



National Academy of Opticianry

Continuing Education Course

Approved by the American Board of Opticianry and the National Contact Lens Examiners

What are HIV and AIDS?

National Academy of Opticianry

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National Academy of Opticianry

PREFACE:

This continuing education course was prepared under the auspices of the National Academy of Opticianry and is designed to be convenient, cost effective and practical for the Optician.

The skills and knowledge required to practice the profession of Opticianry will continue to change in the future as advances in technology are applied to the eye care specialty. Higher rates of obsolescence will result in an increased tempo of change as well as knowledge to meet these changes. The National Academy of Opticianry recognizes the need to provide a Continuing Education Program for all Opticians. This course has been developed as a part of the overall program to enable Opticians to develop and improve their technical knowledge and skills in their chosen profession.

The National Academy of Opticianry

INSTRUCTIONS:

Read and study the material. After you feel that you understand the material thoroughly take the test following the instructions given at the beginning of the test. Upon completion of the test, mail the answer sheet to the National Academy of Opticianry, 8401 Corporate Drive, Suite 605, Landover, Maryland 20785 or fax it to 301-577-3880. Be sure you complete the evaluation form on the answer sheet. Please allow two weeks for the grading and a reply.

CREDITS:

The American Board of Opticianry and the National Contact Lens Examiners have approved this course for one (1) Continuing Education Credit toward certification renewal. To earn this credit, you must achieve a grade of 80% or higher on the test. The Academy will notify all test takers of their score and mail the credit certificate to those who pass. You must mail the appropriate section of the credit certificate to the ABO and/or your state licensing board to renew your certification/licensure. One portion is to be retained for your records.

AUTHOR:

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INTENDED AUDIENCE:

This course is intended for opticians of all levels.

COURSE DESCRIPTION:

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS) are pandemics. HIV is the name of the virus that causes the infection. AIDS is a severe immunological disorder caused by the retrovirus HIV. HIV causes a defect in cell-mediated immune response that is manifested by increased susceptibility to opportunistic infections and to certain rare cancers, such as Kaposi's sarcoma. It is transmitted primarily by exposure to contaminated body fluids, especially blood and semen. Most new infections globally are transmitted heterosexually, although risk factors vary. In some countries, men who have sex with men, injecting drug users, and sex workers are at significant risk.

LEARNING OBJECTIVES:

. Upon successfully completing this course, the participant should be able to:

- Name to daily infectivity rates of HIV.
- Differentiate between HIV and AIDS.
- List three ways to prevent infection.

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Overview

HIV is short for Human Immunodeficiency Virus (HIV), which is the name of a retrovirus that attacks the immune system. If left untreated, HIV infection may progress to Acquired Immunodeficiency Syndrome (AIDS), which is an immunological disorder comprised of a set of symptoms (syndrome) and severe illnesses that occur in the final stages of HIV infection.

HIV infection destroys a type of white blood cell in our immune system called T-helper or CD4 cells. The virus causes a defect in our bodies' cell-mediated immune response that is manifested by increased susceptibility to opportunistic infections and to certain rare cancers, such as Kaposi's sarcoma. Disease progression may take 10 years or more before the body succumbs to the virus' effects. HIV is transmitted person-to-person primarily by exposure to contaminated body fluids, especially blood and semen. Most new infections globally are transmitted heterosexually, although risk factors vary. In some countries, men who have sex with men, injecting drug users, and sex workers are at significantly higher risk. Although there is currently no cure, HIV infection can be controlled and people can live long and healthy lives due to current advances in antiretroviral drug therapy and proper support. [1,2]

Statistics

The statistics as stated by the CDC are staggering, yet the numbers are improving. These are U.S. data unless otherwise noted [2,3]

- The first cases known as AIDS were reported in June 1981.
- HIV remains a significant cause of death for certain populations. In 2014, it was the 8th leading cause of death for those aged 25-34 and 9th for those aged 35-44.
- Gay and bisexual men, particularly young African American gay and bisexual men, are most affected. Gay and bisexual men accounted for 82% (26,375) of HIV diagnoses among males in 2014.
- In 2014 heterosexual contact accounted for 24% (9,339) of HIV diagnoses
- In 2014, there were 12,333 deaths (due to any cause) of people with diagnosed HIV infection ever classified as AIDS, and 6,721 deaths were attributed directly to HIV
- Six percent (2,392) of HIV diagnoses in the United States were attributed to injection drug use in 2015.
- In 2015, 39,513 people were diagnosed with HIV. The annual number of new diagnoses declined by 9% from 2010 to 2014
- In 2014 1.1 million people in the US were living with HIV, and 1 in 7 of them don't know it. An estimated 166,000 (15%) had not been diagnosed.

