

Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome

Purpose: The purpose of this course is to provide an update on human immunodeficiency virus and acquired immunodeficiency syndrome.

Objectives

1. Differentiate between human immunodeficiency virus and acquired immunodeficiency syndrome
2. List three ways human immunodeficiency virus is transmitted
3. List three ways human immunodeficiency virus can be prevented
4. List three common diseases associated with acquired immunodeficiency syndrome
5. Discuss the treatment options for human immunodeficiency virus and acquired immunodeficiency syndrome

Once an incurable death sentence, now human immunodeficiency virus (HIV) is a manageable chronic disease. Since the introduction of better treatment in 1996, health care providers are able to control the virus and extend the life-expectancy of the HIV positive patient.

HIV is the virus that causes acquired immunodeficiency syndrome (AIDS). HIV works by attacking the immune system making it unable to fight off infections. When HIV is advanced the body is prone to infection by microorganisms that someone with an intact immune system is able to fight off.

AIDS is late-stage HIV. Years pass until HIV transforms into AIDS. AIDS is diagnosed when an HIV positive patient contracts one or more of the 25 health conditions including certain infections (e.g. *Pneumocystis jiroveci* pneumonia,

toxoplasmosis of the brain) or certain malignancies (e.g. primary lymphoma of the brain, Kaposi's sarcoma) or if the CD4 lymphocyte count is below 200 cells/mcL or a CD4 percentage below 14% (1).

Statistics

Statistics are much more accurate today, as all states now report HIV to the Center of Disease Control (CDC). Better laboratory testing makes it easier to determine who is a recent converter versus who has had the disease for an extended period of time. This new system is called the serological testing algorithm for recent HIV seroconversion (STARHS) (3).

In the United States, approximately 40,000 people each year are infected with HIV. While the disease was deadly in the 1980's and early 1990's, with the advent of new medications it has become a chronic disease. Currently, approximately one million people in the United States are living with HIV or AIDS (4).

While transmission of the virus often comes via sexual contact or IV drug abuse, mother to infant transmission is another major cause of infection. It is much more common in the developing world, but occurs in the United States with an estimated 70-246 infections by this means per year (2, 5). This is compared to sub-Saharan Africa where 630,000 children are born HIV positive every year (2). Perinatal transmission rates vary but range from 2-25 percent (5). Treatment is available to reduce the transmission of HIV, unfortunately, many mothers are unaware of their HIV status or do not get prenatal care.

Developing countries have a higher prevalence of HIV with over 90 percent of cases in the developing world. Worldwide, approximately forty million people are infected with the highest concentration noted in sub-Saharan Africa (2).

Health care workers are at risk for HIV. Exposure can be through needle injury, mucous membrane, skin or blood exposure. As of 2003, in the United States, there are 57 health care workers who have seroconverted to HIV following occupational exposures. In addition, health care workers have accounted for 139 other cases of HIV infection or AIDS who denied other risk factors for HIV infection (10).

African Americans are more severely affected by HIV. Forty-nine percent of the people with HIV/AIDS are African Americans, although African Americans only make up 13 percent of the population (6). Sixty-four percent of women and 41 percent of men with HIV are black. In addition, African Americans do not live as long as other races or ethnicities with HIV. The reason for this is likely multifactorial and due to economic problems, genetics, attitudes and beliefs.

A deficiency of a receptor responsible for the uptake of HIV into the cells is deficient in as many as 10% of Europeans and 20% of Ashkenazi Jews (5), which is one potential genetic reason African Americans, are at higher risk than white Americans.

HIV in Children

Children are not a high-risk group in America. It is extremely rare to get HIV through a blood transfusion – which was a common way for children to contract HIV prior to 1985. Teenagers who engage in risky behaviors are at risk for HIV including those who have unprotected sex or use IV drugs.

Another common way children get HIV is through vertical transmission. This is from the mother during childbirth. HIV contracted through vertical transmission can progress rapidly, but most who get it through vertical transmission will have a slowly progressive course – similar to an adult with a survival period of about 10 years. In countries without medical resources to care for the disease many children will die by age 3.

Generally, teenagers have a similar HIV course as adults, but they may survive longer than the adults.

History

The disease likely started in Central Africa in the 1950's, but was not identified until years later. The source of HIV infection is thought to be a certain type of Chimpanzee in West Africa, which was hunted for food. When humans came in contact with their infected blood the virus was transmitted to humans (4).

In the United States, HIV was identified in 1981 when gay men developed a rare type of cancer. As scientists were trying to identify this disease, approximately 150,000 people were coming down with HIV in the 1980s (4).

In 1969 a 15 year-old boy died of AIDS. It was determined when stored blood samples were tested. In addition, multiple patients in the early 1960s were found to have antibodies against HIV -1 when their blood was tested at a later date. When they originally died doctors were unable to determine the cause of death.

Transmission

HIV is found in body fluid: blood, semen, breast milk and vaginal fluid. Transmission rates are higher in those with higher viral loads.

It is transmitted when infected fluid from one person is given to another. The most common ways it is transmitted are:

- Sex – vaginal, oral, anal
- Sharing needles/syringes
- The birthing process – an infected mother to her child
- Breastfeeding
- Contact with infected fluid from another person on the mucous membranes or an open wound

Those who are involved in the sex industry, drug abusers are those at high risk for HIV. Anyone who has unprotected sex is at risk. Other risk factors include those with hepatitis, tuberculosis or other sexual transmitted diseases (1, 2, 9).

Transmission rates are not as high as generally perceived. Many factors can affect transmission rates such as high viral loads, sexual encounters during the menstrual period or if there ulcerative lesions are present there is an increased risk. According to Katz et al. (1) transmission rates for the following activities with an HIV infected person are listed below:

- Receptive anal intercourse is between 1:30 to 1:100
- Insertive anal intercourse - 1:1000
- Receptive vaginal intercourse - 1:1000
- Insertive vaginal intercourse - 1:10,000
- Receptive fellatio with ejaculation - 1:1000
- Needle stick with infected blood - 1:300
- Sharing needles during illicit drug use is approximately 1:150

It is extremely rare to get HIV from a blood transfusion. As of 1985, all blood is screened for HIV. The current risk is believed to be about 1 in a million (1).

Prevention

Preventing HIV is as simple as avoiding any situation where HIV may be transmitted. This is not always possible. Therefore, there are many strategies one can use to minimize risk. Abstinence from sex is one strategy. Having sex with only one person who is HIV negative is another. If having sexual relations with a person who is HIV positive or an unknown HIV status than a latex condom with lubricant should be used. If both partners are HIV positive a condom is recommended to prevent transmission of a different strain of HIV.

While it is uncomfortable, sexual partners should discuss drug use, HIV status and all other sexually transmitted diseases with each other. If testing has not been done, both partners should get tested before a sexual relationship is commenced.

Do not inject medications, unless prescribed by a doctor, and use proper protocol. Those who do inject drugs should use precautions.

- Do not share needles
- Use only clean needles – one time use for all syringes

Circumcision is a new topic of interest in HIV. Those who are circumcised are at lower risk for developing HIV than those who have not been circumcised (7).

The Center of Disease Control has not made a formal statement on their recommendation regarding male circumcision. When it does it will likely include that circumcision will be completely voluntary and dependent on the individual.

Oral Sex and HIV

HIV can be transmitted via oral sex, but the risk is generally lower than vaginal or anal sex. The use of a latex or plastic condom (for men) or the use of a dental dam or a cut-open condom (for women) can reduce the risk of HIV. The risk of HIV transmission is higher when there are open ulcers, bleeding gums, or the presence of another STD.

The Virus

The immune system fights microorganisms. Phagocytic cells engulf microorganisms often with the help of antibodies that make it easier for the phagocytic cells to come in and make the kill. When the body has seen this response it develops a memory to it through T-memory cells, equipping it to more easily fight the invader if it attacks again.

