HIV and AIDS: An Overview

This course has been awarded
One (1.0) contact hour
This course expires on
June 28, 2019

First Published: September 15, 2009

Disclaimer

Insert new disclaimer

Acknowledgements

RN.com acknowledges the valuable contributions of…

… Kim Maryniak, RNC-NIC, MSN, PhD(c)

Purpose and Objectives

The purpose of this course is to provide a brief overview of HIV and AIDS, the current state of the epidemic, and how specific state reporting requirements may be implemented.

After successful completion of this course, you will be able to:

1. Differentiate between HIV and AIDS.
2. Outline how HIV is transmitted and symptoms of HIV.
3. Define how HIV is diagnosed.
4. Define HAART.
5. Outline the key side effects associated with HAART medications.
6. Discuss at least three considerations for evaluation and management of HIV in women and children

Introduction

Acquired immunodeficiency syndrome (AIDS) was first reported in the United States in 1981 and has since become a major worldwide epidemic (Centers for Disease Control

and Prevention [CDC], 2001a; CDC, 2011a).

AIDS is caused by human immunodeficiency virus (HIV). HIV increasingly kills or damages cells in the immune system, decreasing the ability to fight infections and certain cancers. This can lead to life-threatening diseases called opportunistic infections, which are caused by viruses or bacteria that usually do not infect people with an intact immune system (CDC, 2001a; CDC, 2011a).

HIV/AIDS Statistics in the U.S.

More than 1.2 million cases of HIV/AIDS have been reported in the United States, with 14% of individuals unaware of their infection (Centers for Disease Control (CDC), 2014). The epidemic is growing most rapidly among minority populations and is a leading killer of African-American males ages 45 to 54.

The CDC has developed an innovative system to estimate the number of new HIV infections (or incidence) for the United States in a given year. Using this long-term, confidential name-based HIV reporting, approximately 50,000 new HIV infections occurred in the United States per year, between 2007 and 2010 (CDC, 2012).

According to the CDC report in 2012, approximately 83.1% of HIV/AIDS diagnoses among adolescents and adults and males. In 2012, the largest estimated proportion of HIV/AIDS diagnoses among adults and adolescents were for men who have sex with men (MSM) **with** injection drug use, followed by male to male sexual contact only (CDC, 2014).

In 2013, persons aged 20–24 accounted for the largest proportions of newly diagnosed HIV/AIDS cases, with age groups 25-49 also highly affected (CDC, 2015d).

African Americans accounted for almost half of the estimated number of HIV/AIDS diagnoses made during 2013 (CDC, 2015d).

AIDS surveillance:
Through a uniform system, the CDC receives reports of AIDS cases from all U.S. states. Effective April 2008, all 50 states, the District of Columbia, and six dependent areas—American Samoa, Guam, the Northern Mariana Islands, Palau, Puerto Rico, and the U.S. Virgin Islands report data via these standards. This data is used to monitor trends in HIV / AIDS because they are representative of all areas
(CDC, 2014).

Pediatric HIV/AIDS Statistics in the U.S.

Young people in the United States are at continual risk for HIV infection, particularly for youth of minority races and ethnicities. HIV disproportionately affects children in minority groups, especially African Americans.

Persistent HIV prevention outreach and education efforts, including programs on abstinence and on delaying the initiation of sex, are required as new generations replace the generations that benefited from earlier prevention strategies.

According to UNAIDS (The Joint United Nations Programme on HIV/AIDS) approximately 240,000 children became infected with HIV in 2013. The good news is that this was a 58% decline in the number of new HIV diagnosis in children since 2001 (UNAIDS, 2014).

The United States has a relatively small percentage of the world's children living with HIV. The vast majority of HIV-infected children acquire the virus from their mothers before or during birth or in the early postnatal period.

The term "Youth" refers to persons aged between 13 - 24 years of age.
"Children" are those less than 13 years of age.

HIV/AIDS Statistics around The World
Worldwide, the HIV/AIDS epidemic is at a critical stage. 36.9 million people are living with HIV globally. In 2014, two million people were newly infected, and 1.2 million people died from AIDS or a related illness in 2014 (UNAIDS, 2015).

HIV/AIDS is the leading cause of death in Africa and the 4th leading cause of death worldwide. In Africa alone, the prevalence of new HIV infection is at least 66% of the global total, decreasing life expectancy in that part of the world by more than 20 years (UNAIDS, 2015).

It is estimated that there are 7000 new cases of HIV each day worldwide (World Health Organization [WHO], 2011). Lack of education, stigma, and inability to access healthcare resources all contribute to the HIV/AIDS epidemic around the world (UNAIDS, 2015).

Interactive Activity
Watch this brief video as individuals discuss their experiences living with HIV, available at https://www.youtube.com/watch?v=le7KMg82ljc

HIV versus AIDS
The term AIDS applies to the most advanced stage of HIV infection, stage 3. The CDC developed official criteria for the definition of AIDS and is responsible for tracking the spread of AIDS in the United States.

CDC's definition of AIDS includes all HIV-infected people who have fewer than 200 CD4+ T cells per cubic millimeter of blood (Healthy adults usually have CD4+ T-cell counts of 1,000 or more) or DC4+ cells accounting for fewer than 14% of all lymphocytes.

In addition, the definition includes 26 clinical conditions that affect people with advanced HIV disease. Most of these are opportunistic infections that are often severe and sometimes fatal because the immune system is so ravaged by HIV that the body cannot fight the infection.

Children with AIDS may get the same opportunistic infections as do adults with the

disease. In addition, they also have severe forms of the typically common childhood bacterial infections, such as conjunctivitis (pink eye), ear infections, and tonsillitis.

People with AIDS are also particularly prone to developing various cancers, especially Kaposi's sarcoma, cervical cancer, and lymphomas. These cancers are usually more aggressive and difficult to treat in people with AIDS (CDC, 2015a)

Transmission: Risky Behaviors and Blood Transfusions
HIV can infect anyone who practices risky behaviors such as:

- Sharing drug needles or syringes.
- Having sexual contact, including oral, with an infected person without using a condom.
- Having sexual contact with someone whose HIV status is unknown.