- In the United States, more than 1.1 million people are estimated to be living with HIV (including those with AIDS) today, representing a slight increase over time as people are living longer with HIV disease and new infections remain relatively stable
- HIV disease continues to be a serious health issue for parts of the world. Worldwide, there were about 2.1 million new cases of HIV in 2015.
- About 36.7 million people are living with HIV around the world, and as of June 2016, 17 million people living with HIV were receiving medicines to treat HIV, called antiretroviral therapy (ART).

The HIV virus

In general, viruses are very small particles and classified as prokaryotic organisms. They are ‘lower life forms’ that contains a bit of DNA or RNA, but not both, which is surrounded by a protein coat. Viruses are obligate intracellular parasites, meaning that they cannot live and reproduce on their own. Outside a living cell, a virus is inactive, lifeless, and harmless. The only way for a virus to replicate is to transport its own genetic material (RNA or DNA) into the body’s living cells, and then use the cell’s ‘machinery’ to reproduce.

The HIV virus is transmitted from an infected person through bodily fluids and enters the bloodstream to infect the next victim. In the blood, the virus attaches to cholesterol-rich regions of a cell’s membrane. Here the HIV virus does something that is unique: It directly attacks the most important immune cells in our bodies, namely the CD4 cells (aka T-helper lymphocytes) and uses them to reproduce and make more viruses. The virus hides inside of these important immune cells and thereby becomes invisible to our bodies’ defenses.

HIV infection lessens the ability of our immune systems to fight other infections. Consequently, people who are infected with the HIV virus are more susceptible to common infections from bacteria, fungi, other viruses, and cancers. Eventually, the immune system collapses and the victim dies from ‘opportunistic’ infections.

Tuberculosis

HIV and Tuberculosis (TB) are the world’s two most deadly infectious diseases. These two epidemics are tragically interconnected, as TB is the leading cause of death for those living with HIV.

The *Mycobacterium tuberculosis* bacterium is the etiologic agent for tuberculosis. Tuberculosis primarily attacks the lungs of susceptible individuals. Inhaling droplets from the cough of persons infected with tuberculosis spreads it person-to-person. TB infection can be detected by a simple screening test called a purified protein derivative (PPD) skin test.

A positive PPD test means that the bacteria have entered the body, but our immune system typically suppresses these bacteria so symptoms may be delayed. Our immune system does this by producing cells called macrophages that surround the bacteria and wall it off, forming a tubercle, hence the nickname *tubercle bacillus*, and keeping the organisms from multiplying and spreading. Individuals with HIV are immunocompromised (the immune system is compromised), and cannot contain the TB organisms from spreading. After being infected the TB bacteria can spread via the blood to other organs, such as the bones, peritoneum, and brain.

TB infections had been declining during the past century due to better living conditions and antibiotics. Unfortunately, the HIV/AIDS epidemic has brought this killer back into our modern world. An estimated one-third of the persons living with HIV infection are co-infected with TB. TB is the cause of death for as many as half of all persons with AIDS. An estimated 9–14 million Americans are infected with TB bacteria, and many do not know it. If they are not treated, tuberculosis will develop at some point in many of these persons. Multi-drug-resistant TB (MDR TB) is TB that is resistant to at least 2 of the best anti-TB drugs—isoniazid and rifampin. MDR TB is extremely difficult to treat and can be fatal. Although the number of cases in the United States decreased during the past few years, MDR TB has now been reported in nearly all states and the District of Columbia. A total of 9,557 TB cases (a rate of 3.0 cases per 100,000 persons) were reported in the United States in 2015.[14]

In addition to HIV/AIDS, the increase in TB in the developing world is partially due to famine, homelessness, war, and lack of medical care, any of which may compromise our body's immune system.

Economic Impact

The impact on the economy is quite significant. In FY 2009, U.S. federal funding to combat HIV totaled \$24.8 billion. Of this, 50% is for care, 11% for research, 10% for cash and housing assistance, 4% for prevention, and 25% for the international epidemic.

Tuberculosis is a major comorbidity of HIV infection, and TB killed 1.8 million people in 2015, making it the most deadly infectious disease worldwide, but funding for research into better TB prevention, diagnosis, and treatment dropped. [13] In 2015, the world spent US\$620.6 million on TB research and development (R&D), the lowest level of funding since 2008. Fortunately, and in response to the persistent challenges related to TB, including drug-resistant TB, the United Nations General Assembly will hold the first-ever high-level meeting on TB in 2018 to discuss these challenges and examine progress toward global goals, including ending the epidemic by 2030.[14]

