 2003 and eventually infected over 8,000 people worldwide, with 774 deaths. SARS is thought to be spread by close personal contact with people who are infected, though research on other methods of transmission is ongoing. Symptoms of SARS include high fever, body aches, headache, diarrhea, and a cough. Eventually, this cough can progress to a pneumonia-like upper respiratory illness. 18

**Avian (Bird) Flu** Avian influenza is an infectious disease of birds. There has been considerable media flurry in the past few years over a strain of avian (bird) flu, H5N1, that is highly pathogenic and is capable of crossing the species barrier and causing severe illness in humans. This virulent strain began to emerge in bird populations throughout Asia, including domestic birds such as chickens and ducks, as early as 1997. By 2007, H5N1 bird flu had spread to birds in parts of western Europe, eastern Europe, Russia, and northern Africa. 19 Although the virus has yet to mutate into a form highly infectious to humans, outbreaks have occurred in rural areas of the world (where people often live in close proximity to poultry and other animals). As of July 2007, bird flu had caused 192 human deaths worldwide. 20

Many health experts suggest that this virus, should it develop the ability to be transmissible between humans, is virulent enough to surpass the lethality of the influenza epidemics of 1918 and 1919, which swept the global community, causing millions of deaths. Thus far, the virus has infected only humans who have come in contact with infected birds; however, some scientists believe it is only a matter of time before the H5N1 strain will be readily passed from human to human.

The current spread of H5N1 throughout global bird populations has sparked international governments into action. Countries around the globe are working to develop strategic action plans and early warning systems, prevent the spread of disease, and create vaccines. However, developing countries are of great concern, because the same resources are not available to them. No vaccine is currently ready for production, and when it is ready, producing enough vaccine for an epidemic could present a challenge. Despite this, there are some promising treatments and tips for prevention. Antiviral medication, such as Tamiflu, can reduce the severity and duration of illness. Countries worldwide and the WHO are stockpiling these medications and developing plans for rapid distribution should an outbreak occur.

**Escherichia coli** O157:H7 *Escherichia coli* O157:H7 is one of over 170 types of *E. coli* bacteria that can infect humans. Most *E. coli* organisms are harmless and live in the intestines of healthy animals and humans; *E. coli* O157:H7, however, produces a lethal toxin and can cause severe illness or death.
Imagine a world where people actually die from simple cuts or exposure to common household ailments such as the cold, minor burns and scrapes, or other seemingly innocent infections. According to the World Health Organization, “People of the world may only have a decade or two to make use of many of the medicines presently available to stop infectious diseases before antimicrobial resistance begins to be a major threat to health.”

**Drug-Resistant Infections Are on the Rise**

Drug-resistant pathogens—those that are not killed or inhibited by antibiotics and other antimicrobial compounds—are on the rise globally:

- **Strains of *Staphylococcus aureus*** resistant to most antibiotics are endemic in many hospitals today. In some cities, 31 percent of staph infections are resistant, and in nursing homes as many as 71 percent of staph infections defy traditional antibiotic regimens.
- **Strains of *Streptococcus pneumoniae*** causes thousands of cases of meningitis and pneumonia and 7 million cases of ear infections in the United States each year. Currently, about 30 percent of these cases are resistant to penicillin, the primary drug for treatment. Many penicillin-resistant strains are also resistant to other antibiotics.
- An estimated 300 to 500 million people worldwide are infected with parasites that cause malaria, and an estimated 700,000 to 2.7 million people die each year from the disease. Resistance to chloroquine, once a widely used and highly effective treatment, is now found in most regions of the world, and other treatments are losing their effectiveness at alarming rates.
- **Strains of multidrug-resistant organisms (MDROs)** that defy our current arsenal of antibiotics have emerged over the last decade. Numbers of persons infected have risen dramatically throughout the world, prompting increased concern by health care professionals. Infection control units in hospitals and health care facilities are particularly concerned about outbreaks among patients whose immune systems are already compromised.

**Why is antimicrobial resistance growing?**

Antibiotics typically wipe out bacteria that are susceptible to them. However, when used improperly, the antibiotics kill only the weak bacteria and leave the strongest versions to thrive and replicate. Because bacteria can swap genes with one another under the right conditions, hardy, drug-resistant germs can share their resistance mechanisms with other germs. Eventually, an entire colony of resistant bugs grows and passes on its resistance traits to new generations of bacteria.

Resistance commonly stems from incorrect use of antibiotics. For example, patients may begin an antibiotic regimen, start to feel better, and stop taking the drug to save money by using the drug another time. The surviving bacteria then build immunity to the drugs used to treat infections.

**Bioterrorism: The New Global Threat**

The idea of using infectious microorganisms as weapons is not new. In fact, during the seventeenth century wars, the English traded to Native Americans blankets impregnated with scabs from smallpox patients in hopes of spreading disease. The threat of delivering a lethal load of anthrax or other deadly microorganisms in the warheads of missiles or by a single person is a topic of much discussion among today’s world leaders, particularly after the cases of anthrax delivered by mail following the September 11, 2001, terrorist attacks. For more information on what you can do to protect yourself from bioterrorism, see Chapter 4.

*E. coli* O157:H7 can live in the intestines of healthy cattle and then contaminate food products at slaughterhouses. Eating ground beef that is rare or undercooked, drinking unpasteurized milk or juice, or swimming in sewage-contaminated water or public pools can cause infection through ingestion of feces that contain *E. coli*.

A symptom of infection is nonbloody diarrhea, usually 2 to 8 days after exposure; however, asymptomatic (symptom-free) cases have been noted. Children, older adults, and people whose immune systems have been weakened by other diseases are particularly vulnerable to serious side effects such as kidney failure.

Although *E. coli* organisms continue to pose threats to public health, strengthened regulations on the cooking of meat and regulation of chlorine levels in pools have helped. However, the 2006 *E. coli* outbreak linked to contaminated spinach has caused the USDA and others in the agriculture industry to consider new safety measures.
them. Also, doctors have overused antibiotics; the CDC estimates that one-third of the 150 million prescriptions written each year are unnecessary, resulting in bacterial strains that are tougher than the drugs used to fight them. Other factors may include the following:

- **Overuse of antibiotics in food production.** About 70 percent of antibiotic production today is used to treat sick animals and encourage growth in livestock and poultry. Farmed fish may be given antibiotics to fight off disease in controlled water areas. Although research is only in its infancy, many believe that ingesting meats, animal products, and fish that are rich in antibiotics may contribute to antibiotic resistance in humans.

- **Antibacterial soaps and other cleaning products.** Just how much these products contribute to overall resistance is also in question; as with antibiotics, the germs these products do not kill may become stronger than before.

### Reducing the Risk of Antimicrobial Resistance

What can be done to slow the growth of resistant organisms? Individual and community actions include the following:

- Enact policies that severely restrict the use of antibiotics, growth hormones, and other products in our food supply.

- Buy foods and products that are antibiotic-free. This means requiring labeling of all foods in which antibiotics have been used in any stage of processing.

- Motivate people to take medications as prescribed and to finish all medications: killing the bugs the first time, all the time.

- Encourage doctors to prescribe antibiotics only when absolutely necessary, and encourage patients not to pressure their doctors to prescribe antibiotics for all ailments.

- Educate consumers about the fact that not all germs are inherently bad and that exposure to many of them helps our immune systems develop arsenals capable of fighting pathogens.

- Educate people that washing their hands with a good flow of water and regular soap for at least 20 seconds is better than using antibacterial soaps.

- Choose hand soaps, bath soaps, dishwashing detergents, and household cleaners that are NOT “antibacterial.”

- Encourage pharmaceutical companies to develop, test, and market new classes of antibiotics to keep up with growing resistance.

### Sources


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**Sexually Transmitted Infections**

**Worksheet**

Sexually transmitted infections (STIs) have been with us since our earliest recorded days on Earth. Today, there are more than 20 known types of STIs. Once referred to as **venereal diseases** and then **sexually transmitted diseases**, the current terminology is more reflective of the number and types of these communicable diseases. More virulent strains and antibiotic-resistant forms spell trouble in the days ahead.

Sexually transmitted infections affect men and women of all backgrounds and socioeconomic levels. In the United States alone, an estimated 19 million new cases of STIs are reported each year. More than 65 million people are currently living with an incurable STI.

Early symptoms of an STI are often mild and unrecognizable (**Figure 13.6**). Left untreated, some of these infections can have grave consequences, such as sterility, blindness, central nervous system destruction, disfigurement, and even death. Infants born to mothers carrying the organisms for these infections are at risk for a variety of health problems.

As with many communicable diseases, much of the pain, suffering, and anguish associated with STIs can be eliminated through education, responsible action, simple preventive strategies, and prompt treatment. Although STIs can happen to anyone, you can avoid them if you take appropriate precautions when you decide to engage in a sexual relationship.

**sexually transmitted infections (STIs)**

Infectious diseases transmitted through some form of intimate, usually sexual, contact.
Men and Women

• Sore bumps or blisters near sex organs or mouth
• Burning or pain when urinating
• Swelling or redness in throat
• Fever, chills, aches
• Swelling of lymph nodes near genitals or swelling of genitals
• Feeling the need to urinate frequently

Women Only

• Vaginal discharge or odor from the vagina
• Pain in the lower pelvis or deep in the vagina during sex
• Burning or itching around the vagina
• Bleeding from the vagina at times other than the regular menstrual periods

Men Only

• A drip or drainage from penis

Possible Causes: What’s Your Risk?

Several reasons have been proposed to explain the present high rates of STIs. The first relates to the moral and social stigma associated with these infections. Shame and embarrassment often keep infected people from seeking treatment. Unfortunately, they usually continue to be sexually active, thereby infecting unsuspecting partners. People who are uncomfortable discussing sexual issues may also be less likely to use and ask their partners to use condoms to protect against STIs and pregnancy.

