LESSON ASSIGNMENT

LESSON 3

Human Immunodeficiency Virus and Acquired Immune Deficiency Syndrome

LESSON ASSIGNMENT

Paragraphs 3-1 through 3-14.

LESSON OBJECTIVES

After completing this lesson, you will be able to:

3-1. Select the ways in which the human immunodeficiency virus (HIV) can be transmitted.

3-2. Identify the types of individuals who may be considered "high risk" to contract the human immunodeficiency virus (HIV).

3-3. List precautions health care workers should take when caring for patients with human immunodeficiency virus (HIV) infections.

SUGGESTIONS

After completing the assignment, complete the exercises of this lesson. These exercises will help you to achieve the lesson objectives.
3-1. INTRODUCTION

In March 1985, there were more than 17,000 reported acquired immune deficiency syndrome (AIDS) cases in the United States. By May 1987, there had been more than 35,000 reported AIDS cases in the U.S. with more than 20,000 AIDS deaths recorded. It is estimated that by the end of 1991, AIDS cases will number 270,000 with AIDS deaths numbering 179,000. Currently, cases of AIDS-related complex (ARC), those with AIDS-related symptoms but not the active disease, do not have to be reported to a health authority. Because of this fact, it is estimated that perhaps 10 times the number of people with AIDS may have AIDS-Related Complex (ARC). AIDS has become a disease of epidemic proportions. Of the many things you should learn about this disease are these facts:

a. The human immunodeficiency virus (HIV) is NOT the same as AIDS.

b. People who have tested positive for HIV can, but do not always, develop AIDS.

3-2. TERMINOLOGY

The acquired immune deficiency syndrome AIDS is a disease in which the patient's immune system has been so weakened that a second unrelated disease produces the symptoms which may result in death. To understand this problem, become familiar with the definition of these terms.

a. Human Immunodeficiency Virus (HIV). HIV is a virus which infects certain types of white blood cells called the T-helper cells (T4 cells). The T-helper cells regulate our immune system and protect us from various infectious agents.

b. Acquired Immune Deficiency Syndrome (AIDS). AIDS, a diagnostic category created by the Centers for Disease Control (CDC), is a term used to identify HIV-infected persons with life-threatening symptoms. CDC also terms such people as having "CDC-defined AIDS" or "full-blown" AIDS. The most harmful result of HIV infections is AIDS. AIDS is a disease at least moderately predictive of a defect in the body's immune system; this disease can occur in a person with no known cause for diminished resistance to that disease.
c. **AIDS-Related Complex (ARC).** HIV infection in some people leads to an illness in which the patient develops some of the nonspecific symptoms of AIDS but not the typical opportunistic infections. This illness is sometimes mistakenly labeled pre-AIDS. The illness may progress to AIDS.

d. **Opportunistic Infections.** These are infections caused by organisms that do not ordinarily cause disease because the body's immune system successfully fights the organism. A weakened immune system, typical of the AIDS patient, cannot fight off the organism, and the organism infects the person.

**NOTE:** The Centers for Disease Control defined AIDS in 1981 as a syndrome characterized by unusual opportunistic infections and rare malignancies in otherwise healthy individuals with no other reason for immune system compromise. This definition helped public health officials monitor the fast-growing AIDS epidemic even though its cause was unknown. Research to date indicates that AIDS is caused by a human retrovirus.

### 3-3. BACKGROUND

a. No one is absolutely certain how AIDS originated, but many scientists believe that it began in central Africa. One theory is that the AIDS virus first infected monkey colonies in central Africa and then spread to humans in Africa in the mid-1970's. Scientists hypothesize that the virus was transmitted to humans by a Green Monkey scratch or bite. From Africa, the AIDS virus may have been carried across the Atlantic Ocean by Haitians who once lived in or visited central Africa. The spread of AIDS from Haiti may have occurred in two ways: first, by Haitian immigrants and second, by vacationing American homosexual males, who often traveled to Haiti. In the U.S., AIDS was first seen as pneumonia of a rare type in primarily, but not limited to, homosexual men.

