AIDS/HIV

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COURSE DESCRIPTION:

The purpose of this course is to introduce and reinforce knowledge about HIV and AIDS. The content of the course includes HIV modes of transmission, risk factors, pathophysiology, signs and symptoms, infection control, and prevention. Also included is the treatment of AIDS/HIV, occupational and nonoccupational post exposure prophylaxis, and some legal considerations relating to HIV.

This course meets the Florida State AIDS/HIV continuing education requirement for biennial license renewal

OBJECTIVES:

At the conclusion of this course, the learner will be able to:

1. Summarize the modes of transmission, risk factors, pathophysiology, signs and symptoms and preventive measures, including infection control practices, associated with AIDS/HIV;
2. Discuss the treatment of AIDS/HIV and opportunistic infections;
3. Relate some legal considerations related to HIV;
4. Detail occupational and nonoccupational post exposure prophylaxis guidelines.

WHAT ARE HIV and AIDS?

HIV, human immunodeficiency virus, is a human retrovirus. At the current time, there is the classic HIV-1 and HIV-2. HIV-2 has been identified in several people in our country but, for the most part, this variant is primarily found among West Africans. HIV-1 and HIV-2 are quite similar, except each have differing glycoproteins. (Centers for Disease Control and Prevention, 1998)

AIDS, acquired immunodeficiency syndrome, is defined as a group of symptoms, caused by an infection and/or a cancer, coupled with an adversely affected immune system. (Centers for Disease Control and Prevention, 1998)

MODES OF TRANSMISSION

The modes of transmission for HIV are the same as those for hepatitis B: sexual transmission; parenteral transmission; and transmission to newborns by an HIV positive mother. The sexual practice at greatest risk for HIV transmission is receiving anal sex from an infected partner. The risk is less for vaginal sex because traumatic bleeding and tearing is less frequent. Research indicates that about 1 in 300 exposures to HIV contaminated needles leads to HIV infection.

- It is estimated that about 13% to 40% of infants born to mothers infected with HIV become infected with the virus. The risk of this transmission can be decreased by almost two-thirds by administering an antiretroviral medication by the second trimester of pregnancy, during labor, and during delivery. (Tierney, McPhee & Papadakis, 2003)

THE PATHOPHYSIOLOGY OF HIV

HIV leads to three known pathophysiological mechanisms:

- *Immunodeficiency.* HIV affects immune cells. A number of infections and neoplasms occur as a result of this immunodeficiency.
- *Autoimmunity.* Autoimmunity can result from B lymphocyte dysfunction or the dysfunctional immune function of the body infected with HIV. Lymphocytic interstitial pneumonitis and immunologic thrombocytopenia are examples of the autoimmunity disorders found in HIV patients.
- *Neurological Dysfunction.* (Tierney, McPhee & Papadakis, 2003)

THE RISK FACTORS ASSOCIATED WITH HIV

The risk factors associated with HIV have remained relatively unchanged since this infection was first recognized. The risk factors include:

- *Sexual contact*. Sexual contact with an infected person spreads the virus. HIV is spread with blood and other bodily fluids, including those associated with sexual contact. HIV is spread through semen, vaginal secretions, and blood contact during sexual contact. Homosexual and bisexual males, as well as heterosexual males and females, who have sexual contact with HIV positive individuals, are at risk for HIV.

- *IV drug use*. Sharing needles contaminated with HIV spreads the disease.
- *Childbirth to an HIV infected mother.* HIV is transmitted to the children of HIV infected mothers. (Centers for Disease Control and Prevention, Nettina, 2001; Tierney, McPhee & Papadakis, 2003)

HIV STATISTICS

It is estimated that about 850,000 to 950,000 people in the United States have HIV. As many as 280,000 affected people do not even know that they have it. (Fleming, Byers & Sweeney, 2002)

The number of estimated AIDS cases among adult males is 749,887 and among adult females, 170,679. There are an estimated 9,419 AIDS cases among those less than 13 years of age. (Centers for Disease Control and Prevention, 2004)