HIV is spread most commonly by having unprotected sex with an infected partner. The virus can enter the body through the lining of the vagina, vulva, penis, rectum, or mouth during sex. Persons with a sexually transmitted infection (STI) such as syphilis, genital herpes, chlamydial infection, gonorrhea, or bacterial vaginosis appears may be more susceptible to getting HIV infection during sex with infected partners. It is important to note that although the use of a condom significantly reduces risk of transmitting infection, it does not eliminate the possibility completely (CDC, 2015a).

HIV also is spread through contact with infected blood. Before donated blood was screened for evidence of HIV infection and before heat-treating techniques to destroy HIV in blood products were introduced, HIV was transmitted through transfusions of contaminated blood or blood components. Today, because of blood screening and heat treatment, the risk of getting HIV from such transfusions is extremely small (CDC, 2015a).

Transmission: Contaminated Needles
HIV is frequently spread among injection drug users. They become infected by sharing of needles or syringes contaminated with very small quantities of blood from someone infected with the virus.

There has been some concern that body tattooing and piercing increase the risk of acquiring HIV. However, to date, the CDC knows of no instances of HIV transmission through tattooing or body piercing, although hepatitis B virus has been transmitted during some of these practices (CDC, 2015a).

It is rare for a patient to give HIV to a healthcare worker or vice-versa by accidental sticks with contaminated needles or other medical instruments (CDC, 2015c).

Interactive Activity
Match the behaviors described with either high risk or lower risk

	Behavior	**Risk**
1.	Sharing needles	Lower risk
2.	Sexual intercourse using a condom	Lower risk

3. Oral sex without a condom — High risk
4. Having ears pierced — High risk

Answers:
1= High risk; 2= Lower risk; 3= High risk; 4= Lower risk

Transmission: Mother to Child (MTCT)
Women can transmit HIV to their babies during pregnancy or birth.

Approximately one-quarter to one-third of all untreated pregnant women infected with HIV will pass the infection to their babies. HIV also can be spread to babies through the breast milk of mothers infected with the virus. If the mother takes certain drugs during pregnancy, she can significantly reduce the chances that her baby will get infected with HIV. If healthcare providers treat HIV-infected pregnant women and deliver their babies by cesarean section, the chances of the baby being infected can be reduced to a rate of 1 percent. HIV infection of newborns has been almost eradicated in the United States due to appropriate treatment. Maternal-fetus transmission will be discussed in greater detail later in this course.

The risk of mother to child transmission is significantly increased if the mother has advanced HIV disease, high amounts of HIV in her bloodstream, or fewer-than-normal amounts of the CD4+ T cells.

Other factors that may increase the risk include:

- Drug use, such as heroin or crack/cocaine.
- Severe inflammation of fetal membranes.
- A prolonged period between membrane rupture and delivery.

(WHO, 2015; Mark et al., 2012)

Transmission: Mother to Child (MTCT)
The transmission of HIV from an HIV-positive mother to her child during pregnancy, labor, delivery or breastfeeding is called mother-to-child transmission (MTCT). Without any interventions, transmission rates range from 15-45% (WHO, 2015). Most MTCT, an estimated 50 to 70%, probably occurs late in pregnancy or during birth. Although the exact ways the virus is transmitted are unknown, scientists think it may happen when the mother's blood enters fetal circulation or by mucosal exposure to the virus during labor and delivery. One study also found that HIV-infected women who gave birth more than four hours after rupture of the fetal membranes were nearly twice as likely to transmit HIV to their babies, as compared to women who delivered within four hours of membrane rupture. In the same study, HIV-infected women who used heroin or crack/cocaine during pregnancy were also twice as likely to transmit HIV to their babies as compared to HIV-infected women who did not use drugs (Mark et al., 2012).

The first regimen to prevent MTCT was identified in a landmark study conducted in 1994. A specific regimen of AZT (azidothymidine) given to an HIV-infected woman during pregnancy and to her baby after birth was shown to reduce mother-to-child HIV

transmission by two-thirds.

Test Yourself

True or False?

Most mother to child transmission of HIV occurs late in pregnancy or during birth.

True.

Risk of Perinatal Transmission

Research into and improvements in treatment protocols have led to a dramatic decrease in the number of HIV infected babies born to HIV+ mothers.

In the United States, approximately 25 percent of pregnant HIV-infected women who do not receive AZT or a combination of antiretroviral therapies pass the virus to their babies. If women do receive a combination of antiretroviral therapies during pregnancy the risk of HIV transmission to the newborn drops to 1-2% (Havens et al, 2011).

The risk of MTCT is significantly increased if the mother has advanced HIV disease, high amounts of HIV in her bloodstream, or fewer-than-normal amounts of the CD4+ T cells.

Other factors that may increase the risk include:

- Maternal drug use, such as heroin or crack/cocaine.
- Severe inflammation of fetal membranes.
- A prolonged period between membrane rupture and delivery.

Breastfeeding & HIV Transmission

HIV may also be transmitted from a nursing mother to her child. A series of studies have determined that breastfeeding increases the risk of HIV transmission by about 14 percent.

Currently, the Joint United Nations Programme on HIV/AIDS (UNAIDS) recommends that HIV-positive women be educated and counseled so they can make an informed decision about how to breastfeed their children (2014).

There are a number of other studies being conducted in both the United States and around the world to determine the best strategies for both the breastfeeding mother and the child.

The World Health Organization recognizes the need for breastfeeding as a means for infant feeding in many countries. WHO recommends that breastfeeding continue until the infant is 12 months of age, provided the HIV-positive mother or baby is taking active antiretroviral therapy during that period. This will reduce the risk of HIV transmission and improve the infant's chance of survival (Tsague & Abrams, 2014).