b. The AIDS virus did not suddenly arrive in its present deadly state as a completely new virus. Research indicates that this virus is the result of a different virus which has gone through some changes. Originally, there was either a disease-causing human virus with a different capability or a virus in some animal reservoir. Virologists believe that this virus changed and developed in some isolated primate stock in an isolated area where animal and human populations are scattered and remote. (Of possible areas, central Africa is most plausible because the first documented cases of AIDS were either Africans or individuals with some connection to central Africa.) A logical conclusion is that, over a period of time the original virus went through several changes to become the deadly AIDS virus (HIV) we know today.
3-4. TRANSMISSION OF HIV

There is no current evidence that HIV can be transmitted through casual contact. Routes of transmission include the following:

a. Sexual Contact. HIV can be transmitted by direct contact of genital or rectal mucosa with infected semen or vaginal secretions. HIV can be found in many body fluids—saliva, tears, semen, vaginal and cervical secretions. It is believed that the virus is transmitted by fluid only through semen and vaginal and cervical secretions. Additionally, that fluid contact must be direct regardless of whether the contact is homosexual or heterosexual.

b. Sharing Needles. The second largest group of people to have AIDS in the United States and Europe are intravenous (IV) drug users. HIV is transmitted through sharing drug injection equipment—needles and syringes—contaminated with infected blood.

c. Contaminated Blood. Several known viruses including hepatitis B virus and Epstein-Barr virus can be transmitted in blood products. In 1982, it was discovered that HIV could be transmitted in blood transfusions. Blood products are now screened for HIV with the result that fewer cases of AIDS can be attributed to donated blood products.

d. Maternal-Child Transmission in Utero. A pregnant female infected with HIV can transmit the infection during pregnancy, labor, and delivery. It is not known exactly what determines whether the infant will have AIDS since not every infant born to an HIV-infected female develops AIDS.

e. Casual Contact. There is no current evidence that the virus can be transmitted by casual contact. Scientific studies have concluded HIV, although deadly when transmitted as just stated, is not transmitted by saliva sprayed in a cough or a sneeze or left on a drinking glass. Tears, urine, and insect bites are not routes of transmission. Research indicates that HIV is a fragile virus that can be killed by heat, ordinary soap and water, household bleach solutions, alcohol, hydrogen peroxide, Lysol, and the chlorine used in swimming pools.

f. Workplace Safety. According to the Public Health Service, AIDS is a blood-borne that is not spread by casual contact. No known risk of transmission to co-workers, clients, or consumers exists from HIV infected workers in offices, schools, factories, or construction sites. The Public Health Service recommends that workers known to be infected with HIV should not be restricted from using telephones, office equipment, toilets, showers, eating facilities, or water fountains.
3-5. ACTION OF A VIRUS ON A CELL

A variety of microorganisms are present in our environment. Some of these are harmful--bacteria, fungi, rickettsiae, protozoans, helminthes, and viruses--and can cause disease in a susceptible person. AIDS is caused by a virus called the human immunodeficiency virus (HIV).

a. Viruses. A virus can be defined as a piece of free-floating genetic material which is surrounded by a protective protein coating called a capsid. Not a cell and not alive, a virus is a subcellular microorganism whose duty is to replicate (reduplicate, duplicate).

(1) When a virus enters the body, it finds a host cell. Once the virus selects a cell, the virus can pierce the cell membrane with a "spike" which is in the capsid of the virus or the virus can use an enzyme to break down the cell membrane and enter the cell. Inside the cell, the virus uses the cell's machinery to replicate itself. The cell will die either from the duplication process or when the new viral particles leave the cell. On the other hand, sometimes the virus will become dormant (do nothing) when it enters a cell.

