HIV and AIDS

An Overview on HIV/AIDS, transmission and treatment.

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Disclosure

I have no actual or potential conflict of interest in relation to any product or service mentioned in this program or presentation.

Learning objectives

1. Understand the difference between HIV infection and AIDS
2. Understand the etiology and pathophysiology
3. Understand and learn about transmission
4. Understand the stages and progression of HIV infection
5. Understand clinical manifestations, diagnostic evaluations and complications
6. Understand basics of management
7. Understand the role as Nurse/ Service Coordinator/ Social Worker/Case Management

Definitions

What is HIV

Human - infecting human beings

Immunodeficiency - decrease or weakness in the body's ability to fight off infections and illness

Virus - a pathogen having the ability to replicate only inside a living cell

What is HIV disease

- HIV disease is the entire course of HIV infection from a symptomatic infection and early symptoms to AIDS

- A chronic condition controllable with medications and strict adherence to treatment recommendations

Types of HIV

HIV-1

- HIV-1 is the main type of HIV worldwide. Most people that are living with HIV have HIV-1.
- Here are four groups of HIV-1. They are:
  Group M
  Group N
  Group O
  Group P
- HIV-1 viruses in Group M account for most cases worldwide.
- Subtype C is the most prevalent worldwide. However, Subtype B is most prevalent in the United States.

HIV-2

- HIV-2 is less common than HIV-1. It's generally rare outside of western Africa, may progress more slowly than HIV-1, and is resistant to some antiretroviral drugs.
- there are nine groups of HIV-2. These are classified using the letters A through I.
- HIV-2 viruses in Groups A and D are the most prevalent.
- HIV-2 doesn't have subtypes.
- It's possible for an individual to contract both HIV-1 and HIV-2. In this case, HIV-2 may slow the progress of HIV-1.

What is AIDS

- **A**cquired- To come into possession of something new
- **I**mmuno (Immunodeficiency)
- **D**eficiency - decrease or weakness of the body's ability to fight off infections and illnesses
- **S**yndrome a group of signs and symptoms that occur together and characterize a particular abnormality

AIDS

- AIDS as the final stage of the disease caused by infection with a type of virus called HIV
- Most severe form of a continuum of illnesses associated with HIV infection
- If untreated it causes slowed degeneration of the immune system with the development of opportunistic infections and malignancies

HIV vs AIDS

- HIV is a virus that causes AIDS
- Not everyone who is infected with HIV has AIDS
- Everyone with AIDS is infected with HIV
- AIDS is a result of the progression of HIV infection
- Anyone infected with HIV, although healthy, can still transmit the virus to another person

Etiology and Pathophysiology

Structure of HIV

- It is a retrovirus that infects and depletes the CD4+ T helper lymphocytes (one of the protector cells of the immune system)