In the United States, however, breastfeeding is NOT recommended for HIV infected

women, including those with active antiretroviral therapy (The Panel on Treatment of HIV-Infected Pregnant Woman and Prevention of Perinatal Transmission, 2015).

Transmission: The Environment & Casual Contact

Scientists and medical authorities agree that HIV does not survive well in the environment, making the possibility of environmental transmission remote. Additionally, HIV is unable to reproduce outside its living host. Although HIV has been transmitted between family members in a household setting, this type of transmission is very rare. These transmissions are believed to have resulted from contact between mucous membranes and infected blood; therefore, it does not spread or maintain infectiousness outside its host.

Some people fear that HIV might be transmitted in other ways; however, no scientific evidence to support any of these fears has been found. If HIV were being transmitted through other routes (such as through air, water, or insects), the pattern of reported AIDS cases would be much different from what has been observed.

Studies of families of HIV-infected people have shown clearly that HIV is not spread through casual contact such as the sharing of food utensils, towels and bedding, swimming pools, telephones, or toilet seats.

There is also no evidence that the virus is spread by contact with saliva. Laboratory studies reveal that saliva has natural properties that limit the power of HIV to infect, and the amount of virus in saliva appears to be very low. Research studies of people infected with HIV have found no evidence that the virus is spread to others through saliva by kissing. The lining of the mouth, however, can be infected by HIV, and instances of HIV transmission through oral intercourse have been reported.

Scientists have found no evidence that HIV is spread through sweat, tears, urine, or feces (CDC, 2015a).

Test Yourself

Which of the following increases the risk of HIV transmission from mother to child?

A. The use of antiretroviral drugs during pregnancy
B. Maternal tobacco use
C. Mothers with advanced HIV

Symptoms

Most people do not have any symptoms when they first become infected with HIV. They may, however, have a flu-like illness within a month or two after exposure to the virus. Acute illness lasts from one to two weeks and occurs in approximately 50% to 90% of cases. This illness may include:

- Fever
- Headache
- Fatigue

- Enlarged lymph nodes

These symptoms usually disappear within a week to a month and are often mistaken for those of another viral infection. During this period, people are very infectious, with large numbers of the HIV virus in blood and other body fluids (Mayo Clinic, 2015).

More persistent or severe symptoms may not appear for up to 10 years or more after HIV first enters the body in adults, or within two years in children born with HIV infection. This period of "asymptomatic" infection varies greatly in each individual. Some people may begin to have symptoms within a few months, while others may be symptom-free for more than 10 years.

Symptoms Continued
Even during the asymptomatic period, the virus is actively multiplying, infecting, and killing cells of the immune system. The virus can also hide within infected cells and lay dormant. The most obvious effect of HIV infection is a decline in the number of CD4 positive T (CD4+) cells found in the blood. The T cells are the immune system's key infection fighters. The virus slowly disables or destroys these cells without causing symptoms. By monitoring a patient's CD4+ cells, you can monitor progression of the virus, even when the patient is essentially asymptomatic.

A normal CD4 lymphocyte count is 500-1500 cells/mm3. As the HIV virus attacks the immune system, the CD4 lymphocytes are depleted. When the count reaches 200 cells/mm3, the patient disease has transitioned from HIV to AIDS.

As the immune system's function declines, a variety of complications start to occur. For many people, the first signs of infection are enlarged lymph nodes. Other symptoms often experienced months to years before the onset of AIDS include:

- Fatigue
- Weight loss
- Frequent fevers and sweats
- Persistent or frequent yeast infections (oral or vaginal)
- Persistent skin rashes or flaky skin
- Pelvic inflammatory disease in women that does not respond to treatment
- Short-term memory loss
- Frequent herpes infections
- Delayed growth in children
  (Mayo Clinic, 2015)

Interactive Activity
Please watch this brief video outlining the symptoms of HIV, available at https://www.youtube.com/watch?v=WD7PSB6mrvY

Diagnosis
Because early HIV infection often causes no symptoms, healthcare providers usually diagnose it by testing for the presence of antibodies to HIV. HIV antibodies generally do

not reach noticeable levels in the blood for one to three months following infection. It may take the antibodies as long as six months to be produced in quantities large enough to show up in standard blood tests. Therefore, patients who may have been recently infected may need to be screened for the presence of HIV genetic material. Direct screening of HIV is extremely critical in order to prevent transmission of HIV from recently infected individuals.

The most common tests to determine the presence of HIV are the ELISA/Western Blot tests. (ELISA is an acronym for enzyme –linked immunoassay.) This is a set of blood tests used in the diagnosis of chronic infection with human immunodeficiency virus (HIV). The HIV ELISA is a screening test for the diagnosis of HIV infection. There are a number of conditions that can cause a false positive ELISA, including lupus, Lyme disease, and syphilis. If the ELISA test is positive, it must be confirmed with a second test called the Western Blot, which is more specific and will confirm if someone is truly HIV positive (Branson et al., 2014).

Testing

After the first exposure, there is a –two to four week period of intense viral replication before the onset of an immune response and clinical illness. HIV antibody tests can't detect infection soon after exposure because the immune system needs time to produce antibodies. It generally takes from two to 12 weeks for the antibodies to be detected. During this time a test may show a "false negative."

Clinical manifestations begin to resolve as antibodies to the virus become detectable in patient serum. Patients then enter a stage of asymptomatic infection lasting months to years.

Instead of being tested for HIV antibodies, patients who want results about very recent exposures need to be tested using technology that detects and amplifies HIV viral particles directly (PCR) (Branson et al., 2014).

Test Yourself

Which of the following tests statements is true regarding the ELISA test?

A. It is a definitive test for HIV
B. False positives can be caused by diseases such as lupus
C. The test shows HIV by analyzing DNA

Testing: Confidentiality and Support

People being tested for HIV need information and emotional support. Often they may be worried or guilty about potentially risky behavior and may be unable to objectively evaluate their true risk.

Many people worry about their confidentiality. They want to know who will have access to their test results within the testing facility, and whether the information will be available to insurance carriers. Ensure that patients have the correct information about who will be able to access their records and under what conditions. Describe the

reporting requirements for your healthcare agency, city, and state. In many states, the patient's name must accompany a report of HIV infection or AIDS. Other states link the patient's name to a special code or identify patients only by codes. Persons being tested for HIV need information and emotional support.

During the course of your counseling, ensure that your patients understand the following topics:

- Behaviors that increase the risk of HIV transmission
- How to reduce the risk of transmitting HIV
- The value of treatment for HIV infection
- The value of notifying partners of their exposure
- If they need additional services, such as counseling

(CDC, 2015b)

Evaluate the patient's support network and coping skills and, if necessary, refer the patient for mental health services.

CDC Recommendations for HIV/AIDS Testing

In September 2006, the CDC recommended routine HIV testing in medical settings in order to increase the number and proportion of HIV-infected persons who know their HIV status. This will enable those newly diagnosed with HIV to access HIV care and to take measures to protect their partners from HIV transmission.

The CDC recommendations describe routine voluntary HIV screening as a normal part of medical practice, similar to screening for other treatable conditions. Although created in 2006, the CDC continues to support these guidelines (CDC, 2015b).

The CDC recommendations include the following:

- Everyone between the ages of 13 and 64 should routinely be offered testing at least once, with their awareness, and the ability to 'opt-out' of HIV testing;
- General consent should be sufficient for HIV testing;
- Prevention counseling should not be required with HIV diagnostic testing or as part of HIV screening in health-care settings; and
- When states have statutory or other regulatory impediments to opt-out screening, or other specific requirements for counseling, written consent, confirmatory testing, or communicating HIV test results that conflict with these recommendations, jurisdictions should consider strategies to best implement these recommendations within current parameters and consider steps to resolve conflicts with these recommendations.

For more information on state requirements for testing and reporting, see the RN.com course *State Specific Requirements for HIV & AIDS Testing & Reporting*

Treatment

Because HIV can become resistant to any of these drugs, healthcare providers must use a combination treatment to effectively suppress the virus. When multiple drugs (three or more) are used in combination, it is referred to as **highly active antiretroviral therapy**, or **HAART,** and can be used by people who are newly infected with HIV as well as people with AIDS.

For many people, quality of life dramatically improved with HAART medications. Previously disabled individuals returned to work or school and are fully enjoying their family and friends. For them, HIV has become a manageable chronic condition.

Goals of therapy include the following:

- Improve quality of life
- Reduce HIV-related morbidity and mortality
- Restore and/or preservation of immunologic function
- Maximal and durable suppression of viral load

Initiation of antiretroviral therapy should be based on viral load, CD4-lymphocytes, and clinical parameters (Department of Health and Human Service [DHHS] et al., 2015).

HAART suppresses HIV, but cannot eradicate it.

HAART Therapy

There are several classes of anti-retroviral medications that are used in combination to create “HAART” therapy.

The first group of drugs used to treat HIV infection, called **nucleoside reverse transcriptase inhibitors (NRTI)**, interrupts an early stage of the virus making copies of itself. These drugs may slow the spread of HIV in the body and delay the start of opportunistic infections. NRTIs include:

- AZT (azidothymidne)
- ddC (zalcitabine)
- ddI (didanosine)
- d4T (stavudine)
- 3TC (lamivudine)
- Abacavir (ziagen)
- Tenofovir (viread).
- Emtriva (emtricitabine)

Healthcare providers can also prescribe n**on-nucleoside reverse transcriptase inhibitors (NNRTIs),** such as:

- Delavridine (Rescriptor).
- Nevirapine (Viramune).
- Efravirenz (Sustiva) (in combination with other antiretroviral drugs).
  (DHHS et al, 2015)

Protease Inhibitors (PI)
A second class of drugs used for treating HIV infection is protease inhibitors (PI). Protease inhibitors interrupt the virus from making copies of itself at a later step in its life cycle. They include:

- Ritonavir (Norvir)
- Saquinivir (Invirase)
- Indinavir (Crixivan)
- Amprenivir (Agenerase)
- Nelfinavir (Viracept)
- Lopinavir (Kaletra)
- Atazanavir (Reyataz)
- Fosamprenavir (Lexiva)
  (DHHS et al, 2015)

Fusion Inhibitors
A third new class of drugs, known as fusion inhibitors, is also used to treat HIV infection.

Fuzeon (enfuvirtide or T-20), the first approved fusion inhibitor, works by interfering with HIV-1's ability to enter into cells by blocking the merging of the virus with the cell membranes. This inhibition blocks HIV's ability to enter and infect the human immune cells.

Fuzeon is designed for use in combination with other anti-HIV treatment. It reduces the level of HIV infection in the blood and may be active against HIV that has become resistant to current antiviral treatment schedules (DHHS et al, 2015)

Test Yourself
True or false:
HAART treatment consists of using one class of medications only.
Answer: False

Side Effects of HAART Medications
Despite the beneficial effects of HAART, potentially severe side effects are associated with the use of antiviral drugs. Some of the NRTIs may cause anemia or granulocytopenia, especially when taken in the later stages of the disease. Some may also cause inflammation of the pancreas and painful nerve damage. There have been reports of complications and other severe reactions, including death, to some of the antiretroviral nucleoside analogs when used alone or in combination. Therefore, healthcare experts recommend that patients on antiretroviral therapy are closely followed by their healthcare providers.

The most common side effects associated with protease inhibitors include nausea, diarrhea, and other gastrointestinal symptoms. However, the most serious side effects include increased blood sugar, liver dysfunction, and lipodystrophy. This is an increase

in cholesterol and triglyceride levels and a redistribution of fat that causes increased fat in the abdomen and breasts, and wasting in the face and extremities. The elevation of cholesterol and triglycerides may lead to additional health problems.