(2) After a virus enters a cell (infection), the body's primary immune response will go into action. B cells and T cells collect at the site of the infection to fight the virus. Antibodies to this particular virus are produced by the B cells. T cells have antibodies in their cell membranes. T cells will determine the type of virus. The particular T cell which can fight this virus will become active, increasing in size and multiplying. This killer T cell will rush to the cell with the virus and secrete substances that render the viral cell harmless. (Thousands of different types of T cells exist in the body; each type of T cell can fight a specific infection.)

b. Action of HIV on Cells. AIDS is caused by the action of a virus, the human immunodeficiency virus (HIV), on cells in the body. The problem is that the human immunodeficiency virus attacks the very cells that are responsible for killing the virus, the T4 lymphocytes. HIV enters the bloodstream and makes contact with T4 lymphocytes (white blood cells). The invading virus fits onto the cells' receptors. The cell reads the virus as if the virus were part of the cell. At this point, the virus can either become dormant (inactive and just being there), or the virus can become active, changing and multiplying to enter the bloodstream to infect other T4 cells. If this virus is active, it can multiply itself many times, break out of the host T4 cell, killing the cell in the replication process or as the virus leaves. What happens in the body is that T4 cells are either killed or weakened. Since the T4 cells are of great importance in the body's immune system, eventually after the major portion of these cells is killed, the body's immune system is weakened or useless. Then the patient becomes susceptible to opportunistic infections and unusual cancers. The patient has developed the syndrome called AIDS.

NOTE: A dormant virus in a cell may become active at any time.
3-6. SIGNS AND SYMPTOMS OF HIV

The person infected with human immunodeficiency virus may have not symptoms at all or symptoms of AIDS. Most people infected with this virus have no symptoms and are what is called "healthy carriers."

3-7. SIGNS AND SYMPTOMS OF AIDS

Some people with AIDS have no symptoms and seem healthy until they abruptly develop an opportunistic infection or Kaposi's sarcoma. Other patients have a recent history of nonspecific signs and symptoms. These signs and symptoms are displayed by those with AIDS.

a. Fever of unknown origin. The fever may be low grade and persistent, or it may be episodic and spiking.

b. Weight loss. The patient may lose as much as 20 to 30 percent of his body weight.

c. Malaise.

d. Diarrhea.

e. Opportunistic infections; for example, Candida, Pneumocystis pneumonia, toxoplasmosis, cytomegalovirus.

f. Kaposi's sarcoma. This is a type of cancer, a vascular tumor with brown and purple plaques or nodules. When associated with AIDS, this disease progresses rapidly and may be found in the oral cavity, hard palate, gastrointestinal tract, lymph nodes, and lungs.

3-8. TREATMENT

Currently, there is no cure for the HIV infection and, therefore, no cure for AIDS. Research continues to find methods to stop the growth of the human immunodeficiency virus and to restore the patient's immune system. In the meantime, patients are treated to alleviate signs and symptoms from which they are suffering. Specifically, supportive measures are taken to reduce the risk of the patient developing an infection, to treat any existing infections and malignancies, to maintain adequate nutrition for the patient, and to give the patient emotional support. The drug Zidovudine (formerly called azidothymidine or AZT) was the first drug which slowed down the progression of AIDS. This drug, however, is very toxic. (Patients using the drug in a controlled study required regular blood transfusions to maintain their hemoglobin.) Research must continue to discover an effective treatment for AIDS.
3-9. WALTER REED STAGING CLASSIFICATION

As more knowledge about HIV infection became known, it became apparent that a classification system for the progression of HIV/AIDS was necessary. So far, four classification systems regarding the progression of the HIV infection have been developed. One of those classification systems was developed by the Army at Walter Reed Army Medical Center. This system is called the Walter Reed staging classification for HIV infection. This system is based on current concepts of the immunopathogenesis of AIDS and attempts to provide an objective scale of the progression of the disease (HIV infection to AIDS). The Walter Reed stages are defined according to virologic/serologic evidence of HIV infection, CD4+T-helper lymphocyte subset depletion, loss of cutaneous delayed hypersensitivity, and appearance of opportunistic infections. One of the strengths of this system is that it provides a useful tool for studying the natural history of "early" HIV infection. This system provides uniformity of clinical evaluation of patients with documentation of HIV infection. Here are the stages of the system:

a. WRO. High risk contacts (sexual contacts or blood recipients of HIV-infected individuals).

b. WR1--WR6. Require documentation of HIV infection by positive Western Blot blood test.

c. WR5. Patient has complete energy or thrush.

d. WR6. Patient has had an opportunistic infection.

3-10. PROBLEMS UNIQUE TO THE MILITARY

The disease AIDS has a special impact on military personnel. Consider the following:

a. Deployment. American security depends on a fighting force that is 100 percent physically fit and ready to be deployed whenever and wherever needed. Personnel ill with AIDS will not be able to perform their mission and will also overextend medical support on noncombat-related problems. Suppose a member of a deployed unit is diagnosed as having AIDS. Will other unit members want to be near him? Perhaps not. The result may be undermining individual morale and destruction of unit esprit de corps.

b. Battlefield Injuries Transfusions. Military personnel may need transfusions, but the soldiers may be fearful of receiving a blood transfusion from an anonymous donor. There is the possibility that the blood might be contaminated and give him AIDS.
c. **Live Virus Inoculation.** Military personnel require a variety of inoculations to help keep the fighting force physically fit in other parts of the world. Those inoculations are sometimes given with needles and syringes. Couldn't either of those be contaminated? (This is unlikely since usually both needles and syringes come packaged and sterilized, and neither are reused.)

3-11. PREVENTION

Follow these guidelines to reduce the risk of becoming infected with the human immunodeficiency virus and subsequently developing AIDS:

a. Avoid sexual contact with those at risk:
   (1) Prostitutes.
   (2) Drug users.
   (3) Homosexuals.
   (4) Bisexuals.
   (5) Promiscuous individuals.

**NOTE:** The use of condoms made of latex has been shown to be an effective barrier against HIV. Condoms made of animal membrane, however, have not provided protection against HIV.

b. Limit the number of sexual partners.

c. Don't use IV drugs.

**NOTE:** Women who are HIV infected or think they may be HIV infected should be cautioned to avoid pregnancy because they can transmit the virus to their unborn child.

3-12. PSYCHOSOCIAL ASPECTS

At this time, an individual diagnosed as having AIDS faces not only the trauma of having a fatal illness but also the possibility that he will lose his job, family, and friends. The patient needs help in dealing with not only physical problems but also the collapse of his economic and social life. People with AIDS have some common concerns, some of which include the following:
a. **Need for Confidentiality.** As a health care provider, you have a responsibility to keep the knowledge that an individual has AIDS, ARC, or an HIV infection confidential. In the military, do not talk about cases of individuals with any of these infections. You will need to follow standard operating procedures for reporting such information as you come across it in your job. Currently, government policy affecting people with AIDS, ARC and/or HIV infection is as follows:

1. All military personnel and all recruits are tested for HIV antibodies. Army recruits, ROTC students, service academy cadets, and all candidates for officer service are expelled if found to be infected with HIV. Active duty personnel who test positive for HIV are not separated from the service but are subject to involuntary change and limited duties.

2. In regard to AIDS, ARC, and/or HIV infection, there is a limited confidentiality. Information a military doctor learns from his military patient may be used against the patient in court-martial proceedings. Care will be taken that only those with a "need to know" are given any information about a soldier's HIV status. For example, the HIV-infected soldier will be advised to inform all previous sexual partners to seek testing and counseling. Information must also be reported to civilian public health authorities.

**NOTE:** In the civilian community, all states have laws requiring that doctors report the identities of individuals diagnosed with AIDS either to state or local health authorities. For many years, doctors have been required to report other communicable and sexually transmissible diseases. Through the years, public health officials have a good record of keeping such information confidential. The purpose of reporting such AIDS information is to help track the progress of the AIDS epidemic.

b. **Feelings of the Patient at the Time of Diagnosis.** Generally, individuals first diagnosed as having AIDS experience these reactions: fear and panic, denial, anger and depression, and helplessness. Most individuals pass through these phases of feelings in the sequence given here. Naturally, not everyone reacts this way. Let's look at these feelings, since these are the most common reactions.