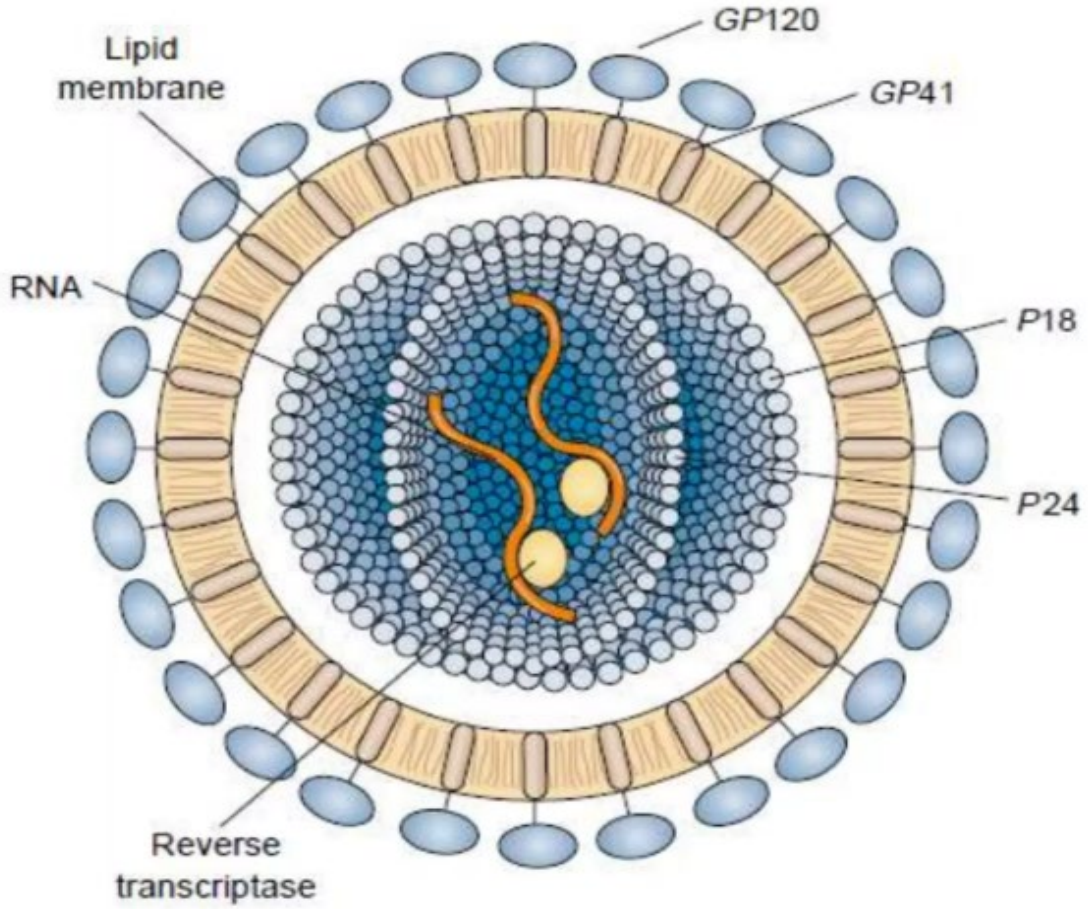
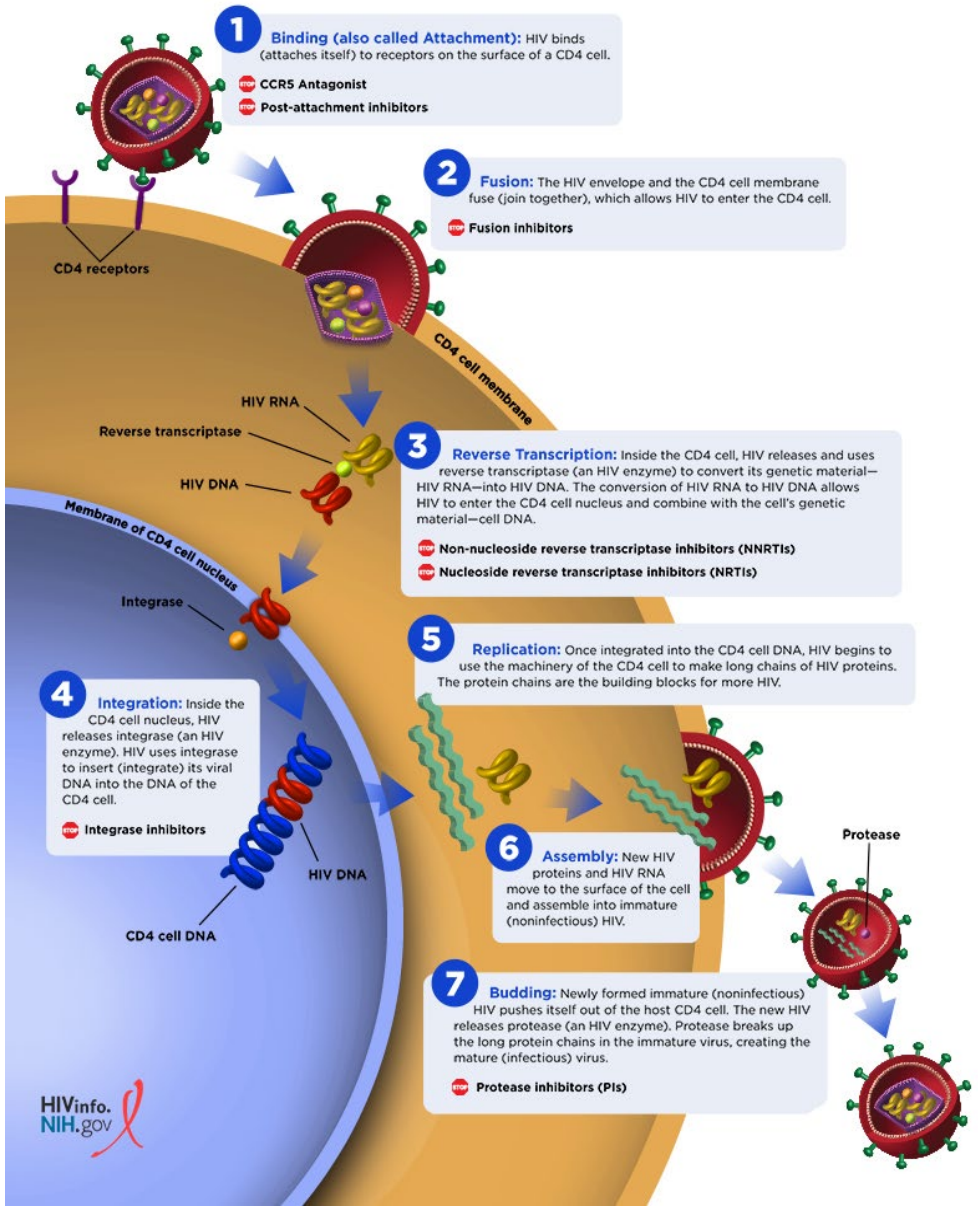