Another reason proposed for the STI epidemic is our culture’s casual attitude about sex. Bombarded by media hype that glamorizes easy sex, many people take sexual partners without considering the consequences. Generally, the more sexual partners a person has, the greater the risk for contracting an STI. Evaluate your own attitude and beliefs about STIs by completing the Assess Yourself box on page 400.

Ignorance—about the infections, their symptoms, and the fact that someone can be asymptomatic but still infected—is also a factor. A person who is infected but asymptomatic can unknowingly spread an STI to an unsuspecting partner, who may, in turn, ignore or misinterpret any symptoms. By the time either partner seeks medical help, he or she may have infected several others. In addition, many people mistakenly believe that certain sexual practices—oral sex, for example—carry no risk for STIs. In fact, oral sex practices among young adults may be responsible for increases in herpes and other STIs.

Routes of Transmission

STIs are generally spread through some form of intimate sexual contact. Sexual intercourse, oral–genital contact, hand–genital contact, and anal intercourse are the most common modes of transmission. Less likely, but still possible modes of transmission include mouth to mouth contact, or contact with fluids from body sores that may be spread by the hands. Although each STI is a different infection caused by a different pathogen, all STI pathogens prefer dark, moist places, especially the mucous membranes lining the reproductive organs. Most of them are susceptible to light, excess heat, cold, and dryness, and many die quickly on exposure to air. Like other communicable infections, STIs have both pathogen-specific incubation periods and periods of time during which transmission is most likely, called periods of communicability. Practicing the following behaviors will help you protect yourself and reduce your risk:

▪ Avoid casual sexual partners. Ideally, have sex only if you are in a long-term, mutually monogamous relationship with someone who is equally committed to the relationship and who has tested negative for STIs.

▪ Avoid unprotected sexual activity involving the exchange of blood, semen, or vaginal secretions with people whose present or past behaviors put them at risk for infection. Postpone sexual involvement until you are assured that he or she is not infected.

▪ Practice safer sex by using latex condoms. Remember, however, that condoms do not provide 100 percent safety. Avoid injury to body tissue during sexual activity. Some STIs can enter the bloodstream through microscopic tears in anal or vaginal tissues.

▪ Avoid unprotected oral sex or any sexual activity in which semen, blood, or vaginal secretions could penetrate mucous membranes through breaks in the membrane. Always use a condom or a dental dam during oral sex.

▪ Avoid using drugs (including alcohol) that may dull your senses and affect your ability to take responsible precautions with potential sex partners.

▪ If you are worried about your own STI status, have yourself tested. Don’t risk infecting others.
Chlamydia

Chlamydia, a disease that often presents no symptoms, tops the list of the most commonly reported sexually transmitted infections in the United States. Chlamydia infects about 2.8 million people annually in the United States, the majority of them women. Public health officials believe that the actual number of cases is probably higher because these figures represent only those cases reported. College students account for over 10 percent of infections, and these numbers seem to be increasing yearly.

In men, early symptoms may include painful and difficult urination, frequent urination, and a watery, pus-like discharge from the penis. Symptoms in women may include a yellowish discharge, spotting between periods, and occasional spotting after intercourse. However, many chlamydia victims display no symptoms and therefore do not seek help until the disease has done secondary damage. Women are especially likely to be asymptomatic; over 70 percent do not realize they have the disease until secondary damage occurs.

The secondary damage resulting from chlamydia is serious in both genders. Men can suffer injury to the prostate gland, seminal vesicles, and bulbourethral glands as well as arthritis-like symptoms and inflammatory damage to the blood vessels and heart. In women, chlamydia-related inflammation can injure the cervix or fallopian tubes, causing sterility, and damage the inner pelvic structure, leading to pelvic inflammatory disease (PID). If an infected woman becomes pregnant, she has a high risk for miscarriage and stillbirth. Chlamydia may also be responsible for one type of conjunctivitis, an eye infection that affects not only adults but also infants, who can contract the disease from an infected mother during delivery. Untreated conjunctivitis can cause blindness.

If detected early, chlamydia is easily treatable with antibiotics. Unfortunately, chlamydia tests are not a routine part of many health clinics’ testing procedures. Usually a person must specifically request a chlamydia check.

Gonorrhea

Gonorrhea is one of the most common STIs in the United States, surpassed only by chlamydia in number of cases. The Centers for Disease Control and Prevention (CDC) estimates that there are over 700,000 cases per year, plus numbers that go unreported. Caused by the bacterial pathogen Neisseria gonorrhoeae, gonorrhea primarily infects the linings of the urethra, genital tract, pharynx, and rectum. It may spread to the eyes or other body regions by the hands or through body fluids, typically during vaginal, oral, or anal sex. Most cases occur in individuals between the ages of 20 and 24. In men, a typical symptom is a white, milky discharge from the penis accompanied by painful, burning urination 2 to 9 days after contact. However, about 20 percent of all men with gonorrhea are asymptomatic.

In women, the situation is just the opposite: only 20 percent experience any discharge, and few develop a burning sensation on urinating until much later in the course of the infection (if ever). The organism can remain in the woman’s vagina, cervix, uterus, or fallopian tubes for long periods with no apparent symptoms other than an occasional slight fever. Thus a woman can be unaware that she has been infected and that she is infecting her sexual partners.

If the infection is detected early, antibiotic treatment is generally effective. In a man, untreated gonorrhea may spread to the prostate, testicles, urinary tract, kidney, and bladder. Blockage of the vasa deferentia due to scar tissue may cause sterility. In some cases, the penis develops a painful curvature during erection. If the infection goes undetected in a woman, it can spread to the fallopian tubes and ovaries, causing sterility or, at the very least, severe inflammation and PID. The bacteria can also spread up the reproductive tract or, more rarely, through the blood and infect the joints, heart valves, or brain. If an infected woman becomes pregnant, the infection can cause conjunctivitis in her infant. To prevent this, physicians routinely administer silver nitrate or penicillin preparations to the eyes of newborn babies.

Pelvic Inflammatory Disease

Pelvic inflammatory disease (PID) is a term used to describe a number of infections of the uterus, fallopian tubes, and ovaries. Although PID often results from an untreated sexually transmitted infection, especially chlamydia or gonorrhea, it is not actually an STI.

Symptoms of PID vary but generally include lower abdominal pain, fever, unusual vaginal discharge, painful intercourse, painful urination, and irregular menstrual bleeding. Risk factors include young age at first sexual intercourse, multiple sex partners, high frequency of sexual intercourse, and change of sexual partners within the past 30 days. Regular gynecological examinations and early treatment for STI symptoms reduce risk.

Syphilis

Syphilis is caused by a bacterium, Treponema pallidum. Because the bacterium is extremely delicate and dies readily on exposure to air, dryness, or cold, it is generally transferred through direct sexual contact. Typically, this means contact between sexual organs during intercourse, but in rare instances, the organism enters the body through a skin break or scratches. Syphilis has distinct phases and potentially serious results.

(Text continues on page 402.)
The following quiz will help you evaluate whether your beliefs and attitudes about STIs lead you to behaviors that increase your risk of infection. Indicate whether you believe the following items true or false by checking the corresponding box. Then consult the answer key that follows.

<table>
<thead>
<tr>
<th></th>
<th>True</th>
<th>False</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>You can usually tell whether someone is infected with an STI, especially HIV infection.</td>
<td>☐</td>
</tr>
<tr>
<td>2.</td>
<td>Chances are that if you haven’t caught an STI by now, you probably have a natural immunity and won’t get infected in the future.</td>
<td>☐</td>
</tr>
<tr>
<td>3.</td>
<td>A person who is successfully treated for an STI needn’t worry about getting it again.</td>
<td>☐</td>
</tr>
<tr>
<td>4.</td>
<td>So long as you keep yourself fit and healthy, you needn’t worry about STIs.</td>
<td>☐</td>
</tr>
<tr>
<td>5.</td>
<td>The best way for sexually active people to protect themselves from STIs is to practice safer sex.</td>
<td>☐</td>
</tr>
<tr>
<td>6.</td>
<td>The only way to catch an STI is to have sex with someone who has one.</td>
<td>☐</td>
</tr>
<tr>
<td>7.</td>
<td>Talking about STIs with a partner is so embarrassing that it’s better not to raise the subject and instead hope the other person will.</td>
<td>☐</td>
</tr>
<tr>
<td>8.</td>
<td>STIs are mostly a problem for people who have numerous sex partners.</td>
<td>☐</td>
</tr>
<tr>
<td>9.</td>
<td>You don’t need to worry about contracting an STI so long as you wash yourself thoroughly with soap and hot water immediately after sex.</td>
<td>☐</td>
</tr>
<tr>
<td>10.</td>
<td>You don’t need to worry about AIDS if no one you know has ever come down with it.</td>
<td>☐</td>
</tr>
<tr>
<td>11.</td>
<td>When it comes to STIs, it’s all in the cards. Either you’re lucky or you’re not.</td>
<td>☐</td>
</tr>
<tr>
<td>12.</td>
<td>The time to worry about STIs is when you come down with one.</td>
<td>☐</td>
</tr>
<tr>
<td>13.</td>
<td>As long as you avoid risky sexual practices, such as anal intercourse, you’re pretty safe from STIs.</td>
<td>☐</td>
</tr>
<tr>
<td>14.</td>
<td>The time to talk about safer sex is before any sexual contact occurs.</td>
<td>☐</td>
</tr>
<tr>
<td>15.</td>
<td>A person needn’t be concerned about an STI if the symptoms clear up on their own in a few weeks.</td>
<td>☐</td>
</tr>
</tbody>
</table>

**Scoring Key**

1. **False.** While some STIs have telltale signs, such as the appearance of sores or blisters on the genitals or disagreeable genital odors, others do not. Several STIs, such as chlamydia, gonorrhea (especially in women), internal genital warts, and even HIV infection in its early stages cause few if any obvious signs or symptoms. You often cannot tell whether your partner is infected with an STI. Many of the nicest-looking and most well-groomed people carry STIs, often unknowingly. The only way to know whether a person is infected with HIV is by means of an HIV-antibody test.