Fuzeon (Fusion Inhibitor) may also cause severe allergic reactions such as pneumonia, trouble breathing, chills and fever, skin rash, blood in urine, vomiting, and low blood pressure. Local skin reactions are also possible since it is given as an injection underneath the skin (Lacy et al, 2011).

Screening and Diagnosis of Maternal HIV

It is recommended for HIV testing early in pregnancy as standard of care for all pregnant women in the United States. In the third trimester, repeat HIV testing is recommended for women who have negative HIV antibody tests earlier in pregnancy but have high risk of HIV infection.

Women presenting in labor with unknown HIV status should have rapid HIV antibody testing, and women with a positive antibody test should initiate intrapartum antiretroviral (ARV) prophylaxis. A virologic test such as a plasma HIV RNA assay should be performed if acute HIV infection is suspected in a pregnant woman, because serologic testing may be negative at this early stage of infection. Women without HIV testing before or during labor should undergo rapid HIV antibody testing during the immediate postpartum period, or their newborns should undergo rapid HIV antibody testing (The Panel on Treatment of HIV-Infected Pregnant Woman and Prevention of Perinatal Transmission, 2015).

Management of Maternal HIV

HIV drug-resistance studies should be performed before starting or modifying antiretroviral (ARV) regimens in all pregnant women whose HIV RNA levels are above the threshold for resistance testing (>500–1,000 copies/mL) before initiation of ARVs and for those entering pregnancy with detectable HIV RNA levels while receiving antiretroviral therapy or who have suboptimal viral suppression after starting ARVs during pregnancy.

In women who present late in pregnancy, an ARV regimen should be initiated immediately without waiting for the results of resistance testing, with adjustment as needed after test results are available. The optimal prophylactic regimen for newborns of women with ARV resistance is unknown; thus, prophylaxis should be initiated, preferably before delivery .HIV-infected pregnant women should be given combination ARV drug regimens to maximally suppress viral replication, which is the most effective strategy for preventing resistance and reducing risk of perinatal transmission. All pregnant and postpartum women should be counseled about the importance of adherence to prescribed ARV medications to reduce the potential for development of resistance (The Panel on Treatment of HIV-Infected Pregnant Woman and Prevention of Perinatal Transmission, 2015).

Screening and Diagnosis of Neonatal HIV

HIV antibody testing cannot establish HIV infection in infants less than 18 months, as maternal HIV antibodies may persist and interfere with the interpretation of a positive HIV antibody test. Virologic assays that directly detect HIV must be used to diagnose HIV infection in this age group, and it is recommended to test infants with known perinatal HIV exposure at ages 14–21 days, one to two months, and four to six months. Virologic diagnostic testing at birth should be considered for infants at high risk of HIV infection.

HIV DNA polymerase chain reaction (PCR) and HIV RNA assays are recommended as preferred virologic assays. Confirmation of HIV infection should be based on two positive virologic tests obtained from separate blood samples. Conclusive exclusion of HIV infection (in the absence of breastfeeding) should be based on at least two negative virologic tests at greater than one month of age, and one at greater than four months of age. Some experts confirm the absence of HIV infection at 12–18 months of age in infants with prior negative virologic tests by performing an antibody test to document loss of maternal HIV antibodies. In children ≥18 months of age, HIV antibody assays alone can be used for diagnosis (The Panel on Antiretroviral Therapy and Medical Management of HIV-Infected Children, 2015).

Management of Neonatal HIV

If the mother or infant is HIV antibody positive, infant ARV prophylaxis should be initiated as soon as possible and the mother advised not to breastfeed pending results of confirmatory HIV antibody testing. Infants born of HIV-1–infected mothers should be considered for prophylaxis starting at 4 to 6 weeks of age. Infants with indeterminate HIV-1 infection status should receive prophylaxis until they are determined not to be infected with HIV-1. All infants exposed to ARV agents in utero or as infants should be monitored for short- and long-term drug toxicity (Haven et al., 2011).

Combination therapy, including an NNRTI or PI plus an NRTI is recommended for initial treatment of HIV-infected children (AI). The goal of therapy in treatment-naive children is to reduce plasma HIV RNA levels to below the limits of quantitation of ultrasensitive assays and to preserve or normalize immune status. ARV drug-resistance testing is recommended before initiation of therapy in all treatment-naive children (The Panel on Antiretroviral Therapy and Medical Management of HIV-Infected Children, 2015).

Screening and Diagnosis of Pediatric HIV

HIV is transmitted to children as an infant through MTCT, blood transfusions (rare), and behaviors of risk. Screening and diagnosis of infants is described above. Adolescents who become sexually active can be in a high risk group. Risk assessment and counseling is recommended with pediatricians for all adolescents over the age of 13. Pediatricians should assess sexual and substance use behaviors, an essential component of routine adolescent care, irrespective of perceived risk. In populations with an HIV prevalence of more than 0.1%, routine HIV screening should be offered to all adolescents at least once by 16 to 18 years of age. With lower community HIV prevalence, routine HIV testing is encouraged for all sexually active adolescents and those with other risk factors for HIV. In addition, high-risk youth should be tested

annually for HIV. HIV testing should be done with testing for other STDs (Committee on Pediatric AIDS, 2011).

Management of Pediatric HIV

Antiretroviral therapy (ART) should be initiated in children with AIDS or significant symptoms age ≥1 year, regardless of CD4 percentage/count or plasma HIV RNA level. Initiation of ART is also recommended for children age ≥1 year regardless of symptoms or plasma HIV RNA level if: a) age 1 to <5 years and CD4 percentage <25%; or b) age ≥5 years and CD4 count ≤500 cells/mm3 (for CD4 percentage <25% or CD4 count <350 cells/mm3 and BII* for CD4 count 350–500 cells/mm3). Initiation of ART is also recommended for children age ≥1 year who are asymptomatic or have mild symptoms with a plasma RNA ≥100,000 copies/mL regardless of CD4 percentage/count. Initiation of ART may be considered for children age ≥1 year who are asymptomatic or have mild symptoms with a plasma RNA RNA <100,000 copies/mL and CD4 percentage >25% if age 1–5 years or CD4 count >500 cells/mm3 if age ≥5 years (The Panel on Antiretroviral Therapy and Medical Management of HIV-Infected Children, 2015).