FIGURE 52-1 Structure of the HIV-1 virus. A glycoprotein envelope surrounds the virus, which carries its genetic material in RNA. Knobs, consisting of protein GP120 and GP41, protrude from the envelope. These proteins are essential for binding the virus to the CD4+ T lymphocyte. From Porth, C. (2002). *Pathophysiology: Concepts of altered health states* (6th ed.). Philadelphia: Lippincott Williams & Wilkins.

The HIV Life Cycle

HIV medicines in seven drug classes stop (STOP) HIV at different stages in the HIV life cycle.



Pathophysiology

- Once HIV has entered the body it attaches most efficiently to CD4+ molecules which are predominantly located on the cell membrane of T4 helper lymphocytes
- After penetrating the cell membrane the HIV genome and enzymes are released in the cell and integrated into the lymphocytes genome
- The result of this reproductive process is the production of many HIV virions and cells death for the T4 helper lymphocytes
- With progressive invasion of HIV, cellular and humoral immunity declines an opportunistic infections that characterized his disease began to emerge

Transmission

How is HIV transmitted

- Unprotected sexual contact with an infected partner (vaginal or anal intercourse, oral sex)

- Injection of blood or blood components
  - Exposure to broken skin or wound to infected blood or body fluids
  - Transfusion with HIV infected blood
  -Infection with contaminated objects

- Mother to child during pregnancy birth or breast-feeding

- Body fluids known to transmit HIV – Blood, Vaginal secretions, Semen, Breastmilk

High risk groups for HIV transmission

- Homosexual or bisexual men
- IV drug users
- Transfusion and blood product recipients before 1985
- Heterosexual contacts of HIV-positive individuals
- Newborn babies of mother's that are HIV positive

How HIV is not transmitted (Misconceptions)

- **Casual Contact:** Hugging, shaking hands, sharing phones, doorknobs, or toilets.
- **Airborne/Droplets:** Sneezing, coughing, or breathing the same air.
- **Saliva/Tears/Sweat:** Kissing (unless blood is present), sharing drinks, or touching tears/sweat.
- **Insects:** Mosquitoes or other bug bites/stings.
- **Blood Transfusions:** The U.S. blood supply is carefully screened, making this extremely rare.
- **Antibiotics:** Can't be treated with antibiotics.

