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What You NEED to Know about HIV/AIDS

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What You NEED to Know about HIV/AIDS

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Introduction

Thirty years ago, the human immunodeficiency virus (HIV) was recognized as the cause of acquired immune deficiency syndrome (AIDS). Since that time, HIV/AIDS continues to be an ongoing problem worldwide. Even with persistent public health campaigns and advancements in antiretroviral therapy, HIV/AIDS remains a major cause of global morbidity and mortality (Aggleton, Yankah, & Crewe, 2011). Although the annual number of new HIV/AIDS infections has remained stable, the number of people living with HIV/AIDS has continued increased. In the United States alone, the Centers of Disease Control and Prevention (CDC) estimates that 1,201,100 people are living with HIV infection, in addition to 168,300 (14%) who are unaware of being infected. In 2013, an estimated 47,352 people were diagnosed with HIV, while an estimated 26,688 people were diagnosed with AIDS (CDC, 2015).

HIV/AIDS is disproportionately more common in certain countries and high-risk groups. Homosexual men, bisexual men, and intravenous drug users continue to endure the highest rates of HIV infection. Homosexual men account for about 50% of people living with HIV, and intravenous drug users account for approximately 25% (Castel, Magnus, & Greenberg, 2015). Racially, African American and Latinos account for 45% of new HIV infections. However, globally, the epidemic is the most severe in South Africa. South Africa holds more than half (70%) of the world's HIV population. Fortunately, since 2010, AIDS-related deaths have decreased steadily due to free drug treatment. But, there has been a rapid increase in new HIV infections in other countries such as: India, China, Central Asia, Eastern Europe, and parts of Russia. In Central Asia and China, the HIV rate has risen 250% over the past 10 years (Moss, 2013).

Although HIV/AIDS infection has dropped about 20%, the incidence of infection varies in different parts of the world. The variation in incidences points to flawed public perceptions that the dangers from HIV are declining as a result of treatment and educational programs. Therefore, education and general public awareness are a main focus when it comes to decreasing the rate of HIV/AIDS.

Pathophysiology

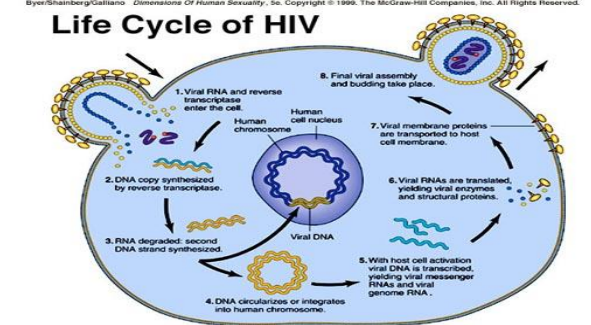
HIV is a member of the lentivirus genus. These viruses are characterized by long latency period and progressive infection where the virus evades the immune response of the host. HIV is transmitted through blood, semen, vaginal fluids, and breast milk. HIV infects cells in the immune system and the central nervous system. More specifically, HIV infects the CD4 T cells, also known as T lymphocytes. T cells play a crucial role in the immune system to fight infection. Therefore, a significant reduction in T cells weakens the immune system. HIV is comprised of two antigens that are specific to the virus, glycoprotein 120 and 41 (gp120 and gp41). These two antigens bind with immune cells to initiate the infectious cycle (Moss, 2013).

In order for the virus to survive and replicate, the virus must go through multiple stages.

- **Attachment-** HIV transmission begins with the HIV's gp120 attaching to the T cell's surface.
- **Penetration-** After the virus is attached, the virus penetrates into the T cell. Once inside, the capsid proteins are digested, releasing viral enzymes and RNA into the cytoplasm of the T cell.
- **Reverse Transcription-** The HIV enzyme uses reverse transcriptase to transform the viral RNA into single-stranded DNA. It is common for errors to occur due to poor "proofreading" of the reverse transcriptase. The process repeats to create a double-stranded DNA.

- **Integration-** The newly created HIV DNA moves into the T cell's nucleus and is spit into the host DNA. Once the viral DNA is integrated with the host's DNA, the DNA is replicated using normal replication mechanisms.
- **Transcription-** Next, HIV uses T cells to make copies of the virus. The viral RNA is used as a template for new viruses and messenger RNA (mRNA). The mRNA produces viral proteins with ribosomes in the cell cytoplasm. Simultaneous production of other mRNA allows for translation of additional viral proteins, which leads to maturation of the HIV and an increased ability to infect the host.
- **Assembly-** During assembly, viral proteins collect at the plasma membrane, and move together toward the cells surface.
- **Budding-** When the virus reaches the cells surface, the virus breaks away from the host cell.
- **Maturation-** The cell does not mature until the HIV protease enzyme, which was produced during integration, cuts the viral multiprotein chains into their proper size. This leads to a mature and functional HIV virion that is able to infect other T cells, specifically T cells with the cell marker CD4.

When the new virus leaves the CD4 T cell, the plasma membrane of the cell is ruptured and the CD4 cell is destroyed. Over a period of years, HIV invades and destroys other T cells; the host immune system is weakened, which leads to the onset of AIDS (Moss, 2013).



Signs and Symptoms

Stage	Phase		Clinical signs	Duration
1	Acute phase	Initial stage	Neutropenia Lymphadenopathy Fever	Weeks to months
2	Asymptomatic phase	Asymptomatic carrier	No clinical signs	Years
3	Phase of unspecific clinical signs	PGL/LAS+ARC	generalized lymphadenopathy, recurrent fever, apathy, leucopenia, anaemia, anorexia, weight loss, chronic stomatitis, behavioral abnormalities	Months to 1 year
4	Terminal AIDS-like phase	AIDS	ARC symptoms and opportunistic infections, neoplasie, neurological abnormalities	Several months

HIV occurs in four stages: primary infection, clinically asymptomatic HIV, possible minor symptoms, and symptomatic HIV.

- **Stage I-** The first stage of infection only last for a couple of months, it is common for the infected person to experience no symptoms or have a brief period of flu-like illness (AIDS.gov, 2015). During this time, there is a high amount of HIV in the blood, and the immune system responds to the virus by generating HIV antibodies and cytotoxic lymphocytes. The process of creating antibodies to a specific antigen is called seroconversion (Moss, 2015).

- **Stage II-** After seroconversion is complete, the infected person will test positive for HIV. The clinically asymptomatic HIV last an average of 10 years. The individual usually has no symptoms, except the person may have swollen glands and may develop psoriasis, shingles, and minor infections. After a prolonged asymptomatic phase, symptoms begin to show in the infected person (Moss, 2015).

- **Stage III-** In the symptomatic HIV phase, HIV has significantly damaged the individual's immune system. When lymphocyte counts drop to below 200 cells/uL, the person is at risk for multiple infections. Opportunistic infections can include: pneumonia, diarrhea, eye infections, and meningitis. Having a severely weakened immune system also increase the risk for various cancers. It is common for the individual to develop HIV wasting syndrome, which is characterized by rapid weight loss and weakness (Moss, 2013).

- **Stage IV-** As the immune system become increasingly impaired, the individual will progress to AIDS. The symptomatic stage progressing to AIDS lasts from 8 to 12 years (Moss, 2013).

Diagnosis

The average detection window for HIV testing is 25 to 30 days after infection. If an infected person is using antiretroviral therapy, antibody formation can be delayed up to 12 months. A diagnosis of HIV can be confirmed with several different types of tests. These tests are designed to detect antigens, antibodies, or RNA. The original screening test was used to determine the presences of enzyme-linked immunosorbent assay (ELISA). The ELISA test is a two-step process used to check for antibodies stimulated by HIV. If the ELISA generates a positive result, a conformation test is usually performed. According to the CDC, the ELISA method is not used to confirm a diagnosis. The CDC recommends using the more expensive Western blot test. The Western blot test also identifies antibodies, but it identified antibodies of specific molecular weight, which eliminates false-positive results. Other tests available are rapid tests that provide a result within 10 to 20 minutes, or at home tests using an oral swab. However, any positive result needs to be confirmed by a Western blot test (Moss, 2013).

Treatment

At this time there is no cure for HIV. But with antiretroviral therapy, the course of HIV can be altered. Enhancements in treatments have led to fewer HIV-infected individuals dying of HIV-related illnesses (Millard, Elliott, & Girdler, 2013). Currently, there are more than 20 approved antiretroviral drugs. These drugs aim to maintain the HIV levels to prevent weakening of the immune system. Combination therapy is when the patient is taking 2 or more antiretrovirals at the same time. Taking 3 or more antiretrovirals is called highly active antiretroviral therapy (HAART). HAART has become the standard of care in high-income countries. Regimes normally contain a drug to suppress viral replication, and a drug to increase CD4 lymphocyte counts. Patient must receive treatment for life. Negative effects of long-term treatment include diabetes, heart disease, liver disease, and various forms of cancer. Although, there is no cure, antiretrovirals have to possibility to turn HIV/AIDS into a long-term chronic medical condition (Moss, 2013).

Nursing Considerations

In caring for a patient with HIV/AIDS, it is important for nurses to be educated on HIV transmission and understand the virus cannot be transmitted through common contact. All body fluid should be considered as potentially infectious, and standard precautions should be maintained. Standard precautions include hand washing, use of personal protective equipment, and sharps handling and disposal (Koerich, dos Santos, Schlindwein Meirelles, & Erdmann, 2015).

Conclusion

Strategies for HIV/AIDS prevention and management evolve continually. Educational programs and treatment are becoming more effective and efficient. The only way to prevent new infections is through education. HIV prevention programs are being implemented in nearly all countries (Moss, 2013). In 2011, the United Nations Program on HIV/AIDS (UNAIDS) mission included decreasing the sexual transmission of HIV by 50%, a 50% reduction in AIDS-related maternal mortality, and the elimination of new infections via drug users and vertical transmission (Moss, 2013). With recent achievements and ambitious goal setting, a HIV-free generation is possible.



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