HIV is a tricky virus; it is a retrovirus that carries genetic information in ribonucleic acid (RNA) instead of deoxyribonucleic acid (DNA). It incorporates itself into the T-cell. It translates its genetic material into the T cell's DNA with the use of the viral enzyme, reverse transcriptase. The cell can then become active or remain dormant. If it stays dormant the virus will integrate itself into the cell's DNA. If it is activated the cell will die.

Any cell expressing the CD4 antigen can be infected when HIV attaches to them. HIV mainly attacks the CD4 T-helper lymphocytes and destroys them; leading to a reduction of CD4 cells.

When the immune system is so weakened by this process, opportunistic infections and illness can take hold. These are infections or illnesses that do not normally affect healthy people. Some common infections/illness includes:

- Kaposi's sarcoma
- Candida of the mouth and esophagus

- *Pneumocystis jiroveci* pneumonia
- *Cryptococcus*
- Primary lymphoma of the brain

HIV is broken down into HIV -1 and HIV -2. Different subtypes can further subdivide HIV-1. HIV-1, subtype B is most common in the United States. HIV -2 is uncommon in the United States and was identified in West Africa. Both viruses are similar but HIV -2 may grow slower and be less destructive than HIV -1 (5).

The HIV virus has effects on other body systems as well. The virus releases cytokines that may lead to neurological dysfunction. In addition, the HIV virus can attack the gastrointestinal and renal cells leading to dysfunction of these organ systems (1).

Screening

Those who are in a high-risk group for HIV transmission should have an HIV test every year. This includes individuals in the sex industry, IV drug users and non-monogamous men who have sex with men.

Women who are thinking about becoming pregnant should also be screened for HIV. If one becomes pregnant a test may be indicated.

The American Academy of Family Physicians recently recommended that all patients over the age of 13 be screened for HIV. They recommend this because risk-based screening does not identify a large portion of those HIV. The hope will be that universal screening will allow earlier treatment and reduced transmission (12).

Screening is done by blood tests, which look for antibodies to HIV. Testing can be done at a doctor's office, independent lab, at some free health clinics and at home with home testing kits.

The HIV enzyme-linked immunoassay (ELISA) is a common screening test for HIV. It is a blood test that is excellent for ruling out HIV, unless they are in the window period (the period of time between when they are infected and when they can be detected by lab testing). Ninety-five percent of patients with HIV are positive on blood test within 6 weeks of being infected (1). A positive test does not definitely diagnosis HIV. A Western blot will confirm the diagnosis.

When is the test positive? After being exposed to the virus, one can not immediately be identified by lab test. It may take 2 weeks to 6 months before a patient is identified as HIV positive by the lab. While the virus is present, not enough antibodies are present to be detected. Antibodies are the substance that most screening tests look for.

Rapid testing is available that can test for HIV -1 and HIV-2. The test is run in a clinician's office and can provide results in about 20 minutes.

There are also tests that use saliva and urine to test for HIV, but are not considered the gold standard for diagnosis.

Home Screening Test

Many people are choosing to be screened at home. It has become much easier with the advent of home tests that are available at the drug/grocery store.

Only one product is currently approved by the FDA – The Home Access HIV -1 Test System or sometimes called The Home Access Express HIV -1 Test System. The product costs around 60 dollars. This products requires that the person collects the

blood sample and sends it to the lab for evaluation. The person mails the sample to the lab and is given a pin number so the results can be attained anonymously. The home test only tests for HIV-1 and not HIV-2.

Similar to other types of screening tests, this has a window period between the time the virus enters the body and when it is detectable. It is usually somewhere between 2-8 weeks, but it may be as long as 6 months.

The test does offer counseling before or after the test. Counseling comes in the form of printed material or phone conversations.

No FDA approved test allows results of the test to be determined at home. Consumers may run across tests that claim to be able to test completely in the home. These products are not FDA approved.

Symptoms

Most cases of HIV are detected by testing. While many patients go through a short period of symptoms when the disease is first contracted (acute seroconversion), symptoms are typically not present until late in the disease. It is estimated that twenty-five percent of patients with HIV do not know they are infected (4).