Stages of HIV disease

Window Period

- Time from initial infection with HIV until antibodies are detected by a single test
- Usually, 3 to 8 weeks before antibodies undetected
- May test false negative for HIV antibodies during this period
- Can still pass the virus to others during this period

Primary HIV infection

- Acute HIV infection/acute HIV syndrome
- Approximately 50% to 90% of persons will experience a brief flu-like illness about 2 to 4 weeks following exposure to HIV
- Typical symptoms include Fever, Adenopathy, Pharyngitis, Rash
- Although most patients seek clinical care, if you are diagnosed because of the symptoms mimicking a common flu
- During this phase the immune system is compromised by a sudden decrease in the T4 helper cells and increase in viral load for a brief. Before returning to baseline
- Seroconversion occurs when the person has developed enough antibodies to HIV that the serologic test is positive
- Usually occurs 4 to 6 weeks after acute HIV infection

HIV asymptomatic

- **CDC category A**: More than 500 CD4+ T lymphocytes/cubic millimeter
- By about 6 months the rate of viral replication reaches a lower but relatively steady state that is reflected in the maintenance of viral levels at a kind of set point
- Set point varies greatly and dictates a subsequent rate of disease progression
- On average 8 to 10 years past before a major HIV related complication develops
- Patients feel well and have few if any symptoms
- Apparent good health continues because CD4+ T cell levels remain high enough to preserve defensive responses to other pathogens