1. **Fear and panic.** Since there is much about this disease that is unknown, it is natural and normal to be afraid and to panic. There have been many horror stories about this disease. Additionally, the prospect is that the disease is fatal. Specific fears may include fear of rejection, fear of being helpless and alone, fear of pain, and, of course, fear of death.

2. **Denial.** First, the thoughts are "It can't be me." "Oh, no, not me." That the person could have the disease seems just too horrible to be true.
(3) Anger. AIDS brings out a great deal of anger. First, there is anger about having the disease itself. "Why me?" Then, anger about many things come out. If friends abandon the person, anger at the abandonment. Often, a person feels anger at the government and society for not having found a cure and/or treatment for the disease. Included are angers at health care people for not doing more to help and angers at the tremendous cost for medications that do not cure. Eventually, these and other angers turn inward, and the person feels depressed.

(4) Helplessness. Finally, many feel helpless. Helpless and hopeless seem to go hand in hand. Many individuals just give up.

NOTE: On a positive note, as the AIDS epidemic continues to grow, support systems and positive information also is growing. There are now support groups in several states. Information is available in books, audio tapes, and video tapes.

c. Potential for Suicide Ideation. Patients who are terminally ill with AIDS may consider suicide. The pain of associated illnesses, the prospect of repeated hospital stays with no cure, and the sense of being a burden to others are all factors that contribute to the idea of suicide as a way out.

d. Fears Concerning Development of AIDS and Subsequent Death. It is natural and normal to worry about how the disease will progress. Will it be painful? Will the person lose his independence? Since the disease is usually fatal and death is full of unknowns, it is also normal to worry about death. The individual patient will eventually come to terms with these concerns himself. In the military, the patient is usually referred to AIDS counselors when initially diagnosed. These counselors work with the patient, referring him to psychologists, ministers, etc. as needed.

3-13. PRECAUTIONS FOR HEALTH CARE WORKERS

Traditionally, health care workers have taken precautions such as hand washing when working with individuals with an infectious disease. With the discovery that health care workers may come in contact with supposedly healthy persons who are carriers of HIV, it now becomes necessary for these workers to take precautions routinely:

a. Wash your hands before and after contact with each patient. Also, wash your hands after exposure to body fluids or laboratory specimens.

b. Wear disposable gloves whenever you have direct contact with potentially infected substances, body tissues, or environmental surfaces.

c. Employees with weeping or exudative skin lesions on the hands or other exposed areas should be excused from direct patient care activities until the condition is healed.
d. Wear gowns or other protective garments if your clothing is likely to be soiled with blood, secretions, or excretions. DO NOT wear soiled gowns outside the patient care area or outside the laboratory areas.

e. Dispose of used needles, scalpels, and other sharp disposable objects in puncture-resistant containers. DO NOT resheath, bend, break, or manipulate such equipment in any way before disposal.

f. It is not necessary to wear masks and protective eye wear routinely. Wear a mask when dealing with a coughing patient suspected of having *M. tuberculosis* or any other infectious respiratory disease. Wear masks and protective eye wear when you think there may be a splatter of saliva, respiratory secretions, amniotic fluid, blood, or other body fluids. This is to protect you from infected materials.

g. Clean contaminated areas with a solution of 10 percent household bleach; that is, 1 part bleach to 9 parts water.

h. Place contaminated wastes in containers for disposal according to local standing operating procedure. Soiled linens and other laundry should be put in bag clearly marked as contaminated and transported and laundered according to local standing operating procedure.

i. Be sure to label blood products from infectious or possibly infectious patients correctly.

j. Take precautions when drawing blood or starting an IV.