During 2003, 17,934 adults and adolescents died as a result of AIDS. The number of deaths among AIDS affected children was 83 during the same year. The cumulative number of deaths related to AIDS through the year 2003 has reached 524,060, with 5,492 pediatric deaths and 518,568 adult and adolescent deaths. (Centers for Disease Control and Prevention, 2004)

Those between the ages of 35 and 44 years of age have the highest cumulative estimated cases of AIDS. Through the end of 2003 this age group had 365,432 cases. (Centers for Disease Control and Prevention, 2004)

According to the Centers for Disease Control and Prevention (2004), the population with the highest estimated number of AIDS cases is the white race. Other race or ethnicity statistics for the year 2003 and on a cumulative basis are shown below.

Race or Ethnicity	**Cumulative Estimated # of AIDS Cases**	**2003 Estimated # of AIDS Cases**
American Indian/Alaska Native	3,026	196
Asian/Pacific Islander	7,166	497
Hispanic	172,993	8,757
Black (not Hispanic)	368,169	21,304
White (not Hispanic)	376,834	12,222

(Centers for Disease Control and Prevention, 2004)

AIDS/HIV PREVENTION

The focus of AIDS/HIV prevention remains on safe sexual and IV use practices, the continued screening of blood and blood products, and infection control measures within healthcare facilities where blood and other body fluids are, or could be, present. To date there is no effective vaccine against HIV so other preventive measures are of utmost importance.

Screening, education, and counseling are critical components of primary prevention. All patients, whether in the community or within our healthcare facilities, should be assessed for sexual history and possible IV drug use. Women who are pregnant should also be assessed and given HIV counseling to prevent perinatal transmission.

Education should consist of safe sex practices. For those who are HIV positive, the education should detail the proper use, application and removal of condoms, the use of only latex condoms, and the role of a water-soluble lubricant and nonoxynol-9 in safe sexual practices. It is not realistic to teach abstinence as the only way to prevent the spread of this disease. Sex is a normal part of life. A more feasible approach is conveying safe sex, monogamy, and prudence.

IV drug users should be warned against sharing needles and other drug paraphernalia. (Tierney, McPhee & Papadakis, 2003)

The Centers for Disease Control recommends:

- individual interventions including health education, risk reduction counseling, and referrals to appropriate community resources such as a substance abuse treatment center to support the individual's preventive practices;
- peer support and educational groups that aim to reinforce the individual's preventive behaviors and to promote interpersonal negotiating skills, skills that aid and facilitate sustained behavioral change;
- intense community efforts that aim to change affective attitudes and norms of high risk for HIV subgroups;
- public information and educational campaigns to debunk myths and misinformation about AIDS/HIV and to reverse discrimination against HIV positive people in the community. (Centers for Disease Control and Prevention, 1995)

Our nation has successfully reduced the risk of HIV transmission from the infusion of blood or a blood product to 1:100,000. Continued vigilance in this area is necessary to prevent any sentinel events in blood screening and testing. (Tierney, McPhee & Papadakis, 2003)

INFECTION CONTROL MEASURES

Standard precautions in healthcare have greatly reduced the risk of occupational exposures to HIV and other blood borne pathogens. Other infection control measures that decrease the risk of spreading HIV in our healthcare facilities include:

- frequent handwashing;
- engineering controls, such as "needleless" systems to replace needles;
- work practice controls;
- the use of personal protective equipment, such as gowns, goggles, gloves and masks; and
- the proper handling of sharps and regulated, biohazardous waste.

The greatest occupational risks appear to remain in areas where invasive procedures are done. Sharps, including needles, appear to be the culprits in these high-risk areas. Take our course entitled *OR: Safety in the Operating Room and Other Areas Where Invasive Procedures Are Done* for further information about safety in these areas.

THE SIGNS AND SYMPTOMS OF HIV

Many people are asymptomatic for years even without antiretroviral treatment. The average amount of time between infection with HIV and the development of AIDS, the emergence of an opportunistic infection, is an average of 10 years. (Tierney, McPhee & Papadakis, 2003)

Some of the signs and symptoms of AIDS/HIV include the following disorders by system:

- *Pulmonary.* Pneumocystis pneumonia, noninfectious pulmonary diseases like interstitial pneumonitis, infectious pulmonary diseases like pneumonia and pseudomonas aeruginosa and sinusitis.