Adherence

The issue of adherence to HAART regimen cannot be over-emphasized. HIV-infected patients must take all of their HAART medications precisely as prescribed to fully obtain their benefits. Because HAART medications suppress HIV replication but do not eradicate the virus, even one missed dose a week may allow HIV to rebound. Eventually drug-resistant HIV may gain a foothold and dramatically shorten the time the medication remains effective. Rebounds in the amount of HIV in patients' blood are seldom caused by new mutant strains of HIV, but are related to failure to take all medications. Patients who skip doses, take late medications, or ignore dietary instructions can have higher levels of HIV. Patients are most likely to adhere to their treatment when it "fits" their lifestyle and they believe that the drug's effectiveness depends on taking every dose. Patients who frequently drink alcohol or use recreational drugs are the least likely to continue to take all their medications as prescribed. Patients experiencing unacceptable side effects may benefit from switching to another combination of medications. HAART therapy is a lifelong commitment, and adherence is vital (Rathbun, 2015).

Strategies to Improve Adherence

The DHHS (2015) recommends the following strategies to help improve adherence with medications:

- Use all the members of the healthcare team.
- Establish trust.
- Negotiate a treatment plan that the patient understands and is committed to.
- Recruit family and other significant supporters to reinforce the plan.
- Establish readiness to follow the plan before beginning.
- Provide concrete directions for incorporating regimen into meals times and daily routine.

- Simplify food requirements.
- If possible, reduce dose frequency and number of pills.
- Avoid adverse drug interactions.
- Monitor for side effects, and treat appropriately.
- Provide suitable mechanisms to remind the patient to take medications.
- Develop support groups around adherence issues.
- Provide ongoing access to healthcare team.
- Provide many opportunities for the patient to ask questions or raise concerns.
- Monitor adherence.
- Consider referrals for mental health or chemical dependency services.
- Consider the impact of changes in the patient's condition, living circumstances, or mood and adjust treatment accordingly.

Opportunistic Infections
HIV positive patients are at a greater risk for opportunistic infections (OI). You may see your HIV+ patient on antibiotic or other therapies that you are not familiar with. Remember that OIs can be deadly to your HIV+ patient.

One of the key nursing responsibilities is to protect your HIV patients from infections. Part of the guidelines for caring for HIV patients is assuring that they have followed the most current immunization protocol. The protocol outlines which immunizations are recommended for all or some HIV patients, and which are not recommended for HIV patients (CDC, 2012).

AIDS Associated Opportunistic Infections
The AIDS associated opportunistic infections (OIs) and cancers include:

- Pneumocystis Carinii Pneumonia (PCP).
- Kaposi's Sarcoma (KS).
- HIV wasting syndrome.
- Non-Hodgkin's lymphoma.
- Cryptococcosis, extrapulmonary.
- HIV encephalopathy (AIDS Dementia).
- Mycobacterium Avium Intracellulare (MAC or MAI).
- Candidiasis of the esophagus, trachea, bronchi, or lungs.
- Cryptosporidiosis, chronic intestinal.
- Cytomegalovirus disease (CMV).
- Tuberculosis (outside of the lungs).
- Herpes simplex virus infection.
- Progressive Multifocal Leukoencephalopathy (PML).
- Primary lymphoma of the brain.

- Toxoplasmosis of the brain.
- Histoplasmosis.
- Isoporiasis, chronic intestinal.
- Coccidioidomycosis.
- Salmonella septicemia.
- Bacterial infections, recurrent, <13 years.
- Lymphoid interstitial pneumonia/pulmonary lymphoid hyperplasia, <13 years.
- Pulmonary tuberculosis.
- Recurrent bacterial pneumonia (two or more episodes in one year).
- Invasive cervical cancer.

(AIDS.gov, 2010)

People who are positive for HIV and have one of these conditions meet the criteria for AIDS. However, not every person who has *one* of the above conditions has AIDS.

Cancers

In addition to OIs, the compromised immune system puts HIV-positive patients at risk for cancer.

Kaposi's Sarcoma and lymphoma are two of the most common "AIDS-related" cancers.

Healthcare providers use radiation, chemotherapy, or injections of alpha interferon (a genetically engineered protein that occurs naturally in the human body) to treat AIDS-related cancers.

Interactive Activity

Identify which of the following are opportunistic infections (OI) associated with HIV/AIDS:

1. Non-Hodgkin's lymphoma	OI
2. Hodgkin's lymphoma	OI
3. Kaposi's sarcoma	Non-OI
4. Liposarcoma	Non-OI

Answers:
1= OI; 2= Non-OI; 3= OI; 4= Non-OI

Prevention

Because no vaccine for HIV is available, the only way to prevent infection by the virus is to avoid behaviors that put an individual at risk of infection, such as sharing needles and having unprotected sex.

Many people infected with HIV have no symptoms. Therefore, there is no way of knowing with certainty whether a sexual partner is infected unless he or she has

repeatedly tested negative for the virus and has not engaged in any risky behavior (Mayo Clinic, 2015).

Infection Control
Healthcare personnel are at risk for occupational exposure to bloodborne pathogens, including hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV).

Exposures occur through needle punctures or cuts from other sharp instruments contaminated with an infected patient's blood or through contact of the eye, nose, mouth, or skin with a patient's blood.

Important factors that influence the overall risk for occupational exposures to bloodborne pathogens include the number of infected individuals in the patient population and the type and number of blood contacts.