**NOTE:** The goal is to prevent health care workers from being exposed to potentially infected body fluids and tissues.

### 3-14. CLOSING

a. To combat the epidemic of immune deficiency disease, general principles of prevention, eradication, and treatment of infection should be used. First, educate the public to prevention procedures so that there are fewer people exposed to the virus and, thus, fewer people infected. Second, research must continue to ward developing a vaccine composed of antigens which would elicit neutralizing antibody formation. (Research on HIV and AIDS has advanced dramatically over the past five years.) Third, ongoing research and development of drugs to treat the infection and restore the body's immune system must be move forward.
b. To facilitate development of scientifically based information on the natural history and transmission pattern of HIV, it is essential that infected soldiers assist the military health care system by providing accurate information. Accordingly, the mere presence of the HIV antibody will not be used as the basis for adverse action against a soldier.

c. Currently, the military research community is continuing to help the civilian sector in the ongoing research concerning the human immunodeficiency virus which causes AIDS. At the present time, the best health measures are preventative in nature. Each of you is charges with the responsibility of properly educating soldiers in your units with the proper information concerning this virus and the preventative measures that can be taken.

Continue with Exercises

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EXERCISES, LESSON 3

INSTRUCTIONS: Answer the following exercises by marking the lettered response that best answers the question or best completes the incomplete statement or by writing the answer in the space provided.

After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced with the solution.

1. The letters HIV stand for ____________________________________________.

2. HIV may be defined as ____________________________________________
   ____________________________________________

3. The letters AIDS stand for ____________________________________________.

4. AIDS may be defined as ____________________________________________
   ____________________________________________

5. List the four routes of transmission of HIV.
   a. ____________________________________________.
   b. ____________________________________________.
   c. ____________________________________________.
   d. ____________________________________________.

6. AIDS is caused by the action of a virus (HIV) on the body’s ________________

7. The result of the action in test item #6 is that the body’s ________________ system
   is weakened or becomes useless, and the patient becomes susceptible to
   ____________________________ infections and unusual ____________________________.
8. List four signs/symptoms of AIDS.
   a. __________________________________________________________.
   b. __________________________________________________________.
   c. __________________________________________________________.
   d. __________________________________________________________.

9. The system developed at Walter Reed which attempts to provide an objective
   scale of the progression of HIV infection to AIDS is called the __________________________
   ____________________ ________________________________________

10. List five groups of individuals who are high-risk for developing AIDS:
    a. __________________________________________________________.
    b. __________________________________________________________.
    c. __________________________________________________________.
    d. __________________________________________________________.
    e. __________________________________________________________.

11. List three methods of reducing the risk of developing AIDS.
    a. __________________________________________________________.
    b. __________________________________________________________.
    c. __________________________________________________________.
12. A patient just diagnosed as having AIDS may go through these psychological phases:

a. __________________ ___________________________________________.

b. __________________ ___________________________________________.

c. __________________ ___________________________________________.

d. __________________ ___________________________________________.

Check Your Answers on Next Page
SOLUTIONS TO EXERCISES, LESSON 3

1. Human immunodeficiency virus. (3-2a)

2. HIV is a virus that attacks T-helper cells, cells which regulate our immune system and protect us from various infectious agents. (para 3-2a)

3. Acquired immune deficiency syndrome. (para 3-2b)

4. AIDS is a disease that occurs in a person with no known cause for diminished resistance to that disease. (para 3-2b)

5. Sexual contact.
   Sharing of needles.
   Contaminated blood.
   Maternal-child transmission in utero. (paras 3-4a(1) through (4))

6. T4 cells. (para 3-5b)

7. Immune.
   Opportunistic.
   Cancers. (para 3-5b)

8. You are correct if you listed any four of the following:
   Fever of unknown origin.
   Weight loss.
   Malaise.
   Diarrhea.
   Opportunistic infections.
   Kaposi's sarcoma.
   (paras 3-7a through f)

9. Walter Reed Staging Classification System. (para 3-9)

    Drug users.
    Homosexuals.
    Bisexuals.
    Promiscuous individuals. (paras 3-11a(1) through (5))

11. Avoid sexual contact with those at risk.
    Limit the number of sexual partners.
    Don't use IV drugs. (paras 3-11a through c)

12. Fear and panic.
    Denial.
    Anger.
    Helplessness. (paras 3-12b(1) through (4))

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