2. **False.** If you practice unprotected sex and have not contracted an STI to this point, count your blessings. The thing about good luck is that it eventually runs out.

3. **False.** Sorry. Successful treatment does not render immunity against reinfection. You still need to take precautions to avoid reinfection, even if you have had an STI in the past and were successfully treated. If you answered “True” to this item, you’re not alone. About one in five college students polled in a recent survey of more than 5,500 college students across Canada believed that a person who gets an STI cannot get it again.

4. **False.** Even people in prime physical condition can be felled by the tiniest of microbes that cause STIs. Physical fitness is no protection against these microscopic invaders.

5. **True.** If you are sexually active, practicing safer sex is the best protection against contracting an STI.

6. **False.** STIs can also be transmitted through nonsexual means, such as by sharing contaminated needles or, in some cases, through contact with disease-causing organisms on towels and bed sheets or even toilet seats.

7. **False.** Because of the social stigma attached to STIs, it’s understandable that you may feel embarrassed about raising the subject with your partner. But don’t let embarrassment prevent you from taking steps to protect your own and your partner’s welfare.

8. **False.** Though it stands to reason that people who are sexually active with numerous partners stand a greater chance that one of their sexual partners will carry an STI,
all it takes is one infected partner to pass along an STI to you, even if he or she is the only partner you’ve had or even if the two of you had sex only once. STIs are a potential problem for anyone who is sexually active.

9. False. Though washing your genitals immediately after sex may have some limited protective value, it is no substitute for practicing safer sex.

10. False. You can never know whether you may be the first among your friends and acquaintances to become infected. Moreover, symptoms of HIV infection may not appear for years after initial infection with the virus, so you may have sexual contacts with people who are infected but don’t know it and who are capable of passing along the virus to you. You in turn may then pass it along to others, whether or not you are aware of any symptoms.

11. False. Nonsense. While luck may play a part in determining whether you have sexual contact with an infected partner, you can significantly reduce your risk of contracting an STI.

12. False. The time to start thinking about STIs (thinking helps, but worrying only makes you more anxious than you need be) is now, not after you have contracted an infection. Some STIs, like herpes and AIDS, cannot be cured. The only real protection you have against them is prevention.

13. False. Any sexual contact between the genitals, or between the genitals and the anus, or between the mouth and genitals, is risky if one of the partners is infected with an STI.

14. True. Unfortunately, too many couples wait until they have commenced sexual relations to have “a talk.” By then it may already be too late to prevent the transmission of an STI. The time to talk is before any intimate sexual contact occurs.

15. False. Several STIs, notably syphilis, HIV infection, and herpes, may produce initial symptoms that clear up in a few weeks. But while the early symptoms may subside, the infection is still at work within the body and requires medical attention. Also, as noted previously, the infected person is capable of passing along the infection to others, regardless of whether noticeable symptoms were ever present.

Interpreting Your Score
First, add up the number of items you got right. The higher your score, the lower your risk. The lower your score, the greater your risk. A score of 13 correct or better may indicate that your attitudes toward STIs would probably decrease your risk of contracting them. Yet even one wrong response on this test may increase your risk of contracting an STI. You should also recognize that attitudes have little effect on behavior unless they are carried into action. Knowledge alone isn’t sufficient to protect yourself from STIs. You need to ask yourself how you are going to put knowledge into action by changing your behavior to reduce your chances of contracting an STI.

Source: From Jeffrey S. Nevid with Fern Gottfried, Choices: Sex in the Age of STDs, 2nd ed., 10–13. © Copyright 1998/Pearson Education. Published by Allyn & Bacon, Boston, MA. Reprinted by permission of the publisher.

MAKE it happen!

ASSESSMENT: The Assess Yourself activity gave you the chance to consider your beliefs and attitudes about STIs and possible risks you may be facing. Now that you have considered these results, you can begin to change behaviors that may be putting you at risk.

MAKING A CHANGE: To change your behavior, you need to develop a plan. Follow these steps below and complete your Behavior Change Contract to take action.

1. Evaluate your behavior, and identify patterns and specific things you are doing. What can you change now? What can you change in the near future?

2. Select one pattern of behavior that you want to change.

3. Fill out the Behavior Change Contract found at the front of your book. It should include your long-term goals for change, your short-term goals, the rewards you’ll give yourself for reaching these goals, potential obstacles along the way, and strategies for overcoming these obstacles. For each goal, list the small steps and specific actions that you will take.

4. Chart your progress in a journal. At the end of a week, consider how successful you were in following your plan. What helped you be successful? What made change more difficult? What will you do differently next week?

5. Revise your plan as needed. Are the short-term goals attainable? Are the rewards satisfying?
EXAMPLE: Carlos had never thought that he was at risk for an STI. He dated only one woman at a time, and he had never had an STI himself. After he reviewed his answers to the self-assessment, however, he saw that there were several ways in which he was putting himself at risk.

He had thought that he would be able to tell whether someone was infected with an STI but the answer to question 1 informed him that, especially among women, some STIs show few if any obvious signs or symptoms. Carlos also believed that he was not at risk because he dated only one woman at a time, but the answer to question 8 pointed out that a person can pass on an STI that he or she contracted from a previous sex partner. Carlos decided it was time to take responsibility for his sexual activity. He had been on three dates with Sherry and felt things were progressing toward a more intimate stage; he wanted to be sure that they discussed STIs before they put themselves at risk.

Carlos was nervous when he thought about talking to Sherry, so he wrote out a few ideas of ways to bring up the subject. This made him more confident that he would be able to talk honestly with Sherry. He also made sure that he had a supply of condoms, so there wouldn’t be any reason not to practice safer sex. During their next date, Carlos asked Sherry whether they could have a serious conversation about the next step. When he told her that he wanted to talk about STIs, she told him that she was relieved that he had brought up the subject. She knew that she was healthy but hadn’t been sure how to find out his status. Carlos was relieved that Sherry was as concerned about the issue as he was, and they were both glad that embarrassment had not prevented them from having this conversation.

break in the skin, through deep kissing in which body fluids are exchanged, or through some other transmission of body fluids.

Syphilis is called the “great imitator” because its symptoms resemble those of several other infections. Left untreated, syphilis generally progresses through several distinct stages. It should be noted, however, that some people experience no symptoms at all. Because the organism is bacterial, it is treated with antibiotics. The major obstacles to treatment are misdiagnosis of this “imitator” infection and lack of access to health care.

Primary Syphilis The first stage of syphilis, particularly for men, is often characterized by the development of a chancre (pronounced “shank-er”), a sore located most frequently at the site of initial infection. Although painless, the dime-sized chancre is oozing with bacteria, ready to infect an unsuspecting partner. Usually it appears 3 to 4 weeks after initial infection.

In men, the site of the chancre tends to be the penis or scrotum because this is where the organism first enters the body. But if the infection was contracted through oral sex, the sore can appear in the mouth, throat, or other “first contact” area. In women, the site of infection is often internal, on the vaginal wall or high on the cervix. Because the chancre is not readily apparent, the likelihood of detection is not great. In both men and women, the chancre will completely disappear in 3 to 6 weeks.

Secondary Syphilis A month to a year after the chancre disappears, secondary symptoms may appear, including a rash or white patches on the skin or on the mucous membranes of the mouth, throat, or genitals. Hair loss may occur, lymph nodes may enlarge, and the victim may develop a slight fever or headache. In rare cases, sores develop around the mouth or genitals. As during the active chancre phase, these sores contain infectious bacteria, and contact with them can spread the infection. Because symptoms vary so much and appear so much later than the sexual contact that caused them, the victim seldom connects the two. The infection thus often goes undetected even at this second stage. Symptoms typically disappear, leaving the person thinking that all is well.
Latent Syphilis  After the secondary stage, the syphilis bacteria begin to invade body organs. The infection now is rarely transmitted to others, except during pregnancy, when it can be passed to the fetus. The child will then be born with congenital syphilis, which can cause death or severe birth defects such as blindness, deafness, or disfigurement.

Late Syphilis  Years after syphilis has entered the body, its effects become all too evident. Late-stage syphilis indications include heart and central nervous system damage, blindness, deafness, paralysis, premature senility, and, ultimately, dementia.

Herpes  

Herpes is a general term for a family of infections characterized by sores or eruptions on the skin. Caused by herpesvirus, the herpes family of diseases is not transmitted exclusively by sexual contact. Kissing or sharing eating utensils can also exchange saliva and transmit the infection. Herpes infections range from mildly uncomfortable to extremely serious. Genital herpes is an infection caused by the herpes simplex virus (HSV) and affects over 45 million Americans aged 12 and older.

There are two types of herpes simplex virus (HSV). Both herpes simplex types 1 and 2 can infect any area of the body, producing lesions (sores) in and around the vaginal area, on the penis, around the anal opening, on the buttocks or thighs, and around the mouth. For example, you may have a type 1 infection on your lip and transmit the HSV-1 organism to your partner’s genitals during oral sex. Occasionally, sores appear on other parts of the body. HSV remains in certain nerve cells for life and can flare up, or cause symptoms, when the body’s ability to maintain itself is weakened.

The precursor phase of the infection is characterized by a burning sensation and redness at the site of infection. During this time, prescription medicines such as acyclovir and over-the-counter medications such as Abreva will often keep the disease from spreading. However, this phase of the disease is quickly followed by the second phase, in which a blister filled with a clear fluid containing the virus forms. If you pick at this blister or otherwise touch the site and spread this fluid with fingers, lipstick, lip balm, or other products, you can autoinoculate other body parts. Particularly dangerous is the possibility of spreading the infection to your eyes, for a herpes lesion on the eye can cause blindness.

Over a period of days, the unsightly blister will crust over, dry up, and disappear, and the virus will travel to the base of an affected nerve supplying the area and become dormant. Only when the victim becomes overly stressed, when diet and sleep are inadequate, when the immune system is overworked, or when excessive exposure to sunlight or other stressors occurs will the virus become reactivated (at the same site every time) and begin the blistering cycle all over again. These sores cast off (shed) viruses that can be highly infectious.

However, it is important to note that a herpes site can shed the virus even when no overt sore is present, particularly during the interval between the earliest symptoms and blistering. People may get genital herpes by having sexual contact with others who don’t know they are infected or who are having outbreaks of herpes without any sores. A person with genital herpes can also infect a sexual partner during oral sex. The virus is spread only rarely, if at all, by touching objects such as a toilet seat or hot tub seat.

Genital herpes is especially serious in pregnant women because the baby can be infected as it passes through the vagina during birth. Many physicians recommend cesarean deliveries for infected women. Additionally, women with a
history of genital herpes appear to have a greater risk of developing cervical cancer.

Although there is no cure for herpes at present, certain drugs can reduce symptoms. Unfortunately, they seem to work only if the infection is confirmed during the first few hours after contact. The effectiveness of other treatments, such as L-lysine, is largely unsubstantiated. Over-the-counter medications such as Abreva may reduce the length of time you have sores/symptoms. Other drugs, such as famciclovir (FAMVIR), may reduce viral shedding between outbreaks. This means that if you have outbreaks, you may reduce risks to your sexual partners. Although lip balms and cold-sore medications may provide temporary anesthetic relief, remember that rubbing anything on a herpes blister can spread herpes-laden fluids to other body parts. The following tips can help you prevent contracting herpes.

- If you know that you have frequent cold sores (caused by HSV-1), be extremely careful when kissing another person or sharing their drink glasses or utensils. Never kiss or let yourself be kissed by anyone with sores on their lips or nostrils. Don’t share lipstick, lip balm, or other lip products.
- If you have questionable sores or lesions, seek medical help at once. Don’t touch other parts of your body after touching your own cold sores or genital sores. Many people unknowingly spread herpes to their eyes, nose, or other areas by their hands.
- If you have herpes, reduce your risk of an outbreak by avoiding excessive stress, sunlight, or whatever else appears to trigger an episode.
- Use a condom or dental dam during oral sex. In spite of what many people mistakenly believe, oral sex is not safer than intercourse when it comes to transmitting herpes. Only about one in six Americans currently has HSV-2; however, nearly 58 percent have HSV-1, usually appearing as cold sores on their mouths. Whether you contract either HSV-1 or HSV-2 on your genitals, the net results may be just as painful, just as long term, and just as infectious for future partners.
- Wash your hands thoroughly with soap and water after any kind of sexual contact and after disposing of condoms. If possible gargle with a mouthwash after oral sex.

Genital Warts (Human Papillomavirus)

Genital warts (also known as venereal warts or condylomas) are caused by a group of viruses known as human papillomavirus (HPV). There are over 100 different types of HPV, and more than 30 types are sexually transmitted. A person becomes infected when certain types of HPV penetrate the skin and mucous membranes of the genitals or anus through sexual contact. This is among the most common forms of STI, with 20 million Americans currently infected with genital HPV and approximately 6.2 million new cases each year. Genital HPV appears to be relatively easy to catch. The typical incubation period is 6 to 8 weeks after contact. Many people have no symptoms, particularly if the warts are located inside the reproductive tract, whereas others may notice itchy bumps on the genitals. Genital warts are of two different types: (1) full-blown genital warts, which are noticeable as tiny bumps or growths; and (2) the much more prevalent flat warts, which are not usually visible to the naked eye.

Risks and Treatments of Genital Warts

Genital warts pose a significant risk for cervical cancer. They may lead to dysplasia, or changes in cells that may lead to a precancerous condition.

Exactly how HPV infection leads to cervical cancer is uncertain. It is known that within 5 years after infection, 30 percent of all HPV cases will progress to the precancerous stage. Of those cases that become precancerous and are left untreated, 70 percent will eventually result in actual cancer. In addition, HPV may pose a threat to a pregnant woman’s unborn fetus if the fetus is exposed to the virus during birth. Cesarean deliveries may be considered in serious cases.

New research has also implicated HPV as a possible risk factor for coronary artery disease. It is hypothesized that HPV causes an inflammatory response in the artery walls, which makes cholesterol and plaque build up (see Chapter 12). Genital warts can be treated with topical medications or be frozen with liquid nitrogen and then removed. Large warts may require surgical removal.

Human Papillomavirus Vaccination

In 2006, a new vaccine to prevent HPV was approved by the FDA. The vaccine protects against the four types of HPV that lead
to 70 percent of cervical cancers and 90 percent of genital warts. The vaccine is meant primarily for women aged 9 to 26 and is administered in a series of three shots over a 6-month period.33

Candidiasis (Moniliasis)

Unlike many STIs, which are caused by pathogens that come from outside the body, the yeastlike fungus *Candida albicans* normally inhabits the vaginal tract in most women. Only under certain conditions, in which the normal chemical balance of the vagina is disturbed, will these organisms multiply and cause the fungal disease *candidiasis.*

Symptoms of candidiasis, also sometimes called *moniliasis,* include severe itching and burning of the vagina and vulva, swelling of the vulva, and a white, cheesy vaginal discharge. These symptoms are collectively called *vaginitis,* or inflammation of the vagina. When this microbe infects the mouth, whitish patches form, and the condition is referred to as *thrush.* Thrush infection can also occur in men and is easily transmitted between sexual partners.

Antifungal drugs applied on the surface or by suppository usually cure candidiasis in just a few days. For approximately one out of ten affected women, however, nothing seems to work, and the infection returns again and again. Symptoms can be aggravated by contact of the vagina with soaps, douches, perfumed toilet paper, chlorinated water, and spermicides. Tight-fitting jeans and pantyhose can provide the combination of moisture and irritant the organism thrives on.

Trichomoniasis

Unlike many STIs, *trichomoniasis* is caused by a protozoan. Although as many as half of the men and women in the United States may carry this organism, most remain free of symptoms until their bodily defenses are weakened. Symptoms among women include a foamy, yellowish, unpleasant-smelling discharge accompanied by a burning sensation, itching, and painful urination. Most men with trichomoniasis do not have any symptoms, though some men experience irritation inside the penis, mild discharge, and a slight burning after urinating. Although usually transmitted by sexual contact, the “trich” organism can also be spread by toilet seats, wet towels, or other items that have discharged fluids on them. Treatment includes oral metronidazole, usually given to both sexual partners to avoid the possible “ping-pong” effect of repeated cross-infection typical of STIs.

Pubic Lice

*Pubic lice,* often called “crabs,” are small parasitic insects that are usually transmitted during sexual contact. More annoying than dangerous, they move easily from partner to partner during sex. They have an affinity for pubic hair and attach themselves to the base of these hairs, where they deposit their eggs (nits). One to 2 weeks later, these nits multiply and cause the fungal disease candidiasis. Also known as *moniliasis.*

trichomoniasis Protozoan STI characterized by foamy, yellowish discharge and unpleasant odor.

pubic lice Parasitic insects that can inhabit various body areas, especially the genitals.

acquired immunodeficiency syndrome (AIDS) Extremely virulent sexually transmitted disease that renders the immune system inoperative.

human immunodeficiency virus (HIV) The slow-acting virus that causes AIDS.

A Shifting Epidemic

Initially, people with HIV were diagnosed as having AIDS only when they developed blood infections, the cancer known as Kaposi’s sarcoma, or any of 21 other indicator...
diseases, most of which were common in male AIDS patients. The CDC has expanded the indicator list to include pulmonary tuberculosis, recurrent pneumonia, and invasive cervical cancer. Perhaps the most significant indicator today is a drop in the level of the body’s master immune cells, called CD4 cells, to one-fifth the level in a healthy person.

AIDS cases have been reported state by state throughout the United States since the early 1980s. Today, the CDC recommends that all states report HIV infections as well as AIDS. Because of medical advances in treatment and increasing numbers of HIV-infected persons who do not progress to AIDS, it is believed that AIDS incidence statistics may not provide a true picture of the epidemic, the long-term costs of treating HIV-infected individuals, and other key information. HIV incidence data also provide a better picture of infection trends. Currently, most states mandate that people who test positive for the HIV antibody be reported. Although there is significant pressure to mandate reporting in all states, there is controversy over implementing such a mandate. Many believe that if we require reporting of HIV-positive tests, people will refuse to be tested even if they suspect they are infected.

How HIV Is Transmitted

HIV typically enters one person’s body when another person’s infected body fluids (e.g., semen, vaginal secretions, blood) gain entry through a breach in body defenses. Mucous membranes of the genital organs and the anus provide the easiest route of entry. If there is a break in the mucous membranes (as can occur during sexual intercourse, particularly anal intercourse), the virus enters and begins to multiply. After initial infection, HIV multiplies rapidly, invading the bloodstream and cerebrospinal fluid. It progressively destroys helper T cells (recall that these cells call the rest of the immune response to action), weakening the body’s resistance to disease. The virus also changes the genetic structure of the cells it attacks. In response to this invasion, the body quickly begins to produce antibodies.

Despite some myths, HIV is not highly contagious. Studies of people living in households with an AIDS patient have turned up no documented cases of HIV infection through casual contact. Other investigations provide overwhelming evidence that insect bites do not transmit HIV.

Engaging in High-Risk Behaviors AIDS is not a disease of gay people or minority groups. People who engage in high-risk behaviors increase their risk for the disease; people who do not engage in these behaviors have minimal risk. The following activities are high-risk behaviors.

Exchange of Body Fluids The greatest risk factor is the exchange of HIV-infected body fluids during vaginal or anal intercourse. Substantial research indicates that blood, semen, and vaginal secretions are the major fluids of concern. In rare instances the virus has been found in saliva, but most health officials state that saliva is a less significant risk than other shared body fluids. Even though these risks are well documented, millions of Americans report inconsistent safer sex practices, particularly when drugs or alcohol affect rational thinking.

Injecting Drugs A significant percentage of AIDS cases in the United States result from sharing or using HIV-contaminated needles and syringes. Though users of illegal drugs are commonly considered the only members of this category, others may also share needles—for example, people with diabetes who inject insulin or athletes who inject steroids. People who share needles and also engage in sexual activities with members of high-risk groups, such as those who exchange sex for drugs, increase their risks dramatically. Tattooing and piercing can also be risky (see the Spotlight on Your Health box).

Blood Transfusion Prior to 1985 A small group of people have become infected after receiving blood transfusions. In 1985, the Red Cross and other blood donation programs implemented a stringent testing program for all donated blood. Today, because of these massive screening efforts, the risk of receiving HIV-infected blood is almost nonexistent.

Mother-to-Child Transmission Mother-to-child transmission occurs when an HIV-positive woman passes the virus to her baby. This can occur during pregnancy, during labor and delivery, or through breast-feeding. Without treatment, approximately 15 to 30 percent of babies born to HIV-positive women will become infected with HIV during pregnancy and delivery, and a further 10 to 20 percent will become infected through breast-feeding.
Women and AIDS

HIV is an equal-opportunity pathogen that can attack anyone—regardless of race, gender, sexual orientation, or socioeconomic status—who engages in high-risk behaviors. However, some groups seem to be at greater risk. Today women account for an increasing proportion of this epidemic. By 2005, women accounted for over 27 percent of newly reported AIDS cases in the United States. Among sexually active heterosexual teenagers, college students, and health care workers, nearly 60 percent of HIV cases are women. Compounding the problems of women with HIV are serious deficiencies in our health and social service systems, including inadequate treatment for female drug addicts and lack of access to child care, health care, and social services for families headed by single women.

Women are four to ten times more likely than men to contract HIV through unprotected heterosexual intercourse with an infected partner (Figure 13.7). The vaginal area is more likely than the penis to incur microtears, and during sexual intercourse a woman is exposed to more semen than a man is to vaginal fluids. Women who have STIs are

1. 60 percent of HIV cases are women. Compounding the epidemic among heterosexuals is the greater probability that women will contract HIV from a single infected partner.

2. Among sexually active heterosexual teenagers, college students, and health care workers, nearly 60 percent of HIV cases are women.

3. Women are four to ten times more likely than men to contract HIV through unprotected heterosexual intercourse with an infected partner.

4. The vaginal area is more likely than the penis to incur microtears, and during sexual intercourse a woman is exposed to more semen than a man is to vaginal fluids.

more likely to be asymptomatic and therefore unaware they have a disease; preexisting STIs increase the risk of HIV transmission.42

Socioeconomic factors also correlate to a woman’s likelihood to contract HIV. Women have been underrepresented in clinical trials for HIV treatment and prevention and may be less likely to seek medical treatment because of caregiving burdens, transportation problems, and lack of money. In some cultures, women are subordinate to men, especially in developing nations. This reduces women’s decision-making power and ability to negotiate safer sex. These women are also more likely to be involved in nonconsensual sex or sex without condoms.

Symptoms of HIV/AIDS

A person may go for months or years after infection by HIV before any significant symptoms appear. The incubation time varies greatly from person to person. For adults who receive no medical treatment, it takes an average of 8 to 10 years for the virus to cause the slow, degenerative changes in the immune system that are characteristic of AIDS. During this time, the person may experience opportunistic infections (infections that gain a foothold when the immune system is not functioning effectively). Colds, sore throats, fever, tiredness, nausea, night sweats, and other generally non–life-threatening conditions commonly appear and are described as pre-AIDS symptoms. Some opportunistic infections, such as Kaposi’s sarcoma and tuberculosis, are serious and potentially life-threatening. Research suggests that some very young children have shown the adult progression of AIDS.43

Testing for HIV Antibodies

Once antibodies have formed in reaction to HIV, a blood test known as the ELISA (enzyme-linked immunosorbent assay) may detect their presence. If sufficient antibodies are present, the test will be positive. When a person who previously tested negative (no HIV antibodies present) has a subsequent test that is positive, seroconversion is said to have occurred. In such a situation, the person would typically take another ELISA test, followed by a more precise test known as the Western blot, to confirm the presence of HIV antibodies.

It should be noted that these tests are not AIDS tests per se. Rather, they detect antibodies for HIV, indicating the presence of the virus in the person’s system. Whether the person will develop AIDS depends to some extent on the strength of the immune system. Although we have made remarkable progress in prolonging the relatively symptom-free period between infection, HIV-positive status, and progression to symptomatic AIDS, it is important to note that a cure does not yet exist. The vast majority of infected people eventually develop some form of the disease.

As testing for HIV antibodies has improved, scientists have explored various ways of making it easier for individuals to be tested. Health officials distinguish between reported and actual cases of HIV infection because it is believed that many HIV-positive people avoid being tested. One reason is fear of knowing the truth. Another is the fear of recrimination from employers, insurance companies, and medical staff. However, early detection and reporting are important, because immediate treatment for someone in the early stages of HIV disease is critical.

What do you THINK?

Do you favor mandatory reporting of HIV and AIDS cases? ■ On the one hand, if you knew that your name and vital statistics would be “on file” if you tested positive for HIV, would you be less likely to take the HIV test? ■ On the other hand, do people who carry this contagious fatal disease have a responsibility to inform the general public and the health professionals who provide their care?
New Hope and Treatments

New drugs have slowed the progression from HIV to AIDS and have prolonged life expectancies for most AIDS patients. Current treatments combine selected drugs, especially protease inhibitors and reverse transcriptase inhibitors. Protease inhibitors (for example, amprenavir, ritonavir, and saquinavir) act to prevent the production of the virus in chronically infected cells that HIV has already invaded. Other drugs, such as AZT, ddi, ddc, d4T, and 3TC, inhibit the HIV enzyme reverse transcriptase before the virus has invaded the cell, thereby preventing the virus from infecting new cells.

All of the protease drugs seem to work best in combination with other therapies. These combination treatments are still quite experimental, and no combination has proven to be absolute for all people. As with other antiviral treatments, resistance to the drugs can develop. Individuals who already show resistance to AZT may not be able to use a protease-AZT combination, limiting their options for combination therapy.

Although these drugs provide new hope and longer survival rates for people living with HIV, it is important to maintain caution. We are still a long way from a cure. Apathy and carelessness may abound if too much confidence is placed in these treatments. Newer drugs that held much promise are becoming less effective as HIV develops resistance to them. Costs of taking multiple drugs are prohibitive, and side effects common. There is no cure. Furthermore, the number of people becoming HIV-infected each year has increased in some communities, meaning that we are still a long way from beating this disease. In fact, after years of declines in AIDS diagnoses due to new drug treatments, AIDS diagnoses have recently been on the rise.44

Preventing HIV Infection

Although scientists have been working on a variety of HIV vaccine trials, none is currently available.45 The only way to prevent HIV infection is to avoid risky behaviors. HIV infection and AIDS are not uncontrollable conditions. You can reduce your risk by the choices you make in sexual behaviors and by taking responsibility for your own health and the health of your loved ones.

Unfortunately, the message has not gotten through to many Americans. They assume that because they are heterosexual, do not inject illegal drugs, and do not have sex with sex workers, they are not at risk. They couldn’t be more wrong. Anyone who engages in unprotected sex is at risk, especially sex with a partner who has engaged in other high-risk behaviors. Sex with multiple partners is the greatest threat. You can’t determine the presence of HIV by looking at a person; you can’t tell by questioning the person, unless he or she has been tested recently, is HIV-negative, and is giving an honest answer. So what should you do?

Of course, the simplest answer is abstinence. If you don’t exchange body fluids, you won’t get the disease. As a second line of defense, if you decide to be intimate, the next best option is to use a condom. However, in spite of all the educa-

Noninfectious Diseases

Typically, when we think of major noninfectious ailments, we think of “killer” diseases such as cancer and heart disease. Clearly, these diseases make up the major portion of life-threatening diseases—accounting for nearly two-thirds of all deaths (see Chapter 12). Although these diseases capture much media attention, other chronic conditions can also cause pain, suffering, and disability. Fortunately, most of them can be prevented or their symptoms relieved.

Generally, noninfectious diseases are not transmitted by a pathogen or by any form of personal contact. Lifestyle and personal health habits are often implicated as underlying causes. Healthy changes in lifestyle and public health efforts aimed at research, prevention, and control can minimize the effects of these diseases.
SKILLS FOR behavior change

COMMUNICATING IN AN UNSAFE SEXUAL WORLD

At no time in your life is it more important to communicate openly than when you are considering an intimate relationship. Remember that you can’t tell whether someone has an STI. The following will help you to communicate about potential risks.