Acute seroconversion resembles influenza. Presenting symptoms include: fatigue, fever, sore throat, arthralgias and lymphadenopathy. If cough is present it is unlikely that it is acute retroviral infection (2).

The latency period is the time when HIV is present but there are no signs and symptoms of illness.

The mean time from contracting the virus to the development of AIDS is 10 years (1). When symptoms present they are nonspecific. Common symptoms include: fever,

weight loss, night sweats and anorexia. It may be the development of another disease that tips clinicians off that HIV or AIDS is present. Pneumonia, chronic sinusitis, meningitis, dementia, oral candidiasis, diarrhea, herpes zoster or one of the opportunistic infections or cancers may all be the initial presentation of HIV/AIDS.

Management

Management of HIV is a complex venture. It includes monitoring the disease, providing antiretroviral therapy, treating and preventing opportunistic infections and cancers, and treating abnormal blood values.

Blood work is an important part of the management of HIV/AIDS and therapy associated with the disease. Complete blood counts are important to monitor for anemia, neutropenia and thrombocytopenia, which can occur with certain medications (see table 1) as well as advanced disease. Liver and kidney function tests monitor for the function of these organs. Other tests that are indicated include (9):

- Electrolytes
- Glucose
- Cholesterol levels
- Urinalysis

The absolute CD4 lymphocyte count is used as a predictor of HIV progression. When levels are less than 200 cells/mcL the risk for opportunistic infections is high. Some clinicians will monitor CD4 lymphocyte percentage; and risk is highest for opportunistic infection or malignancy when the percentage is less than 20. HIV viral load measures the actively replicating HIV virus. It is correlated with disease progression.

All HIV infected individuals should have CD4 counts and viral load levels every 3-6 months. HIV viral loads should also be checked one month after a change in therapy (1, 9).

Vaccinations are a key component to maintaining the health of HIV infected patients. Annual influenza vaccination, pneumococcal vaccination, hepatitis B vaccine in those who are HBsAb-negative and Haemophilus influenzae type b vaccination should be given (1, 2).

Tuberculosis (TB) should be monitored for with annual purified protein derivative (PPD) tests. INH and pyridoxine therapy should be given to HIV infected patients with a normal chest x-ray and a positive PPD (9).

In addition to TB, other diseases need to be observed for. Syphilis should be looked for with a rapid plasma regain (RPR) or Venereal Disease Research Laboratory test (VDRL). A hepatitis panel should be run. Toxoplasmosis and *cytomegalovirus* (CMV) IgG serology should be performed. Papanicolaou smears should be done every 6 months in women. Individuals having anal intercourse should have cytological evaluation annually (1, 9).

When should antiretroviral therapy be started? Generally, it is recommended when CD4 counts fall below 200 cells/mcL. When CD4 levels fall below 200 cells/mcL or the CD4 lymphocyte percentage is less than 14 percent and weight loss or oral candida is present than prophylaxis against *Pneumocystis jiroveci* should start with trimethoprim-sulfamethoxazole, dapsone or aerosolized pentamidine. When CD4 counts fall below 75 cells/mcL than the patient should receive prophylaxis against *Mycobacterium avium*

complex with azithromycin, clarithromycin or rifabutin. When CD4 counts are below 50 cells/mcL patients should receive prophylaxis against CMV with antiviral medication (1).

Staging

A staging system has been set up by the Center of Disease Control (CDC). It places HIV/AIDS patients in categories based on CD4 counts and certain infections/conditions.

The categories are ranked from A to C and from 1 to 3.

Category A is the individual with HIV infection without any symptoms or any opportunistic infections.

Category B patients have symptoms/conditions that are related to HIV infection.

Some of the infections in this class include:

- Oral Candida – thrush
- Herpes Zoster (shingles) that occurs more than one time or affects 2 or more dermatomes
- Resistant or persistent vulvovaginal candidiasis
- Peripheral neuropathy
- Pelvic inflammatory disease
- Moderate to severe cervical dysplasia or cervical carcinoma in situ
- Fever more than 38.5 Celsius or diarrhea longer than one month
- Oral hairy leukoplakia

Category C is where there is a opportunistic infection that is associated with AIDS.

