A number of myths surround human immunodeficiency virus (HIV) infection and acquired immune deficiency syndrome (AIDS), and despite large-scale education efforts, many people still do not understand how the infection is transmitted or how the disease is treated. Further, people living with AIDS around the world may face discrimination, even in health care facilities. Prevention of HIV infection requires education and understanding. This article describes various facets of HIV/AIDS, including the characteristics of HIV/AIDS infection, prevention strategies and occupational issues.

The first confirmed acquired immune deficiency syndrome (AIDS) death in the United States occurred in 1969. The victim, known only as Robert R, was a teenaged boy living in Missouri. Robert had admitted himself to the local hospital in early 1968. At the time physicians were perplexed by his symptoms. His legs and genitals were covered with warts and sores, and he had severe swelling in his testicles and pelvic region. The swelling spread to his legs, which resulted in physicians misdiagnosing the condition as lymph node edema.

Despite treatment, he continued to grow pale, lose a great deal of weight and suffer from shortness of breath. Robert told his doctors that his symptoms began in 1966 and that at that time his condition had been diagnosed as a severe chlamydia infection. Robert claimed to be sexually active with a girl from his neighborhood, but doctors believed that Robert may have been a male prostitute. They also suspected that he was homosexual or bisexual because his particular group of symptoms mirrored those seen in homosexuals who were currently being treated.

In late 1968 Robert’s condition appeared to stabilize, but by March 1969 his symptoms reappeared and progressively worsened. Most notable was the severe drop in his white blood cell count. His doctors stated that his immune system appeared to have stopped functioning. Robert developed a fever and died at 11:20 pm on May 15, 1969, at the age of 16. For years physicians and scientists speculated as to the cause of Robert’s death. It was not until 1984 that the true cause of his death was determined. One physician said that it would have been impossible to correctly diagnose Robert’s disease back in 1969 because at the time, physicians did not know that human immunodeficiency virus (HIV) and AIDS existed, much less how to

After completing this article, the reader should be able to:
- List the viral characteristics of HIV.
- Describe how HIV infects the human body.
- Explain the various stages of HIV/AIDS infection.
- Name the at-risk groups that are particularly susceptible to HIV infection.
- List ways to prevent HIV infection.
- Discuss psychosocial issues related to living with HIV/AIDS.
- Understand occupational exposure prevention and other HIV-related work issues.
Although the annual incidence of global HIV infections peaked in the mid-1990s, the World Health Organization (WHO) reported that in 2015, approximately 36.7 million people in the world were living with HIV/AIDS.\(^4\) Approximately 25.6 million of these people (roughly 70%) live in sub-Saharan Africa. The Centers for Disease Control (CDC) reported 2.1 million new cases of HIV in 2015.\(^5\) There is a greater difference than just the total numbers, however, between people infected in African countries and countries such as the United States and those in Central Europe: In sub-Saharan Africa, HIV infection is prevalent throughout the general population, but in all other regions of the world infection occurs predominantly in specific at-risk groups.\(^6\)

According to the U.S. Department of Health and Human Services, ‘The vast majority of people living with HIV are in low- to middle-income countries, particularly in sub-Saharan Africa.’ In 2015, approximately 66% of new HIV infections occurred in sub-Saharan Africa alone.\(^7\) There were approximately 1.1 million deaths worldwide from AIDS-related illness in 2015. According to the CDC, 39,513 people were diagnosed with HIV in 2015 in the United States, which is a decrease of about 42,000 people from 2009.\(^8\)

HIV/AIDS treatments have extended lives up to decades following diagnosis. The treatment comes with a price, however. In 2016, the National Institutes of Health (NIH) published an article in which they outline the monthly average wholesale price of commonly used medications to treat HIV. Although some medications are listed at less than $100, others are listed at over $4,000.\(^9\) With treatment cost being so high, prevention of the disease has become a main focus. In 2003, the U.S. President’s Emergency Plan for AIDS Relief (PEPFAR) was created as the U.S. Government’s strategy to leverage the power of a whole-of-government approach to controlling the HIV/AIDS epidemic.\(^9\) PEPFAR currently works in over 60 countries, and supports roughly 11.5 million people with antiretroviral treatment.\(^9\) Since 2010, the number of new HIV infections among children as declined by 50%, with nearly 2 million babies being born HIV-free to mothers living with HIV (nearly twice as many as in 2013).\(^9\)

### Understanding Infectious Disease

To dispel some of the myths surrounding HIV and how it infects the body, it is helpful to understand the basics of infection. Infectious diseases are caused by microorganisms, but not all microorganisms cause diseases. Many are harmless and, in some cases, can be useful. For example, acidophilus is a generic term for a number of bacteria that manufacturers add to dairy products. When a person consumes a food containing acidophilus, the bacteria help the person’s digestive system break down food and helps protect his or her body from harmful microorganisms.

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**Box 1**

**Early History of the AIDS Epidemic**

The U.S. Centers for Disease Control and Prevention officially recognized AIDS in June 1981. It was brought to their attention because many otherwise healthy homosexual men were presenting with *Pneumocystis jiroveci* pneumonia and candidiasis, and subsequently dying. The virus that causes AIDS was independently identified by a team of French scientists led by Dr. Luc Montagnier of the Pasteur Institute and American scientists led by Dr. Robert C. Gallo of the National Cancer Institute.\(^2\)

This early history of the AIDS epidemic is documented in *And the Band Played On: Politics, People, and the AIDS Epidemic*. Randy Shilts, a reporter for the San Francisco Chronicle, was assigned to follow the epidemic that was killing many of San Francisco’s gay men. When he first wrote about the condition, it was called GRID, for “gay-related immuno-deficiency diseases.” Shilts’s extensive coverage resulted in the book, which is a harsh and damning depiction of the public’s response to the AIDS epidemic. He is especially critical of the government and asserts that the disease was ignored because victims were members of the “4-H club: homosexuals, hard-drug users, hemophiliacs, and Haitians.” He further argued that because victims were not members of mainstream society, necessary resources were not dedicated to identifying the disease, thus increasing the death toll.

Shilts was tested for HIV while he was writing the book but asked his physician not to tell him the results so that he could remain unbiased during his reporting. After completing the manuscript, Shilts was told that he was HIV positive. Shilts died of AIDS in 1994. *And the Band Played On* has been translated into 7 different languages and was developed into a docudrama on HBO.\(^3\)
Microorganisms (microbes) that are known to cause disease are called pathogens. There are seven types of microorganisms: bacteria, archaea, protozoa, algae, fungi, viruses, and multicellular animal parasites (helminths). Four of these (bacteria, fungi, parasites, and viruses) will be discussed in detail below. Each of these categories contains both harmless microorganisms and known pathogens.

The human body contains many microorganisms. Infection can occur when a particular microorganism multiplies beyond a safe level, as in the case of a yeast infection. Infection also arises when a microorganism that occurs naturally in one part of the body is accidentally introduced into another part of the body. For example, certain strains of Escherichia coli inhabit the human digestive tract. When E. coli enters another part of the body such as the urinary tract, an infection can occur there.

Bacteria
Bacteria are living organisms consisting of a single cell with no nuclei. Bacteria contain both DNA and RNA and often live in colonies. The bacteria category is further classified based on the shape of the single-celled microorganism. Spherical bacteria are cocci; those that are oblong are bacilli; spiral-shaped organisms are called spirilla; and an organism that lacks a definitive shape is categorized as pleomorphic.

To be seen, bacteria must be viewed under a microscope using a stain. When scientists discovered that different bacteria reacted to staining agents in different ways, they added classifications to reflect these characteristics. Bacteria are classified as either gram-positive, which means that they take up the stain, or gram-negative, meaning they do not react to a stain. Bacteria labeled as acid-fast resist colorization by acid alcohol.

Although less than 1% of bacteria cause diseases, in some instances they can trigger serious infections. Bacteria have evolved to adapt to changing environments and, therefore, can become immune to disinfectants or antibiotics. This aspect makes fighting some bacterial infections an ongoing and challenging endeavor. Some common diseases caused by bacteria are listed in Table 1.

Fungi
Fungi are primitive plant forms that can spread quickly. Fungi exist in 3 forms: yeasts, molds, and mushrooms. These classifications are based on fungi cell structures and reproductive processes. Yeasts are 1-celled organisms that reproduce through a process called budding. Molds combine to form multicellular colonies and reproduce by forming spores. Fungi can only exist in an oxygen-rich, or aerobic, environment. In most instances, fungi are useful. They are a key component in producing many antibiotic drugs, for instance. Yeast infections are relatively common, however, occurring when the amount of yeast in the body exceeds a certain limit or when a certain type of yeast invades the human body. Table 2 lists infections caused by fungi.

Parasites
Parasites cause a wide range of diseases and come in many shapes and sizes, from the microscopic level to single-cell structures. Parasites seek a host cell to provide protection. They then live and feed off the living host, taking nourishment and sustenance; eventually,