- You have a responsibility to your partner to disclose your own STI and HIV status. You also have a responsibility to yourself to stay healthy. Ask about your partner’s STI and HIV status. Suggest going through the testing together as a means of sharing something important.
- Be direct, honest, and determined in talking about sex before you become involved. Do not act silly or evasive. Get to the point, ask clear questions, and do not be put off in receiving a response. A person who does not care enough to talk about sex probably does not care enough to take responsibility for his or her actions.
- Discuss the issues without sounding defensive or accusatory. Develop a personal comfort level with the subject prior to raising the issue with your partner. Be prepared with complete information, and articulate your feelings clearly. Reassure your partner that your reasons for desiring abstinence or safer sex arise from respect and not distrust.
- Encourage your partner to be honest and to share feelings. This will not happen overnight. If you have never had a serious conversation with this person before you get into an intimate situation, you cannot expect honesty and openness when the lights go out.
- Analyze your own beliefs and values ahead of time. Know where you will draw the line on certain actions, and be very clear with your partner about what you expect. If you believe that using a condom is necessary, make sure you communicate this.
- Decide what you will do if your partner does not agree with you. Anticipate potential objections or excuses, and prepare your responses accordingly.
- Discuss what “having sex” means to your sexual partner. Sometimes people vary in what they think “sex” really is. Oral sex and other non-monogamous relationships with others may also put you at risk. Set boundaries for protecting one another, even if you think certain “open” relationships are okay.
- Discuss the significance of monogamy in your partner’s relationships. Decide early how important this relationship is to you and how much you are willing to work at arriving at an acceptable compromise on lifestyle.

ONLINE DATING AND SUPPORT FOR PEOPLE WITH STIs

Even the most careful individuals run some risk of getting STIs. For those who contract one of these highly stigmatized diseases, their future may never be quite the same. However, support groups abound online, on campuses, and in communities to provide emotional support and educational resources. People with STIs not only can reach out to others struggling with similar problems through support groups, but also access new, Internet-based dating and other social services that are dedicated to infected people. Chat lines, interactive discussion groups, dating services and a whole host of venues are available for people who have STIs. Persons with STIs need not feel alone. Have herpes? Rather than struggling with “telling” a prospective partner about your problem, you can meet people who have similar issues online, in a format where stigma and rejection are gone. As with any online dating or networking service, be cautious about providing personal information when using these sites.

Chronic Lung Diseases

Chronic lung diseases pose a serious and significant threat to Americans today. Collectively, they have become the fourth leading cause of death.46 Most sufferers live with a condition known as chronic dyspnea uncomfortable breathlessness even with mild exertion.47 Chronic lung disease can result in major disability and lack of function as the lungs fill with mucus, become susceptible to bacterial or viral infections, or cause acute stress on the heart as they struggle to get valuable oxygen. Over time, many of these underlying conditions lead to hospitalization and possible death.

Chronic Obstructive Pulmonary Diseases

Chronic obstructive pulmonary diseases (COPDs) include bronchitis, emphysema, and asthma. Eighty to 90 percent of persons with COPD have a history of smoking.48 In addition to smokers, people who have been exposed to dust, fumes, or gases that irritate the lungs over time or in one big dose may be particularly vulnerable.
**Bronchitis** Bronchitis refers to an inflammation of the lining of the bronchial tubes. These tubes, the bronchi, connect the windpipe with the lungs. When the bronchi become inflamed or infected, less air is able to flow from the lungs, and heavy mucus begins to form. Acute bronchitis is the most common of the bronchial diseases, and symptoms often improve in a week or two.

When the symptoms of bronchitis last for at least 3 months of the year in two consecutive years, this may be the more serious form, *chronic bronchitis*. In some cases, this chronic inflammation and irritation of the lungs may lead to other chronic respiratory problems, such as asthma or emphysema. Over 9 million Americans suffer from chronic bronchitis.

**Emphysema** Over 3.5 million Americans suffer from emphysema, which involves the gradual destruction of the alveoli (tiny air sacs) of the lungs. As the alveoli are destroyed, the affected person finds it more and more difficult to exhale, struggling to take in a fresh supply of air before the air held in the lungs has been expended. The chest cavity gradually begins to expand, producing a barrel-shaped chest. For more on emphysema and smoking, see Chapter 8.

**Asthma** Asthma is a long-term, chronic inflammatory disorder that blocks air flow into and out of the lungs. Asthma causes tiny airways in the lung to overreact with spasms in response to certain triggers. Symptoms include wheezing, difficulty breathing, shortness of breath, and coughing spasms. Although most asthma attacks are mild and non–life-threatening, they can trigger bronchospasms (contractions of the bronchial tubes in the lungs) that are so severe that, without rapid treatment, death may occur. Between attacks, most people have few symptoms.

Asthma falls into two distinctly different types. *Intrinsic* or nonallergic asthma may be triggered by anything except an allergy—for example, smoke inhalation, chest infection, stress, laughter, exercise, or cold air. The more common form of asthma, known as extrinsic or allergic asthma, is typically associated with allergic triggers; it tends to run in families and develop in childhood. Often by adulthood, a person has few episodes, or the disorder completely goes away.

Asthma can occur at any age, but it is most likely to occur in children between infancy and age 5 and in adults before age 40. Other risk factors include having one or both parents affected, a history of respiratory infections in childhood, low birth weight, obesity, and gastroesophageal reflux disease. In childhood, asthma strikes more boys than girls; in adulthood, it strikes more women than men. The asthma rate is 50 percent higher among African Americans than whites, and four times as many African Americans die of asthma than do whites. Midwesterners appear to be more prone to asthma than people from other areas of the country. In the last decade, asthma rates have risen dramatically, particularly among inner-city children.

Relaxation techniques appear to help some asthma sufferers. Drugs may be necessary for serious cases. Determining whether a specific allergen provokes asthma attacks, taking steps to reduce exposure, avoiding triggers such as certain types of exercise or stress, and finding the most effective medications are big steps in asthma prevention and control. Numerous new drugs are available that cause fewer side effects than older medications.

**Sleep Apnea**

Sleep apnea is believed to affect more than 18 million Americans, or 1 in every 15 persons. This condition is characterized by periodic episodes during sleep when breathing stops almost completely for 10 seconds or longer. Over time, sleep apnea can lead to high blood pressure, irregular heartbeats, heart attack, accidents, depression, and stroke.

There are two major types of sleep apnea: central and obstructive. Central sleep apnea occurs when the brain fails to tell the breathing muscles to initiate breathing. Abuse of alcohol and other medications can cause this condition. Obstructive sleep apnea, which is the more common form, occurs when air cannot move into and out of a person’s nose or mouth, even though the body tries to breathe. What causes sleep apnea? Typically, obstructive apnea occurs when a person’s throat muscles and tongue relax during sleep and block the airways. People who are overweight or obese often have more tissue to flap or sag, making their risk of apnea greater.

It is a common misperception that breathing always stops entirely during the apnea phases of sleep. Often, breathing continues and the chest rises and falls, but the level of air that is exchanged is minimal. When the body doesn’t get enough oxygen, the heart races, blood pressure goes up, body chemistry may change, and a host of other subtle and not so subtle events occur. Most importantly, as oxygen saturation levels in the blood fall, the body’s autonomic nervous system moves to protect the body and signals it to breathe, often with a sudden gasp of breath. This response may wake a person, causing sufferers to rarely reach deep sleep and to wake up feeling tired and unwell. This restless sleeping pattern is often one of the first symptoms of a person with sleep apnea.
Neurological Disorders

Headaches

Almost all of us have experienced at least one major headache. In fact, more than 80 percent of women and 65 percent of men experience headaches on a regular basis. Over 90 percent of all headaches are of three major types: tension headaches, migraines, and cluster headaches.

Tension Headaches  Tension headaches, also referred to as muscular contraction headaches, are generally caused by muscle contractions or tension in the neck or head. This tension may be caused by actual strain placed on neck or head muscles due to overuse, to holding static positions for long periods, or to tension triggered by stress. Other possible triggers include red wine, lack of sleep, fasting, and menstruation. Relaxation, hot water treatment, and massage are holistic treatments. Aspirin, ibuprofen, acetaminophen, and naproxen sodium remain the old standby treatments for pain relief.

Migraine Headaches  More than 29 million Americans—three times more women than men—suffer from migraines, a type of headache that often has severe, debilitating symptoms. Usually migraine incidence peaks in young adulthood, people aged 20 to 45. Migraines are often hereditary.

Symptoms vary greatly by individual, and attacks typically last anywhere from 4 to 72 hours, with distinct phases of symptoms. In about 15 percent of cases, migraines are preceded by a sensory warning sign known as an aura, such as flashes of light, flickering vision, blind spots tingling in arms or legs, or sensation of odor or taste. Sometimes nausea, vomiting, and extreme sensitivity to light and sound are present. Symptoms of migraine include excruciating pain behind or around one eye and usually on the same side of the head. In some people, there is sinus pain, neck pain, or an aura without headache.

The cause of migraines is unknown, but some research suggests they may occur when blood vessels dilate in the membrane that surrounds the brain. Critics of the blood vessel dilation theory question why only blood vessels of the head dilate in these situations. These researchers suggest that migraines originate in the cortex of the brain, where certain pain sensors are stimulated.

Historically, treatments have centered on reversing or preventing blood vessel dilation, with the most common treatment derived from the rye fungus ergot. Today, fast-acting ergot compounds are available by nasal spray, vastly increasing the speed of relief. However, ergot drugs have many side effects, the least of which may be that they are habit forming. Other drugs that are sometimes prescribed include lidocaine, a new group of drugs called triptans, and Imitrex, a drug tailor-made for migraines.

Cluster Headaches  Fortunately, cluster headaches are among the more rare forms of headache, affecting fewer than 1 percent of people, usually men. Young adults in their twenties tend to be particularly susceptible. Pain is often severe and has been described as “killer” or “suicidal” pain. Usually these headaches cause stabbing pain on one side of the head, behind the eye, or in one defined spot. Other typical cluster headache characteristics include nasal discharge and tearing of the eye on the same side as the pain, a swollen or drooping eyelid and contracted pupil, congestion in the nostril on the affected side, flushing of the face on the affected side, and excessive sweating.

Cluster headaches can last for weeks and disappear quickly. However, more commonly they last for 40 to 90 minutes and often occur in the middle of the night, usually during REM sleep. Oxygen therapy, drugs, and even surgery have been used to treat severe cases.

Seizure Disorders

Approximately 2 million people in the United States suffer from epilepsy or some other form of seizure-related disorder (the word epilepsy derives from the Greek epilepsia, “seizure”). Each year, over 180,000 people in the United States will have a seizure for the first time, and it is estimated that 5 to 10 percent of the population will experience at least one seizure in their lives. Seizure disorders are...
generally caused by abnormal electrical activity in the brain and are characterized by loss of control of muscular activity and unconsciousness. Symptoms vary widely and can range from temporary confusion to major seizing.

Typically seizures fall into one of two categories. When they seem related to abnormal activity in just one region of the brain, they are classified as partial. When they involve all or most parts of the brain, they are generalized. About half of all cases of seizure disorder are of unknown origin. Possible causes include stroke, head injury, congenital abnormalities, injury or illness resulting in inflammation of the brain or spinal column, drug or chemical poisoning, tumors, nutritional deficiency, and heredity.

In most cases, people afflicted with seizure disorders can lead normal, seizure-free lives when under medical supervision. Public ignorance about these disorders is one of the most serious obstacles confronting people suffering from them. Improvements in medication and surgical interventions to reduce some causes of seizures are among the most promising treatments today.

**Parkinson’s Disease**

Over 1.5 million Americans have Parkinson’s disease, a chronic, slowly progressive neurological condition that typically strikes after age 50. Rates of Parkinson’s disease have quadrupled in the past 30 years and may increase even more dramatically as more baby boomers pass age 60. Nearly 60,000 new cases are diagnosed each year.60

The hallmark of Parkinson’s disease is a tremor, or “shaking palsy.” Other symptoms are rigid or stiff muscles, slow movement, poor balance, shuffling steps, and slurred speech. The most common theories concerning its causes include familial predisposition, acceleration of age-related changes, and exposure to environmental toxins. Although Parkinson’s disease is progressive and incurable, new drug therapies can keep symptoms under control, possibly for years. Surgical options such as brain tissue transplants and the use of fetal tissue stem cells or genetically engineered cell transplants have also provided promising results.

**Multiple Sclerosis**

Multiple sclerosis (MS) is a degenerative disease in which myelin, a fatty material that surrounds nerves and facilitates transmission of nerve impulses, breaks down and causes nerve malfunction. Multiple sclerosis typically appears between ages 15 and 50, and symptoms vary considerably by individual. Some people have periods of relapse (when symptoms flare up) and remissions (when symptoms are not present), and others have varying degrees of symptom severity. MS affects over 500,000 Americans.61 Most MS patients have few flare-ups and can lead fairly normal lives. The cause of MS is unknown.

**Digestion-Related Disorders**

**Lactose Intolerance**

As many as 50 million Americans are unable to eat dairy products such as milk, cheese, ice cream, and other foods that the rest of us take for granted. These people suffer from lactose intolerance, which means that they have lost the ability to produce the digestive enzyme (lactase) that is necessary for the body to convert milk sugar (lactose) into glucose. That glass of milk becomes a source of stomach cramping, diarrhea, nausea, gas, and related symptoms. Once diagnosed, however, lactose intolerance can be treated by introducing low-lactose or lactose-free foods into the diet. Through trial and error, people usually find that they can tolerate one type of low-lactose food better than others. Someone who is lactose intolerant may need to experiment before settling into a diet that works.

**Colitis and Irritable Bowel Syndrome**

**Ulcerative colitis** is a disease of the large intestine in which the mucous membranes of the intestinal walls become inflamed. People with severe cases may have as many as 20 bouts of bloody diarrhea a day. Colitis can also produce severe stomach cramps, weight loss, nausea, sweating, and fever. Although some experts believe that colitis occurs more frequently in people with high stress levels, this theory is controversial. Hypersensitivity reactions to certain foods have also been considered as a possible cause. It is difficult to determine the cause of colitis because the disease goes into unexplained remission and then recurs without apparent reason. This pattern often continues over periods of years and may be related to the later development of colorectal cancer. Treatment focuses on relieving the symptoms by such methods as increasing fiber intake and taking anti-inflammatory drugs, steroids, and other medications to reduce inflammation and soothe irritated intestinal walls.

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**Terms**

- Parkinson’s disease: A chronic, progressive neurological condition that causes tremors and other symptoms.
- Multiple sclerosis (MS): A degenerative neurological disease in which myelin, an insulator of nerves, breaks down.
- Lactose intolerance: Inability to produce lactase, an enzyme needed to convert milk sugar into glucose.
- Ulcerative colitis: An inflammatory disorder that affects the mucous membranes of the large intestine, producing bloody diarrhea.
Irritable bowel syndrome (IBS), characterized by nausea, pain, gas, or diarrhea after eating certain foods or during unusual stress, commonly begins in early adulthood. Symptoms may vary from week to week and can fade for long periods of time, only to return. The cause is unknown, but researchers suspect that people with IBS have digestive systems that are overly sensitive to what they eat and drink, to stress, and to certain hormonal changes. Stress management, relaxation techniques, regular activity, and diet can control IBS in the vast majority of cases. Problems with diarrhea can be reduced by cutting down on fat and avoiding caffeine and excessive amounts of sorbitol, a sweetener found in dietetic foods and chewing gum. Constipation can be relieved by a gradual increase in fiber and increased fluid consumption. Some sufferers benefit from drugs that relax intestinal muscle or from antidepressant drugs and counseling to reduce stress.

**Musculoskeletal Diseases**

**Arthritis: Many Types, Many Problems**

Called “the nation’s primary crippler,” arthritis strikes one in five Americans, or over 46 million people. There are over 100 types of arthritis diagnosed today, the most common of which are osteoarthritis, rheumatoid arthritis, gout, lupus, and fibromyalgia. Arthritis accounts for over 30 million lost workdays annually. The cost to the U.S. economy is over $128 billion per year in lost wages and productivity and untold amounts in hospital and nursing home services, prescriptions, and over-the-counter pain relief. Unfortunately, as epidemic rates of obesity and sedentary lifestyle contribute to the development of arthritis, over 67 million Americans aged 18 and over will be diagnosed with the disease by 2030, a number that will have staggering consequences for our health care system.

**Osteoarthritis (OA),** also known as degenerative joint disease, is a progressive deterioration of bones and joints that has been associated with the “wear and tear” theory of aging. Over 21 million Americans have OA. Bones rub directly against each other, causing the pain, swelling, and limited movement characteristic of arthritis. Obesity, joint trauma, and repetitive joint usage all increase the risk and thus are important targets for prevention.

Over 80 percent of people with OA report that their activity has been limited as a result of the condition. Joint replacement and bone fusion are common surgical repair techniques. Anti-inflammatory drugs and pain relievers, applications of heat, mild exercise, and massage may relieve the pain.

**Rheumatoid arthritis** is an autoimmune disease involving chronic inflammation that most commonly appears between ages 20 and 45 and affects over 2.1 million Americans. Symptoms include stiffness, pain, redness, and swelling of multiple joints (often including the hands and wrists) and can be gradually progressive or sporadic, with occasional unexplained remissions.

Treatment of rheumatoid arthritis is similar to that for osteoarthritis, emphasizing pain relief and improved functional mobility. Immunosuppressant drugs can reduce the inflammatory response.

**Fibromyalgia**

Fibromyalgia is a chronic, painful, rheumatoid-like disorder that affects 5 to 6 percent of the general population (nearly 4 million people) with bouts of muscle pain and extreme fatigue. Persons with fibromyalgia experience an array of other symptoms, including headaches, dizziness, numbness and tingling, itching, fluid retention, chronic joint pain, abdominal or pelvic pain, and even occasional diarrhea. Suspected causes include sleep disturbances, stress, emotional distress, viruses, and autoimmune disorders; however, none has been proved in clinical trials. Because of fibromyalgia’s multiple symptoms, it is usually diagnosed only after myriad tests have ruled out other disorders.

**Systemic Lupus Erythematosus**

Systemic lupus erythematosus (SLE, or lupus) is an autoimmune disease in which antibodies destroy or injure organs such as the kidneys, brain, and heart. The symptoms include sensitivity to sunlight, arthritis, kidney problems, anemia, aching muscles and joints, and multiple infections; they range from mild to severe and may disappear for periods of time. A butterfly-shaped rash covering the bridge of the nose and often extending to the upper cheeks is a common presenting symptom.
the nose and both cheeks is common. The disease affects 1 in 700 Caucasians and 1 in 250 African Americans; 90 percent of all victims are women who show initial symptoms between the ages of 15 and 45.68 Extensive research has not yet found a cure for this sometimes fatal disease, although new studies suggest that there may be a genetic predisposition to it.

Lower Back Pain

Approximately 85 percent of all Americans will experience episodes of lower back pain (LBP) at some point. Some of these episodes result from muscular damage and are short-lived and acute; others may involve dislocations, fractures, or other problems with spinal vertebrae or discs, resulting in chronic pain or requiring surgery. Low back pain is epidemic throughout the world and the major cause of disability for people aged 20 to 45 in the United States, who suffer more frequently and severely from this problem than older people do.69 Chapter 17 discusses massage therapy as a possible treatment for LBP.