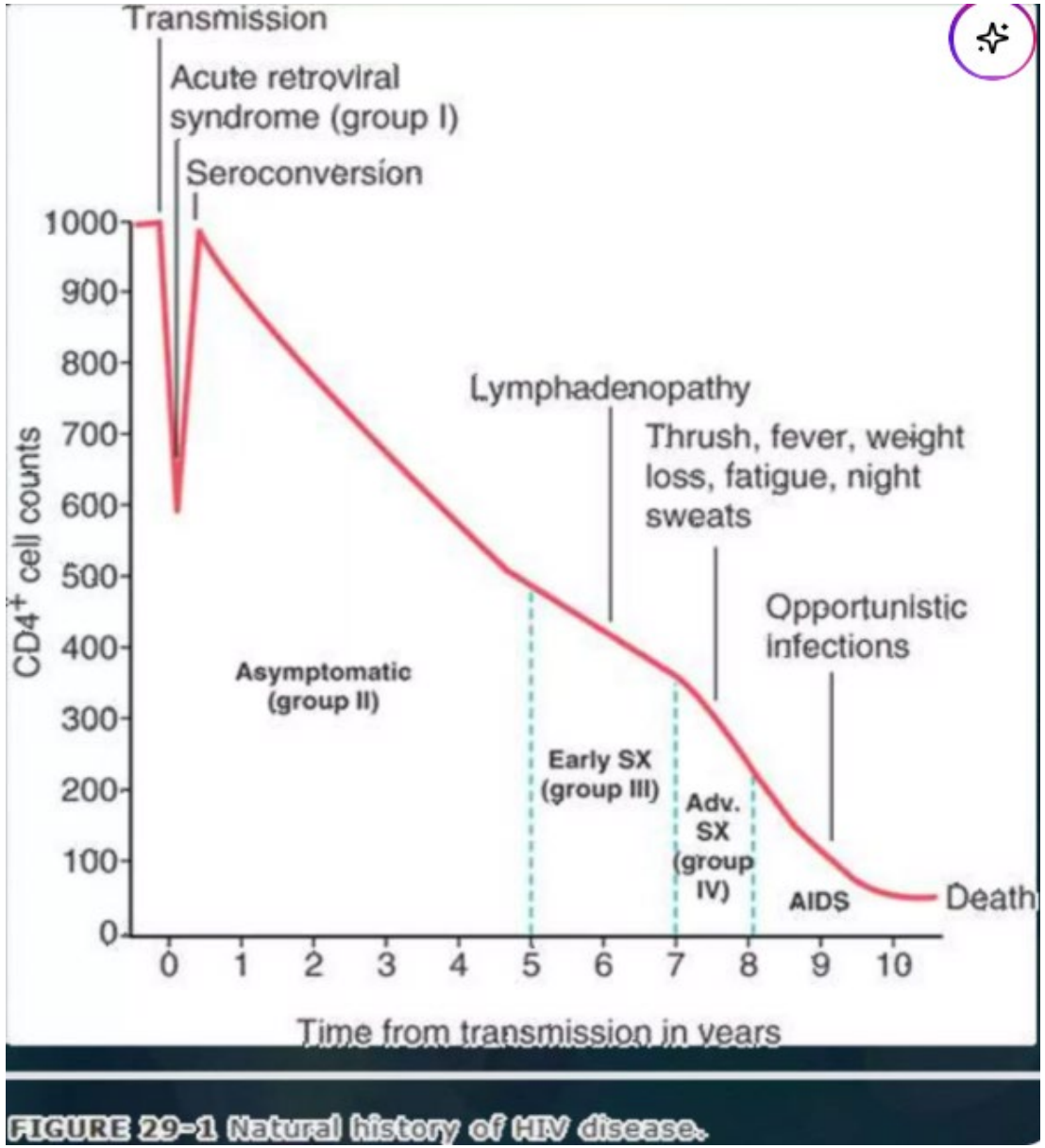
HIV symptomatic

- **CDC category B**: 200-499 CD4+ T lymphocytes per cubic millimeter
- The number of CD4+ T cells gradually falls
- Category B consists of symptomatic conditions in HIV infected patients that are not included in the conditions listed in category C
- These conditions must also meet 1 criteria
    - The condition is due to HIV infection or a defect in cellular immunity
    - Condition is considered to have a clinical course or to require management that is complicated by HIV infection
- If a person was once treated for a category B condition and has not developed a category C disease but is now symptom-free that person's illness is considered category B

AIDS

- **CDC category C**: Fewer than 200 CD4+ T lymphocytes per cubic millimeter
- As levels decreased to fewer than 100 cells per cubic millimeter the immune system is significantly impaired
- Once the patient has had a category C condition, they remain in category C
- The classification has implications for entitlement such as disability benefits housing food stamps
- A CD4+ percentage of less than 14% of the total lymphocytes is consistent with an AIDS diagnosis
- 1 complication of advanced HIV infection is anemia which may be caused by HIV, opportunistic diseases or medications

- Graph showing different stages of HIV from transmission to AIDS



Clinical manifestations

Pulmonary

- Persistent cough with and without sputum production
- Shortness of breath
- Chest pain
- Fever
- Pneumocystis carinii pneumonia (PCP) most common
- Bacterial pneumonia (CAP)
- M tuberculosis
- Disseminated Mycobacterium avium complex
- CMV
- Histoplasma
- Kaposi's sarcoma
- Cryptococcus
- Legionella
- Other pathogens

Gastrointestinal

- Diarrhea
- Weight loss
- Anorexia
- Abdominal cramping
- Rectal urgency or tenesmus
- From enteric pathogen's
- Salmonella
- Shigella
- Campylobacter
- Entamoeba Histolytica
- C. difficile
- CMV
- M avium complex
- Herpes simplex
- Strongyloides
- Giardia
- Cryptosporidium
- Isospora Belli
- Chlamydia

Oral manifestations

- White plaques on oral mucosa, particularly in the posterior pharynx and angular cheilitis from Candida albicans of mouth and esophagus
- Vesicles with ulceration from herpes simplex virus
- White thickened lesions on lateral margins of tongue with hairy leukoplakia
- Oral warts due to human papilloma virus and associated gingivitis
- Periodontitis progressing to gingival necrosis
- Aphthous ulcers of unclear etiology–painful, solitary lesions with raised margins

Central nervous system

- Cognitive, motor, behavioral symptoms (age dementia complex/HIV encephalopathy)
- Mental slowing, impaired memory and concentration, loss of balance, lower extremity weakness, ataxia, apathy social withdrawal
- May be caused by CNS toxoplasmosis, cryptococcal meningitis, herpes virus infections, CMV encephalitis, progressive multifocal leukoencephalopathy, CNS lymphoma
- Sensory symptoms (distal symmetric polyneuropathy) demonstrated by numbness, tingling, neuropathic pain

Ocular manifestations

- