2017

HIV/AIDS

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Introduction

Human Immunodeficiency Virus (HIV) is a disease in which the virus attacks and depletes the CD4+ T cells leading to a weakened immune system in which a patient can no longer fight pathogens. This weakening of the patient's immune system makes them more susceptible to opportunistic infections and malignancies (Coffin & Swanstrom, 2017). In the initial acute HIV infection period the patient usually does not show symptoms but is highly infectious which can allow for transmission unknowingly (Center for Disease Control and Prevention, 2017). HIV can eventually progress to AIDS without treatment.

Admission to the hospital can expose this patient to many opportunistic pathogens and complicate treatment plan.

In Columbus, Ohio, at Grant Medical Center there is a need for better understanding of HIV and the impact it can potentially have on patients who are acutely ill in the critical care setting which is why this topic was chosen.

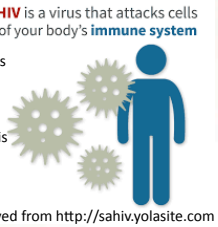
Underlying Pathophysiology

HIV is a virus which is a member of the lentivirus genus, part of the retroviridae family (Moss, 2013). The characteristics of this family of viruses are long latency periods and progressive infection allowing the virus to invade the hosts immune response (Moss, 2013). On the surface of the HIV are two antigens, glycoproteins 120 and 41 (gp120 and gp 41) which allow the virus to bind with the target cell using CXCR4 and CCR5 as co-receptors. CCR5 is expressed on memory cells where CXCR4 is expressed on memory and naïve CD4 T cells (Swanstrom & Coffin, 2013). HIV starts with the infection of a single CD4 T cell. Once in the cell, RNA is released in the cytoplasm of the cell. Using the host's nucleotides, HIV enzyme reverse transcriptase transforms the viral RNA into single-stranded DNA. As this occurs, errors are made due to poor "proofreading" and single stranded DNA is reverse-transcribed and synthesized as double-stranded DNA. The double stranded DNA is then carried to the nucleus and inserts it into the hosts chromosome. (Moss, 2013). HIV continues to replicate in CD4 T cells and as a new viron is formed cell death occurs to the host allowing the virus to be released to infect other CD4 cells (Swanstrom & Coffin, 2013). As the virus replicates there is a significant decrease in CD4 T cells over time leading to immunodeficiency; leaving the host susceptible to infections and malignancies (Moss, 2013).

Significance of Pathophysiology

• Transmission of the HIV virus occurs from and infected person by blood, semen and vaginal fluids through means such as needlesticks, intravenous drug use, sexual intercourse, blood products or mother-to-child.

•Up to 80% of transmission in adults is through sexual intercourse (Moss, 2013). Early diagnosis and treatment is key to prevent further transmission and control of the disease progression. Most HIV viruses can be detected within 25-30 days (Moss, 2013)



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HIV Diagnosis & Treatment

Three types of tests are available to detect and diagnose HIV. They are antibody tests, combination or fourth-generation tests, and nucleic acid tests (NATs).

Antibody detection tests: ELISA is a test in which HIV antigens are used to detect antibodies in the patient's blood serum. The CDC recommends confirmation of the positive result of the ELISA test using Western blot test. The Western blot test is able to identify antibodies of a specific molecular weight, eliminating false positive results (Moss, 2013).

Combination or fourth-generation tests: These tests are looking for both antigens and antibodies

which can be detected 2 to 6 weeks after infection (Center for Disease Control and Prevention, 2017)

Nucleic acid tests: This test is the fastest, it is able to detect the virus in the blood after 7 to 28 days.

This test is typically not used due to the high cost (CDC, 2017).

Treatment: Once a diagnosis has been made, early treatment is imperative. Although there is currently no cure for HIV, the use of highly active antiretroviral therapy (HAART) has decreased morbidity and mortality to those diagnosed with HIV. These drugs decrease the viral load which slows the progression of the disease as well as decreasing the risk of transmission. (Moss, 2013). The progression of antiretroviral therapy has make this once deadly disease into a manageable chronic disease (Sweet, Altice, Cohen & Vandewalle, 2016).

Signs & Symptoms

The HIV infection occurs in four stages:

Stage 1- During the primary infection, which lasts for a few weeks, the person may or may not have symptoms. Symptoms present are usually flu-like such as fever, headache, muscle ache, rash and joint pain (HIV.gov, 2017). During this stage there is a significant amount of HIV circulating and the immune system is responding by generating antibodies, a process called seroconversion, allowing the patients to test positive when tests are conducted for antibodies (Moss, 2013)

Stage 2- During the clinically asymptomatic stage most symptoms are absent with the exception of swollen glands. Although the patient may not have symptoms, the individual is still infectious (Moss, 2013). This stage can last on average ten years without antiretroviral therapy, and for much longer in those receiving antiretroviral therapy (HIV.gov, 2017).

Stage 3- Following the asymptomatic stage, HIV becomes symptomatic when the CD4 lymphocyte count drops below 200 cells/uL. As the immune system is weakened due to damage of tissues and lymph nodes, viral mutation and further destruction of T cells, the person becomes more susceptible to opportunistic infections and malignancies (Moss, 2013). Symptoms at this time can include: rapid weight loss, night sweats, diarrhea, pneumonia, red, brown, pink or purple blotches on skin and memory loss or other neurologic disorders (HIV.gov, 2017). As the person progresses to AIDS, they are more likely to be susceptible to more severe infections and cancers. Examples are Hodgkin disease, squamous cell carcinoma and severe lymphadenopathy (Moss, 2013).

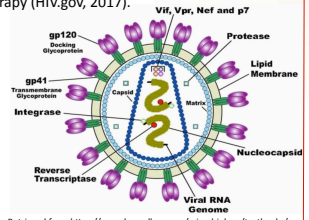
Implications for Nursing Care

•Education to those who are at high risk for contracting this disease is important. HIV is more common among ethnic/racial minorities, homosexual and bisexual men, and intravenous drug users (Moss, 2013).

•To decrease transmission among high risk groups education such as safe sex practice using condoms, using clean needles for intravenous drug use as well as importance of testing are all crucial.

•Under the Affordable Care Act, HIV screening is covered without co-pay to those who have health insurance and many other resources are available for those who are not covered by health insurance.

• Once a patient has contracted HIV, early start of antiretroviral therapy (ART) is important. There are many federal and state resource available for those who are not covered by insurance to help pay for ART therapy (HIV.gov, 2017).



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Conclusion

As more research is done and innovations continue, the hope is to eventually eradicate the HIV virus. At this time vaccine trials have not been effective. Yet, as we understand more about the global genetic variations and their specific pathogenic potential reducing new infections and finding a cure is becoming more of a reality. These breakthroughs allowed The United States, in 2010, to develop a plan to address AIDS by decreasing these new infections, increasing access to care and improving the outcomes to those with HIV (Klatt, Chomont, Douek & Deeks, 2013).

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