Poverty is a significant risk factor for HIV transmission. According to a report from the Food and Agricultural Organization (FAO), Sub-Regional Office for Southern and Eastern Africa Corporate Document Repository: “The impact of HIV/AIDS on the macro economic environment takes two dimensions, namely the direct and indirect costs. The former refers to the cost of treatment associated with HIV related illness, which has serious implications for health care budgets around the region. Those segments of the population that are poverty-stricken stand to lose the most as pressures on the health budgets increases resulting in higher medical costs. Indirect costs are more difficult to measure as the refer to loss of value of production, the loss of current wages, the loss of the present value of future earnings, training cost of new staff, high staff turnover, cost of absenteeism, higher recruitment costs, the drainage of savings, amongst others”[5]

While HIV/AIDS is clearly a health problem, the world has come to realize it is also a development problem that threatens human welfare, socio-economic advances, productivity, social cohesion, and even national security. HIV/AIDS reaches into every corner of society, affecting parents, children and youth, teachers and health workers, rich and poor. To understand the breadth and depth of the AIDS/HIV pandemic, governmental agencies collect data.

Surveillance Data Collection

The Centers for Disease Control and Prevention (CDC) in Atlanta monitor HIV/AIDS cases in conjunction with the World Health Organization (WHO). HIV/AIDS surveillance is the on-going and systematic collection, analysis, interpretation, dissemination, and evaluation of population-based

information about persons infected with HIV or diagnosed with AIDS. HIV/AIDS data are collected and stored through both active surveillance (i.e. CDC contacts local health departments for information) and passive surveillance (local health departments report to CDC). Demographic characteristics are surveyed, such as sex, race, and age. Mode of exposure and associated virologic illnesses are also reported. This information is quite useful in assessing the epidemiologic impact of the epidemic. The AIDS case surveillance system, one of the most complete in the U.S., provides data from all states and represents diagnoses of the most advanced stage of HIV disease. [4]

Confidentiality of Surveillance Information

HIV/AIDS surveillance data are protected under state laws that address public health data. The CDC requires that all data be stored in physically secure environments with limited access to authorized personnel. Patient and physician personal identifiers are not sent to CDC. A federal Assurance of Confidentiality protects data maintained at CDC. The CDC does not collect names, address, or phone numbers of persons with HIV/AIDS. Interestingly, not all states require HIV surveillance. In general, states require a patient's written consent to disclose AIDS Confidential Information (ACI) unless the disclosure is otherwise authorized or required by law. AIDS surveillance data only represent persons with late-stage HIV disease.

Global Impact as published by UNAIDS from 2015 data[12]

Table 1

Global summary of the AIDS epidemic | 2015

Number of people living with HIV	Total	36.7 million [34.0 million – 39.8 million]
	Adults	34.9 million [32.4 million – 37.9 million]
	Women	17.8 million [16.4 million – 19.4 million]
	Children (<15 years)	1.8 million [1.5 million – 2.0 million]
<hr/>		
People newly infected with HIV in 2015	Total	2.1 million [1.8 million – 2.4 million]
	Adults	1.9 million [1.7 million – 2.2 million]
	Children (<15 years)	150 000 [110 000 – 190 000]
<hr/>		
AIDS deaths in 2015	Total	1.1 million [940 000 – 1.3 million]
	Adults	1.0 million [840 000 – 1.2 million]
	Children (<15 years)	110 000 [84 000 – 130 000]



Table 2**Regional HIV and AIDS statistics and features | 2015**

	Adults and children living with HIV	Adults and children newly infected with HIV	Adult prevalence (15–49) [%]	Adult & child deaths due to AIDS
Eastern and southern Africa	19.0 million [17.7 million – 20.5 million]	960 000 [830 000 – 1.1 million]	7.1% [6.6% – 7.6%]	470 000 [390 000 – 560 000]
Western and central Africa	6.5 million [5.3 million – 7.8 million]	410 000 [310 000 – 530 000]	2.2% [1.8% – 2.7%]	330 000 [250 000 – 430 000]
Middle East and North Africa	230 000 [160 000 – 330 000]	21 000 [12 000 – 37 000]	0.1% [<0.1% – 0.2%]	12 000 [8700 – 16 000]
Asia and Pacific	5.1 million [4.4 million – 5.9 million]	300 000 [240 000 – 380 000]	0.2% [0.2% – 0.2%]	180 000 [150 000 – 220 000]
Latin America and the Caribbean	2.0 million [1.7 million – 2.3 million]	100 000 [86 000 – 120 000]	0.5% [0.4% – 0.6%]	50 000 [41 000 – 59 000]
Eastern Europe and central Asia	1.5 million [1.4 million – 1.7 million]	190 000 [170 000 – 200 000]	0.9% [0.8% – 0.9%]	47 000 [39 000 – 55 000]
Western and Central Europe and North America	2.4 million [2.2 million – 2.7 million]	91 000 [89 000 – 97 000]	0.3% [0.3% – 0.4%]	22 000 [20 000 – 24 000]
TOTAL	36.7 million [34.0 million – 39.8 million]	2.1 million [1.8 million – 2.4 million]	0.8% [0.7% - 0.9%]	1.1 million [940 000 – 1.3 million]

The ranges around the estimates in this table define the boundaries within which the actual numbers lie, based on the best available information.

**Recommendations****Recommendations for Prevention of HIV Transmission in Health-Care Setting issued by the Centers for Disease Control and Prevention****Universal Precautions [6, 8,9,10]**

Since medical history and examination cannot reliably identify all patients infected with HIV or other blood-borne pathogens, blood and body- fluid precautions should be consistently used for ALL patients. This approach, previously recommended by CDC and referred to as "universal blood and body-fluid precautions" or "universal precautions," should be used in the care of ALL patients, especially including those in emergency-care settings in which the risk of blood exposure is increased.

1. All health-care workers should routinely use appropriate barrier precautions to prevent skin and mucous-membrane exposure when contact with blood or other body fluids of any patient is anticipated. Gloves should be worn for touching blood and body fluids, mucous membranes, or non-intact skin of all patients, for handling items or surfaces soiled with blood or body fluids, and for performing venipuncture and other vascular access procedures. Gloves should be changed after contact with each patient. Masks and protective eyewear or face shields should be worn during procedures that are likely to generate droplets of blood or other body fluids to prevent exposure of mucous membranes of the mouth, nose, and eyes. Gowns or aprons should be worn during procedures that are likely to generate splashes of blood or other body fluids.
2. Hands and other skin surfaces should be washed immediately and thoroughly if contaminated with blood or other body fluids. Hands should be washed immediately after gloves are removed.

3. All health-care workers should take precautions to prevent injuries caused by needles, scalpels, and other sharp instruments or devices during procedures; when cleaning used instruments; during disposal of used needles; and when handling sharp instruments after procedures. To prevent needle-stick injuries, needles should not be recapped, purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand. After they are used, disposable syringes and needles, scalpel blades, and other sharp items should be placed in puncture-resistant containers for disposal; the puncture-resistant containers should be located as close as practical to the use area. Large-bore reusable needles should be placed in a puncture-resistant container for transport to the reprocessing area.
4. Although saliva has not been implicated in HIV transmission, to minimize the need for emergency mouth-to-mouth resuscitation, mouth pieces, resuscitation bags, or other ventilation devices should be available for use in areas in which the need for resuscitation is predictable.
5. Health-care workers who have exudative lesions or weeping dermatitis should refrain from all direct patient care and from handling patient-care equipment until the condition resolves.
6. Pregnant health-care workers are not known to be at greater risk of contracting HIV infection than health-care workers who are not pregnant; however, if a health-care worker develops HIV infection during pregnancy, the infant is at risk of infection resulting from perinatal transmission.
7. Because of this risk, pregnant health-care workers should be especially familiar with and strictly adhere to precautions to minimize the risk of HIV transmission. Implementation of universal blood and body-fluid precautions for ALL patients eliminates the need for warning labels on specimens since blood and other body fluids from all patients should be considered infective.

Prevention

Human immunodeficiency virus (HIV), the virus that causes acquired immunodeficiency syndrome (AIDS), is transmitted through sexual contact and exposure to infected blood or blood components and perinatally from mother to neonate. HIV has been isolated from blood, semen, vaginal secretions, saliva, tears, breast milk, cerebrospinal fluid, amniotic fluid, and urine and is likely to be isolated from other body fluids, secretions, and excretions. However, epidemiologic evidence has implicated only blood, semen, vaginal secretions, and possibly breast milk in transmission. Although the virus has been isolated from human tears, no known transmission has been documented.

Anyone can become infected with HIV. As stated above, there are three methods of HIV transmission, 1) sexual transmission, 2) transmission through blood (e.g. IV drug use), and 3) mother-to-child transmission. Each category poses challenges to prevention. Preventing HIV transmission is complicated. Prevention programs involve sex education, which traditionally faces barriers to dissemination of accurate information due to political, cultural, religious, ethnic and superstitious reasons. For example, the World Health Organization (WHO) recommends that male circumcision should be part of a comprehensive HIV prevention package. This is not acceptable to all cultures. Similarly, sexual education issues such as abstinence versus the use of condoms remain controversial, as does needle exchange programs for illicit drug users. [7] Please consult the references below for more complete information.

References

- 1 <https://www.avert.org/about-hiv-aids/what-hiv-aids>
- 2 <https://www.cdc.gov/hiv/basics/index.html>
- 3 <https://www.cdc.gov/hiv/statistics/overview/ataglance.html>
- 4 <https://www.cdc.gov/hiv/statistics/surveillance/terms.html>
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- 14 <https://www.cdc.gov/tb/statistics/default.htm>

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