Almost 90 percent of all back problems occur in the lumbar spine (lower back). You can avoid many problems by consciously maintaining good posture. Numerous studies have shown that wearing heavy backpacks, particularly among younger, school-aged children, can result in back pain. It is likely that carrying books and computers all day may also be a cause for concern among college students. Although no clear research has pointed this out, common sense suggests you use caution, making sure you purchase a good quality backpack that has straps to off-load some of the weight to your hips, rather than on your shoulders and back. Other things you can do to reduce risks of back pain include the following:

- Purchase a high-quality, supportive mattress, and avoid sleeping on your stomach.
- Avoid high-heeled shoes, which tilt the pelvis forward, and wear shoes with good arch support.
- Control your weight. Extra weight puts increased strain on knees, hips, and your back.
- Warm up and stretch before exercising or lifting heavy objects. When you lift, use your legs instead of your back.
- Buy a chair with good lumbar support for doing your work.
- Move your car seat forward so your knees are elevated slightly.
- Exercise regularly, particularly exercises that strengthen the abdominal muscles and stretch the back muscles.

Modern Maladies

During the past 20 years, several afflictions have surfaced that seem to be products of our time. Some of these health problems relate to specific groups of people, some are due to technological advances, and others have not been explained.

Chronic Fatigue Syndrome

The diagnosis of chronic fatigue syndrome (CFS) depends on two major criteria and eight or more minor criteria. The major criteria are debilitating fatigue that persists for at least 6 months and the absence of other illnesses that could cause the symptoms. Minor criteria include headaches, fever, sore throat, painful lymph nodes, weakness, fatigue after exercise, sleep problems, and rapid onset of these symptoms. Treatment focuses on improved nutrition, rest, counseling for depression, judicious exercise, and development of a strong support network.

Despite extensive testing, no viral cause has been found. In the absence of a known pathogen, many researchers believe that the illness may have strong psychosocial roots.

Repetitive Stress Injuries

The Bureau of Labor Statistics estimates that 25 percent of all injuries in the labor force that result in lost work time are due to a repetitive stress injury (RSI). These are injuries to nerves, soft tissue, or joints that result from the physical stress of repeated motions.

One of the most common RSIs is carpal tunnel syndrome. Hours spent typing at the computer, flipping groceries through computerized scanners, or other jobs made simpler by technology can irritate the median nerve in the wrist, thus causing numbness, tingling, and pain in the fingers and hands. Risk of carpal tunnel syndrome can be reduced by proper placement of the keyboard, mouse, wrist pads, and other techniques. Better education and improvements in ergonomic workplace designs can eliminate many injuries of this nature.
Summary

- Your body uses a number of defense systems to keep pathogens from invading. The skin is the body’s major protection. The immune system creates antibodies to destroy antigens. Fever and pain play a role in defending the body. Vaccines bolster the body’s immune system against specific diseases. Allergies are an overreaction of the body’s natural defense system.

- The major pathogens are bacteria, viruses, fungi, protozoa, prions, and parasitic worms. Bacterial infections include staphylococcal infections, streptococcal infections, pneumonia, and tuberculosis. Major viral diseases include the common cold, influenza, mononucleosis, hepatitis, and measles. Emerging and resurgent diseases pose significant threats for future generations. Many factors contribute to these risks. Possible solutions focus on a public health approach to prevention.

- Sexually transmitted infections (STIs) are spread through intercourse, oral sex, anal sex, hand–genital contact, and sometimes mouth-to-mouth contact. Major STIs include chlamydia, gonorrhea, syphilis, herpes, genital warts, candidiasis, trichomoniasis, and pubic lice. Pelvic inflammatory disease (PID), although not an STI itself, is generally caused by STI. Sexual transmission may also be involved in some general urinary tract infections.

- Acquired immunodeficiency syndrome (AIDS) is caused by the human immunodeficiency virus (HIV). Globally, HIV/AIDS has become a major threat to the world’s population. Anyone can get HIV by engaging in high-risk sexual activities that include exchange of body fluids, by having received a blood transfusion before 1985, and by injecting drugs (or having sex with someone who does). Women appear to be particularly susceptible to infection. You can cut your risk for AIDS by deciding not to engage in risky sexual activities.

- Chronic lung diseases include asthma, emphysema, and chronic bronchitis. Chronic obstructive pulmonary diseases (COPDs) are the fourth leading cause of death in the United States. Sleep apnea is another breathing-related condition increasing in prevalence.

- Neurological conditions include headaches, seizure disorders, Parkinson’s disease, and multiple sclerosis. Headaches may be caused by a variety of factors, the most common of which are tension, dilation and/or rapid contraction of blood vessels in the brain, chemical influences on muscles and vessels that cause inflammation and pain, and underlying physiological and psychological disorders.

- Digestive conditions, such as colitis and irritable bowel syndrome, result from functional problems in various digestion-related organs or systems. Musculoskeletal diseases such as arthritis, fibromyalgia, systemic lupus erythematosus, and low back pain cause significant pain and disability in millions of people. Chronic fatigue syndrome (CFS) and repetitive stress injuries (RSIs, such as carpal tunnel syndrome) have emerged as major chronic maladies. CFS is associated with depression. Repetitive stress injuries are preventable by proper placement and usage of equipment.

Chapter Review

1. Which of the following is a viral disorder?
   a. measles
   b. pneumonia
   c. tuberculosis
   d. streptococcal infections

2. Acne, boils, and styes are types of
   a. viruses.
   b. fungi.
   c. staphylococcal infections.
   d. streptococcal infections.

3. If you are infected, which one of these STIs will remain in your body for life, regardless of treatment?
   a. chlamydia
   b. gonorrhea
   c. syphilis
   d. herpes

4. The most widespread sexually transmitted bacterium is
   a. gonorrhea.
   b. chlamydia.
   c. syphilis.
   d. chancroid.

5. Jennifer touched her viral herpes sore on her lip and then touched her eye. She ended up with herpesvirus in her eye as well. This is an example of
   a. acquired immunity.
   b. passive immunity.
   c. autoinoculation.
   d. self vaccination.
6. Which of the following is not a true statement about HIV?
   a. You can tell whether a potential sex partner has the virus by looking at the person.
   b. The virus can be spread through either semen or vaginal fluids.
   c. You cannot get HIV from a public restroom toilet seat.
   d. Unprotected anal sex increases risk of exposure to the HIV virus.

7. What is pelvic inflammatory disease (PID)?
   a. a sexually transmitted infection
   b. a type of urinary tract infection
   c. an infection of a woman’s fallopian tubes or uterus
   d. a disease that both men and women can get

8. What degenerative disease involves the breakdown of myelin?
   a. epilepsy
   b. multiple sclerosis
   c. cerebral palsy
   d. Parkinson’s disease

9. The gradual destruction of the alveoli in a smoker’s lung will usually cause which respiratory condition?
   a. dyspnea
   b. bronchitis
   c. emphysema
   d. asthma

10. Which of the following conditions is the leading cause of employee sick time and lost productivity in the United States?
    a. low back pain
    b. the common cold
    c. asthma
    d. on-the-job injuries

Answers to these questions can be found on page A-1.

Questions for Discussion and Reflection

1. What are the major controllable risk factors for contracting infectious diseases? Using this knowledge, how would you change your current lifestyle to prevent such infection?

2. What is a pathogen? What are the similarities and differences between pathogens and antigens? Discuss uncontrollable and controllable risk factors that can threaten your health.

3. What are the six types of pathogens? What are the various means by which they can be transmitted? How do social conditions among the poor and homeless increased the risks for certain diseases, such as tuberculosis, influenza, and hepatitis? Why are these conditions a challenge to the efforts of public health officials?

4. Identify five STIs and their symptoms. How do they develop? What are their potential long-term effects?

5. Why are women more susceptible to HIV infection than men? What implication does this have for prevention, treatment, and research?

6. What are some of the major noninfectious chronic diseases affecting Americans today? Do you think there is a pattern in the types of diseases that we get? What are the common risk factors?

7. List common respiratory diseases affecting Americans. Which of these diseases has a genetic basis? An environmental basis? An individual basis? What, if anything, is being done to prevent, treat, and control each of these conditions?

8. What are the major disorders of the musculoskeletal system? Why do you think there aren’t any cures? Describe the difference between osteoarthritis and rheumatoid arthritis.

Accessing Your Health on the Internet

The following websites explore further topics and issues related to personal health. For links to the websites below, visit the Companion Website for Health: The Basics, Eighth Edition at www.aw-bc.com/donatelle.

1. American Academy of Allergy, Asthma, and Immunology. Provides an overview of asthma and allergies. Offers interactive quizzes to test your knowledge and an ask-an-expert section. www.aaaai.org


3. Centers for Disease Control and Prevention (CDC). Home page for the government agency dedicated to disease intervention and prevention, with links to all the latest data and publications put out by the CDC, including the Morbidity and Mortality Weekly Report, HIV/AIDS Surveillance Report, and the Journal of Emerging Infectious Diseases. Also provides access to Wonder, the CDC research database. www.cdc.gov

5. National Institute of Neurological Disorders and Stroke. Many of the modern maladies result in chronic pain. This site provides up-to-date information to help you cope with pain-related difficulties. www.ninds.nih.gov
6. San Francisco AIDS Foundation. This community-based AIDS service organization focuses on ending the HIV/AIDS pandemic through education, services for AIDS patients, advocacy and public policy efforts, and global programs. www.sfaf.org
7. World Health Organization (WHO). Provides access to the latest information on world health issues, including infectious disease, and direct access to publications and fact sheets, with keywords to help users find topics of interest. www.who.int

Further Reading

An overview of issues, trends, and ethics surrounding the global pandemic of HIV/AIDS and STIs.
Outstanding pocket reference for information on infectious diseases. Updated every 3 to 5 years to cover emerging diseases.
Overview of AIDS risks, prevention, and control, as well as pathological development and historical basis.

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