Transmission of HIV to patients while in healthcare settings is rare; however, proper sterilization and disinfection procedures are required.

Most exposures do not result in infection. As of 2013, only 58 confirmed cases of transmission through occupational exposure had been reported in the U.S. (CDC, 2015a).

Healthcare Workers - Protect Yourselves!
To protect yourself from HIV and other blood-borne pathogens, follow your hospital's policies and procedures for universal precautions or body substance isolation, including using gloves, goggles, gowns, and other protective equipment. Universal precautions were described by the CDC in 1988 and revised in 2007; these were reaffirmed in 2011 (CDC, 2011b). Universal pertain to the following body fluids:

- Blood
- Semen
- Vaginal Secretions
- Cerebrospinal Fluid
- Synovial Fluid

Universal precautions, in terms of risk of HIV or hepatitis B transmission, do not apply to the other body fluids unless they contain visible blood. However, universal precautions should be used with all body fluids to prevent exposure to other diseases, and potential transmission of infections (CDC, 2011b).:

-

Healthcare Workers – Put up the Barrier!
Always use barriers to prevent skin and mucous membrane exposure to blood and body fluids. Gloves are the most important barrier and should be worn when caring for every

patient. Change gloves between patients and wash your hands immediately after removing your gloves. Always wear gloves during the following situations (CDC, n.d.):

- Handling blood, body fluids, mucous membranes, or nonintact skin
- Handling items or surfaces soiled with blood or body fluids
- Performing phlebotomy when healthcare workers have cuts, scratches, or skin breaks
- Performing phlebotomy when contamination with blood is likely, such as with uncooperative patients
- Performing finger or heel sticks for infants and children

In addition to gloves, other equipment (protective eyewear, face shields, and masks) may be needed to prevent exposure of mucous membranes of the mouth, nose, and eyes. Mucous membranes are especially vulnerable during procedures that generate splashes or droplets. Also wear gowns or aprons if you expect splashes of blood or body fluids (CDC, n.d.).

Many hospitals use body substance isolation, which considers all body fluids infectious. But special isolation procedures are still needed to control certain infections. For example, nurses may need to follow droplet precautions for influenza, respiratory isolation for pulmonary tuberculosis, or contact isolation for methicillin-resistant Staphylococcus aureus. Review the infection-control practices in your hospital (CDC, n.d.).

Sharps Injuries

Each year approximately 385,000 healthcare workers, usually nurses, are injured with contaminated needles or other sharps and risk becoming infected with HIV or other blood-borne infections, such as HBV or HCV (CDC, 2013).

Creating a sharps injury prevention program within a facility can help to educate clinicians and other staff about the importance of the proper use of all safety syringes and other infection control devices (CDC, 2013).

The risk of developing an HIV infection from a sharps injury is about 0.3% (CDC, 2013). Infection is possible under the following conditions:

- The sharp is visibly contaminated with blood.
- The needle was directly in the patient’s vein or artery.
- The injury was deep.
- The injury is caused by a hollow-bore needle.
- A relatively large amount of blood or infected body fluid is involved.
- The patient is terminally ill.

Sharps Injuries & Legislation

Many states have laws governing sharps injuries. Because the content of these laws differs widely from state to state, investigate the regulations for reporting incidents in your state.

The federal Needlestick Safety and Prevention Act (2000) also requires employers to meet the following requirements (Occupational Safety & Health Administration [OSHA], n.d.):

- Review exposure-control plans yearly to incorporate changes in technology that could help reduce exposure to bloodborne infections.
- Involve non-managerial workers to evaluate and select safety devices.
- Maintain a log of sharps injuries that ensures employees' privacy. The log must contain at least the type and brand of device involved in the injury, the location of the injury, and a description of the incident.

Prevention of Sharps Injuries

The National Institute for Occupational Safety and Health recommends the following strategies to help prevent sharps injuries:

- Eliminate needles when safe and effective alternatives are available.
- Use devices with safety features and evaluate their effectiveness.
- Analyze injuries from needles and other sharps to identify hazards.
- Train healthcare workers to safely use and dispose of sharps.
- Modify work practices that put healthcare workers at risk
- Encourage timely reporting and follow up of all sharps-related injuries.
- Evaluate the effectiveness of prevention practices and provide feedback on performance.
- Stay up to date about risk factors and ways to prevent injuries.
- Encourage all employees to report hazards for sharps-related injuries.
- Encourage vaccination with HBV vaccine.

(OSHA, n.d.)

Test Yourself

The risk of developing an HIV infection after a sharps injury is:

A. 0.3%
B. 3%
C. 30%

Testing and Treatment after a Work-Related Exposure

If you think you were exposed to HIV or other bloodborne infections, notify your supervisor immediately and follow your hospital's policy for post-exposure testing and treatment. Waiting until the end of a work shift may decrease the effectiveness of treatment.

Sharps-related exposures are the most common route of HIV transmission in healthcare settings. The risk of becoming infected after a single stick depends on the amount of

blood or fluid injected, but is estimated to be 0.3% for each exposure. That's about three times greater than the risk following a single mucous membrane exposure of 0.09% (CDC, 2013).

Antiretroviral medication may reduce the risk of infection, but to be effective, postexposure prophylaxis must begin as soon as possible after the exposure.

Additional treatment may be needed for exposures to HBV, HCV, or other bloodborne diseases. Regardless of your decision to receive postexposure prophylaxis following an exposure, you need a medical evaluation, counseling, and HIV testing (CDC, 2013).

Conclusion

HIV is a complicated and devastating disease. Over the past several decades, many advances in screening, education, and treatment of HIV has been a focus worldwide. There is continuing research in HIV and AIDS, with recommendations that are consistently being updated. As a healthcare professional, it is vital to stay current to give appropriate education and support to your patients and families affected.