In addition to the A, B, C classification the categories are further subdivided into 1, 2 and 3 based on the CD4 count. To get a category 1 classification – for example A1, B1, or C1 - the CD4 count must be greater than 500 cells/mcL. To get category 2 (A2, B2, C2), than the CD4 count needs to be between 200-499 cells/mcL. To get a category 3 rating the CD4 count must be under 200 cells/mcL.

If the CD4 count dips into a lower a class it is always classified in that class. For example, if an HIV positive patient develops pneumonia caused by an opportunistic infection (for example, *Pneumocystis jiroveci* pneumonia) and his CD4 count drops to 100 cells/mcL, that person is in category 3. If he recovers and the CD4 count increases to 300 cells/mcL the person is still classified as category C3. This is because the person has a history of an opportunistic infection and had a count that in the category 3 range.

Based on this classification, a person can be considered to have AIDS. Anyone who is in category 3 or C has AIDS. This includes those with A3, B3, and C1-3 classification.

Health care exposure

Among health care workers, the risk of contracting disease is low – with laboratory workers and nurses being the two most risky professions. Getting a needle stick from a needle with blood from an HIV positive patient confers a risk of contracting HIV of about 1:250 to 1:300 (1, 2, 5). With proper treatment the risk is reduced to almost zero (1, 5). The risk of transmission is greatest in those who get stuck by someone with advanced disease or if the puncture is deep (1).

Those exposed should be tested immediately and have follow-up testing at 6 weeks, 3 months and 6 months. Treatment should be with combination therapy (e.g. zidovudine and lamivudine twice a day) and continued for 4 weeks (1). Counseling should also be offered to anyone exposed.

HIV and the flu

HIV reduces the ability of the body to fight infection. The flu is a serious disease that is rarely fatal, but it can be in some risk populations. Those individuals at risk include: the very young, the very old and the immunocompromised – including the HIV/AIDS patient.

Because of the increased risk of death and complications it is important that HIV infected individuals take precaution. In addition, to the routine measures to prevent infectious disease such as frequent hand washing and avoiding contact with those who are sick, the HIV -infected person should have a flu shot.

The HIV infected individual is a candidate for the flu shot with the inactivated vaccine. They are not candidates for the treatment with the FluMist. FluMist is a live vaccine and not recommended for those with an immune system problem.

HIV patients have a poor response to immunizations. Individuals who are exposed to influenza – even if they got the vaccination – should receive chemoprophylaxis against influenza. This may include a family member, friend, close work contact or housemate. Prophylaxis should occur for 7 days. Those with advanced HIV do not have an adequate response to the influenza vaccine and may be candidates for antiviral medications throughout the flu season.

Medications

Multiple classes of medications used in combination – typically three medications - treat HIV infection. Highly active antiretroviral treatment (HAART) is the standard of care for patients with HIV. While it does not cure the disease, it does maintain immune function.

What are the criteria for the use of HAART? If the CD4 count is less than 200 cells/mcL or symptomatic HIV is present than treatment should be started (1). For those with CD4 counts above 200 cells/mcL, without symptoms, treatment can be considered. Most clinicians do not use HAART with CD4 counts greater than 350-cells/mcL (1). Patients with rapidly progressive disease – those with high viral loads or dropping CD4 counts - should be considered for therapy as well.

Goals of therapy are to suppress viral load to less than 50 to 75 copies/mcL (1). Toxicity should be monitored for diligently. Changing drug regimes may be appropriate for those who do not tolerate the medications.

Classes include the nucleoside reverse transcriptase inhibitors, nucleotide reverse transcriptase inhibitors, protease inhibitors, and non-nucleoside reverse transcriptase inhibitors. The most common treatment regime is the combination of two nucleoside analogue reverse transcriptase inhibitors and one protease inhibitor (2). Medications need to be monitored for side effects and effectiveness. Treatment regimes sometimes need to be switched up if intolerant or not effective. Resistance testing may be employed.

Table 1: Medications used to treat HIV (adapted from (1))

Drug	Side effects
Nucleoside reverse transcriptase	

inhibitors <ul style="list-style-type: none"> • Zidovudine (AZT) (Retrovir) • Didanosine (ddI) (Videx) • Zalcitabine (ddC) (Hivid) • Stavudine (d4T) (Zerit) 	<ul style="list-style-type: none"> • Anemia, neutropenia, myopathy • Pancreatitis, PN, hepatitis • PN, hepatitis • PN, hepatitis, pancreatitis
Nucleotide reverse transcriptase inhibitors <ul style="list-style-type: none"> • Tenofovir (Viread) 	<ul style="list-style-type: none"> • GI upset
Protease inhibitors <ul style="list-style-type: none"> • Ritonavir (Norvir) • Indinavir (Crixivan) • Nelfinavir (Viracept) 	<ul style="list-style-type: none"> • GI upset • Kidney stones • Diarrhea
Non-nucleoside reverse transcriptase inhibitors <ul style="list-style-type: none"> • Nevirapine (Viramune) • Delavirdine (Rescriptor) • Efavirenz (Sustiva) 	<ul style="list-style-type: none"> • Rash • Rash • Neurological changes

When medications are added or subtracted in the treatment of other conditions extreme caution should be used. Medications used to treat HIV have multiple drug-drug interactions.

Common drugs to watch out for are acid suppressors such as proton pump inhibitors or histamine receptor blockers. Without acid in the stomach the medications itraconazole (capsule form) for histoplasmosis and some antiretrovirals will not get

absorbed. This will result in sub therapeutic levels and may lead to progression of disease or the development of resistance.

Complications

As the disease progresses and the CD4 count dips, the patient is at increased risk for being admitted to the hospital. The following are common reasons for hospital admissions for the HIV/AIDS patient:

- Infections
- Organ failure
- Malignancy
- Medication side effects
- Dehydration secondary to nausea, vomiting, diarrhea – often due to an infection

Opportunistic infections are infections that are not common in the healthy population and often take the lives of AIDS patients.

Central nervous system infections – toxoplasmosis, *Cryptococcus* and progressive multifocal leukoencephalopathy (PML) – can occur in advanced HIV. Toxoplasmosis often presents with a brain lesion. The clinical presentation may be a seizure, change in mental status, headache or a focal neurological deficit. It is important to differentiate this from CNS lymphoma, which is another common space occupying lesion in HIV/AIDS.

Cryptococcus typically occurs as the CD4 count drops. It presents with a sub acute picture, meaning that symptoms – headache, personality changes, fever and malaise – may be present for a while before the patient seeks medical treatment (9). The disease

is diagnosed when there is a positive latex agglutination test or a positive spinal culture (1).

Progressive multifocal leukoencephalopathy is an infection of the white matter in the brain. Presentation is typically a focal neurological deficit. Its best treatment options are treating the HIV with antiretroviral therapy (1, 9).

The most common eye problem is a retinitis caused by *cytomegalovirus* (CMV) (1). CMV retinitis occurs when the CD4 count is less than 50 cell/mcL and presents with a cottage cheese and ketchup appearance in the back of the eye (9). It is focal, necrotizing and becomes bilateral (9).

Shingles, when present in someone younger than 55, should have HIV and cancer as an underlying contributing factor considered. Shingles in HIV positive patients can be severe with some ulcers never closing. It may result in severe pain and scarring (9).

Pulmonary disease is another common manifestation of advanced HIV/AIDS. The HIV patient is eight times more likely to develop pneumonia than healthy controls (9). All should be vaccinated against pneumococcal and revaccinated when CD4 counts are above 200 cells/mcL.

Pneumocystis jiroveci pneumonia definitively diagnoses AIDS. It occurs 95-99 percent of the time in patients who have a CD4 count less than 250-cells/mcL (1). Its onset is insidious and presents with progressive shortness of breath, non-productive cough, hypoxia and sometimes fever (1, 9). It is important to rule out TB in these patients. In addition to antibiotics, prednisone is often used when the PaO₂ dips below 70 mm Hg (1, 9).