- *Central nervous system.* AIDS dementia complex, central nervous system lymphoma, toxoplasmosis, cryptococcal meningitis, and HIV myelopathy.
- *Peripheral nervous system.* Sensory neuropathies, mononeuropathies and inflammatory polyneuropathies.
- *Rheumatological.* Systemic lupus erythematosus and psoriatic arthritis.
- *Retinitis*
- *Myopathy*
- *Oral lesions.* Oral candidiasis, hairy leukoplakia, gingivitis and periodontitis.
- *Liver.* Cytomegalovirus, hepatitis B and C.
- *Billiary.* Cholecystitis.
- *Gastrointestinal.* Enterocolitis, candidal esophagitis, gastropathy, and malabsorption.
- *Endocrine*. Adrenal and thyroid dysfunction.
- *Integumentary*. Herpes simplex, herpes zoster, bacillary angiomatosis and molluscum contagiosum.
- *Gynecological*. Vaginal candidiasis, pelvic inflammatory disease and cervical neoplasia and dysplasia. (Tierney, McPhee & Papadakis, 2003)

There are also some malignancies and systemic signs and symptoms of HIV/AIDS.

- *Malignancies.* Invasive cervical cancer, Kaposi's sarcoma, primary lymphoma of the brain and non-Hodgkin's lymphoma.
- *Systemic manifestations.* Fever, weight loss, night sweats, anorexia, nausea, and vomiting. (Tierney, McPhee & Papadakis, 2003)

THE TREATMENT OF AIDS/HIV

The treatment of HIV consists of four categories, as follows:

1. prophylaxis of opportunistic infections;
2. treatment of opportunistic infections and malignancies;
3. antiretroviral therapy; and
4. hematopoietic stimulating factors

Prophylaxis of Opportunistic Infections

Several opportunistic infections respond to prophylaxis. The table below lists these opportunistic infections and the recommended prophylaxis.

Opportunistic Infection	***Prophylactic Medications***
Pneumocystis carinii pneumonia	Dapsone Aerosolized pentamidine Trimethoprim-sulfamethoxazole
M avium complex	Clarithromycin Azithromycin Rifabutin
Toxoplasmosis	Trimethoprim-sulfamethoxazole Dapsone Pyrimethamine
M tuberculosis	Isoniazid
Cytomegalovirus	Oral ganciclovir
Cryptococcosis Candidiasis	Fluconazole

Compiled by Author. Source: Tierney, McPhee & Papadakis, 2003

Treatment of Opportunistic Infections and Malignancies

A large number of opportunistic infections and malignancies, such as Kaposi's sarcoma, are effectively treated with medication. Many opportunistic infections require lengthy therapy and some, including cryptococcosis, toxoplasmosis and cytomegalovirus retinitis, require lifelong therapy. A small number patients, after having gained significant benefit from highly active antiretroviral therapy (HAART), may be able to discontinue their medication regimen for an opportunistic infection without ill effect. Corticosteroids, something not initially thought to benefit an immunocompromised patient, has benefit when given within 72 hours of the onset of moderate or severe pneumocystosis.

P carinii infections can be treated with trimethoprim-sulfamethoxazole, pentamidine, trimethoprim, atovaquone, primaquine, or trimetrexate. Clarithromycin is used for the treatment of M avium complex; and toxoplasmosis is treated with pyrimethamine combined with sulfadiazine and folinic acid, followed by a regimen of pyrimethamine in combination with clindamycin and folinic acid.

Some forms of Kaposi's sarcoma respond to chemotherapy, alpha interferon and radiation. Herpes simplex and herpes zoster are treated with acyclovir and foscamet. Herpes zoster also responds to famciclovir. Amphotericin B alone or in combination with flucytosine followed by fluconazol is effective for the treatment of cryptococcal meningitis. (Tierney, McPhee & Papadakis, 2003)

Antiretroviral Therapy

Antiretroviral therapy has greatly improved the prognosis for many people affected with AIDS/HIV. The goal of this treatment is to stabilize or even improve immune response and to decrease the complications associated with immunosupression.

A combination of three antiretroviral medications is recommended. Once the treatment course is chosen, total suppression using the recommended dosages should begin and continue without interruption. Resistance to these drugs develops quite quickly, therefore, rendering them impotent for future use. If the patient develops toxicity to one of the medications in the combination, that dosage should not be decreased. Instead, the entire regimen should be replaced with another one with full, optimal dosages for each of the three medications.

Antiretroviral therapy is not easy for patients. It is costly and it takes a lifelong commitment to compliance. Education is very important before the person begins this therapy. They should be told about the expense and the need to continue the treatment regimen without fail. (Tierney, McPhee & Papadakis, 2003)

Antiretroviral medications include:

1. Nucleosides and nucleotide analogs

    - zidovudine
    - didanosine
    - zalcitabine
    - stavudine
    - lamivudine
    - abacavir
    - adefovir

2. Protease inhibitors

    - indinavir
    - netfinavir
    - ritonavir
    - saquinavir
    - amprenavir

3. Nonnucleoside reverse transcriptase inhibitors

    - nevirapine
    - delavirdine
    - efavirenz

Hematopoietic Stimulating Factors

Hematopoietic stimulating factors, like erythropoietin, are used to treat anemia among HIV patients. It is also useful for the treatment of anemia resulting from zidovudine use. (Tierney, McPhee & Papadakis, 2003)

LEGAL ASPECTS OF HIV/AIDS

In the past, law did not protect people with HIV. Many suffered from cruel discrimination and unnecessary harm. Laws to protect this population became necessary. The State of Florida now has laws, as do many other states, to protect the rights of individuals in to AIDS/HIV. Some of these laws are below:

- *Confidentiality.* The results of HIV tests are confidential. These results can be shared only with those with a need to know or when the affected individual agrees in writing to share the results with others. Healthcare providers in hospitals, as well as others in the community such as a school nurse, have the need to know.
- *HIV Testing.* Informed consent to HIV testing is necessary, except when it is necessary during an emergency situation and the person is unable to consent, or it is court mandated.
- *Reporting.* Test results must be shared with the individual regardless of the outcome of the test. Florida also requires that confirmed and suspected HIV cases be reported to the Department of Health.

- *Nondiscrimination.* HIV positive people cannot be discriminated against in terms of health insurance, access to healthcare, nor in the workplace or within our schools.

POST EXPOSURE PROPHYLAXIS: OCCUPATIONAL AND NONOCCUPATIONAL

Occupational Exposures

For the last several years, the U.S. Public Health Service has published recommendations for the management of occupational exposures of healthcare workers to blood and other bodily fluids that potentially contain human immunodeficiency virus (HIV), hepatitis B virus (HBV) and/or hepatitis C virus (HCV). These recommendations were again updated in June of 2001.

Occupational exposures to bloodborne pathogens are a matter of grave concern that requires prompt action. Postexposure prophylaxis for HBV consists of hepatitis B immune globulin (HBIG) and/or the hepatitis B vaccine. Antiviral medications, such as interferon and immune globulin, are not recommended for hepatitis C postexposure prophylaxis.

A four-week regimen of two antiretroviral medications is recommended for most HIV post exposure prophylaxis. These 2 medications can be:

- zidovudine (ZDV) and lamivudine (3TC); or
- lamivudine (3TC) and stavudine (d4T); or
- didanosine (ddI) and stavudine (d4T).

The addition of a third antiretroviral medication is recommended for occupational exposures of high risk. When the source patient is known and the source virus is resistant to one or more available medications, ones that are least likely to be resisted are used.

Many occupational exposures occur when someone is stuck with a needle or sharp carelessly left in an area or discarded in a container other than an impervious sharps container. Therefore, the source patient is often difficult, if impossible, to identify.