References:

AIDS.gov. (2010). Opportunistic infections and their relationship to HIV/AIDS. Retrieved from https://aids.gov/hiv-aids-basics/staying-healthy-with-hiv-aids/potential-related-health-problems/opportunistic-infections/

Branson, B., Owen, S.M., Wesolowski, L., Bennett, B., Werner, B., Wroblewski, K., & Pentella, M. (2014). Laboratory testing for the diagnosis of HIV infection: Updated recommendations. Retrieved from http://www.cdc.gov/hiv/pdf/hivtestingalgorithmrecommendation-final.pdf

Centers for Disease Control and Prevention. (n.d.). Guidelines for the selection and use of personal protective equipment (PPE) in healthcare settings. Retrieved from http://www.cdc.gov/HAI/pdfs/ppe/PPEslides6-29-04.pdf

Centers for Disease Control and Prevention. (2001). First report of AIDS. MMWR, 50(21), 421-456. Retrieved from http://www.cdc.gov/mmwr/pdf/wk/mm5021.pdf

Centers for Disease Control and Prevention. (2011a). HIV/AIDS in the United States: 30 years of leadership and lessons. Retrieved from http://www.cdc.gov/hiv/30thAnniversary/index.htm

Centers for Disease Control and Prevention. (2011b). 2007 guideline for isolation precautions: Preventing transmission of infectious agents in healthcare settings. Retrieved from http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html

Centers for Disease Control and Prevention. (2012). New HIV infections in the United States. Retrieved from http://www.cdc.gov/nchhstp/newsroom/docs/2012/HIV-Infections-2007-2010.pdf

Centers for Disease Control and Prevention. (2013). Stop sticks campaign. Retrieved from http://www.cdc.gov/niosh/stopsticks/sharpsinjuries.html

Centers for Disease Control and Prevention. (2014). Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas—2012. *HIV Surveillance Supplemental Report, 19*(3). Retrieved from http://www.cdc.gov/hiv/pdf/surveillance_report_vol_19_no_3.pdf

Centers for Disease Control and Prevention. (2015a). HIV basics. Retrieved from http://www.cdc.gov/hiv/basics/index.html

Centers for Disease Control and Prevention. (2015b). HIV screening and testing. Retrieved from http://www.cdc.gov/hiv/guidelines/testing.html

Centers for Disease Control and Prevention. (2015c). Occupational HIV transmission and prevention among health care workers. Retrieved from http://www.cdc.gov/hiv/workplace/occupational.html

Centers for Disease Control and Prevention. (2015d). Statistics overview. Retrieved from http://www.cdc.gov/hiv/statistics/basics/

Committee on Pediatric AIDS. (2011). Adolescents and HIV infection: The pediatrician's role in promoting routine testing. *Pediatrics, 128*(5), 1022-1029.

Department of Health and Human Services (DHHS) Panel on Antiretroviral Guidelines for Adults and Adolescents. (2015). Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Retrieved from https://aidsinfo.nih.gov/guidelines/html/1/adult-and-adolescent-treatment-guidelines/0

Havens, P.L., Mofenson, L.M, & the Committee on Pediatric AIDS. (2011). Evaluation and management of the infant exposed to HIV-1 in the United States. *Pediatrics, 123*(1), 175-187.

Lacy, C.F., Armstrong, L.L., Goldman, M.P., & Lance, L. (2011). *Drug information handbook,* 20th ed. Hudson, OH: Lexi-comp, Inc.

Mark, S., Murphy, K.E., Read, S., Bitnun, A., & Yudin, M. (2012). HIV mother-to-child transmission, mode of delivery, and duration of rupture of membranes: Experience in the current era. *Infectious Diseases in Obstetrics and Gynecology*, *201*(2), 1-5.

Mayo Clinic. (2015). HIV/AIDS symptoms. Retrieved from http://www.mayoclinic.com/health/hiv-aids/ds00005/dsection=symptoms

National HIV/AIDS Clinicians' Consultation Center at San Francisco General Hospital. (2011). *Compendium of state HIV testing laws*, 2007-2011. Retrieved from http://www.nccc.ucsf.edu/consultation_library/state_hiv_testing_laws/

Occupational Safety & Health Administration. (n.d.). Frequently asked questions. Retrieved from https://www.osha.gov/needlesticks/needlefaq.html

Rathbun, A. (2015). Antiretroviral treatment for HIV infection. Retrieved from http://emedicine.medscape.com/article/1533218-overview

The Panel on Treatment of HIV-Infected Pregnant Woman and Prevention of Perinatal Transmission. (2015). Recommendations for use of antiretroviral drugs in pregnant HIV-1-infected women for maternal health and interventions to reduce perinatal HIV transmission in the United States. Retrieved from https://aidsinfo.nih.gov/contentfiles/lvguidelines/PerinatalGL.pdf

The Panel on Antiretroviral Therapy and Medical Management of HIV-Infected Children. (2015). Guidelines for the use of antiretroviral agents in pediatric HIV infection. Retrieved from https://aidsinfo.nih.gov/guidelines/html/2/pediatric-treatment-guidelines/0

Tsague, L., & Abrams, E. (2014). Antiretroviral treatment for pregnant and breastfeeding women: The shifting paradigm. Retrieved from http://www.who.int/hiv/pub/journal_articles/04_art_pregnant-and-brestfeeding-women.pdf?ua=1

UNAIDS Joint United Nations Programme on AIDS. (2014). Children and HIV. Retrieved from http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/unaidspublication/2014/FactSheet_Children_en.pdf

UNAIDS Joint United Nations Programme on AIDS. (2015). Fact sheet: 2014 global statistics. Retrieved from http://www.unaids.org/sites/default/files/media_asset/20150714_FS_MDG6_Report_en.pdf

World Health Organization. (2015). Mother-to-child transmission of HIV. Retrieved from http://www.who.int/hiv/topics/mtct/en/

World Health Organization. (2011). Global Health Observatory Data Repository. Retrieved from http://apps.who.int/ghodata/?vid=22100