Tuberculosis (TB) presents typically in patients with CD4 counts greater than 400 cells/mcL, but atypically in those with low CD4 counts. When CD4 counts are less than 50 cells/mcL, TB may be disseminated (9). Whenever a lesion is present on chest x-ray, TB should be ruled out with a test for acid-fast bacilli (AFB) on sputum smear.

Mycobacterium avium complex or MAC can present similar to other lung infections. Presentation includes fever, chills, fatigue, myalgia and sweating (2).

Mucocutaneous candidiasis may occur when the CD4 count is less than 200 cells/mcL. It is best to treat topically if possible but if esophagitis is present – as evidenced by painful swallowing - the addition of intravenous or oral Diflucan may be necessary with substitution of amphotericin B in resistant cases (9).

The immunocompromised body is at risk for the development of diarrhea secondary to invasion by multiple microorganisms. Common bugs that can cause diarrhea include: *Salmonella*, *Shigella*, and *Cryptosporidium*. In addition to diarrhea, *cryptosporidium* presents with nausea, vomiting, malabsorption, cholangitis, pancreatitis and some get fever. Anyone can get *cryptosporidium* but it typically just gives a mild annoying diarrhea (9). Those with HIV/AIDS may get severe diarrhea and dehydration.

Strategies to prevent GI bugs from causing problem in the HIV patient include:

- Wear gloves with diaper changes
- Do not eat undercooked meat
- Diligently wash hands

Disseminated infection confirms advanced disease. DMAC or disseminated *Mycobacterium avium* complex presents when CD4 counts are less than 50 cells/mcL

with night sweats, fever, weight loss, fatigue, diarrhea, abdominal pain, enlarged lymph nodes, or an enlarged spleen or liver (1, 9).

Histoplasmosis can cause severe respiratory disease in the HIV patient. Healthy controls get a mild flu like illness from histoplasmosis, but those with HIV may become very ill. It presents systemically with fever, fatigue, enlarged lymph nodes and pancytopenia. The complete blood count may show yeast in the white blood cells. Urine antigen is helpful if positive, but if negative does not rule out the disease (9).

Malignancy is another common complication of HIV/AIDS. The most common are Kaposi's sarcoma, primary lymphoma, non-Hodgkin's lymphoma and invasive cervical cancer. Lymphoma is the most common malignancy. Kaposi's sarcoma presents anywhere with purple lesions and is treated with chemotherapeutic agents. Non-Hodgkin's lymphoma is aggressive and is treated with radiation and chemotherapy (1). Human papilloma virus is a causative factor in cervical cancer as well as anal dysplasia and squamous cell carcinoma (1).

AIDS affects other organs. HIV dementia – which is usually reversible with treatment – is a diagnosis of exclusion. HIV can lead to end-stage liver and kidney disease. Liver dysfunction is directly associated with HIV, but also with its co-morbid hepatitis B or C, which is very common in this population. HIV patients may end up on dialysis or need a liver transplant.

Nurse's Role

Improvement in treatment has resulted in a significant reduction in death rates in the developed world. In the undeveloped world, access to treatment is limited, and death rates remain high.

Nurses have key roles in the prevention, detection and treatment of HIV and AIDS. Nurses need to help identify high-risk patients and encourage screening. This will help raise awareness and hopefully reduce transmission. Nurses should encourage women who are pregnant or are thinking about becoming pregnant to be screened for HIV.

In those with diagnosed HIV the nurse has a key role in education and monitoring. For those patients currently on HAART, teaching them about the importance of adherence to the medication regime is paramount. In addition, they need to teach about medication side effects and reinforce the benefits of therapy.

Nurses need to be leaders in encouraging HIV and AIDS patients to follow up in the health care system to get their blood work to monitor the disease.

Improvements in medical science have vastly improved the prognosis for this disease. Further improvements are on the horizon with the possibility of a vaccine having the potential to someday eradicate this deadly disease.

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