The National Clinicians' Post-Exposure Prophylaxis Hotline (PEP Line) can be reached at 1-888-448-4911. This hotline is particularly useful when the prophylactic treatment of occupational exposure requires a consultation, as is the case when a pregnant woman has been

exposed, and/or PEP has been delayed for one reason or another. (Centers for Disease Control and Prevention, 2001)

Nonoccupational Exposures

The U.S. Department of Health and Human Services also recommends antiretroviral postexposure prophylaxis after nonoccupational exposures to HIV. Most of these nonoccupational exposures occur as the result of sex or IV drug use.

Despite the fact that preventing exposures to HIV is the most effective way to prevent it, exposures do occur. Some of these exposures are consensual and others are not. For example, rape is not consensual and it is not anticipated; nonetheless, it may expose the victim to hepatitis, HIV, and other sexually transmitted diseases.

The recommended PEP for nonoccupational exposures to blood, genital secretions and/or other possibly infectious bodily fluids is as follows:

- 28 day course of treatment with highly active antiretroviral therapy (HAART) when the exposure has high risk of transmission, as is the case if the exposure was to the bodily fluids of a person known to have HIV.

At the current time, no PEP is recommended if there has been a nonoccupational exposure to genital secretions, blood or other possibly infected bodily fluids when the person is NOT known to have HIV and the nature of the exposure does not indicate high risk. However, individual patient care decisions, including those relating to PEP, should be made on an individual basis. (U.S. Department of Health and Human Services, 2005)

REFERENCES

Fleming P, Byers RH, Sweeney PA, et al. (2002). Prevalence in the United States, 2000 [Abstract 11]. Presented at the Ninth Conference on Retroviruses and Opportunistic Infections, Seattle, WA; February 24--28, 2002. http://www.governmentguide.com/govsite.adp?bread=*Main&url=http%3A//www.governmentguide.com/ams/clickThruRedirect.adp%3F55076483%2C16920155%2Chttp%3A//www.cdc.gov/

Nettina, Sandra M. (2001). The Lippincott Manual of Nursing Practice, 7th Ed. Philadelphia: Lippincott, Williams and Wilkins.

Tierney LM, McPhee SJ and Papadakis, MA. (2003). Current Medical Diagnosis and Treatment. New York Mc Graw Hill.

U.S. Centers for Disease Control and Prevention. (1998). Human Immunodeficiency Virus Type 2. http://www.governmentguide.com/govsite.adp?bread=*Main&url=http%3A//www.governmentguide.com/ams/clickThruRedirect.adp%3F55076483%2C16920155%2Chttp%3A//www.cdc.gov/

U.S. Centers for Disease Control and Prevention. (1995). Guidelines for Health Education and Risk Reduction Activities. http://www.governmentguide.com/govsite.adp?bread=*Main&url=http%3A//www.governmentguide.com/ams/clickThruRedirect.adp%3F55076483%2C16920155%2Chttp%3A//www.cdc.gov/

U.S. Centers for Disease Control and Prevention. (2001). Updated U.S. Public Health Service Guidelines for the Management of Occupational Exposures to HBV, HCV, and HIV and Recommendations for Postexposure Prophylaxis. 50(RR11);1-42. http://www.governmentguide.com/govsite.adp?bread=*Main&url=http%3A//www.governmentguide.com/ams/clickThruRedirect.adp%3F55076483%2C16920155%2Chttp%3A//www.cdc.gov/

US Department of Health and Human Services. Centers for Disease Control. (2004) Updated Basic Statistics. http://www.governmentguide.com/govsite.adp?bread=*Main&url=http%3A//www.governmentguide.com/ams/clickThruRedirect.adp%3F55076483%2C16920155%2Chttp%3A//www.cdc.gov/

U.S. Department of Health and Human Services. (2005). Antiretroviral Postexposure Prophylaxis After Sexual, Injection-Drug Use, or Other Nonoccupational Exposure to HIV in the United States. http://www.governmentguide.com/govsite.adp?bread=*Main&url=http%3A//www.governmentguide.com/ams/clickThruRedirect.adp%3F55076483%2C16920155%2Chttp%3A//www.cdc.gov/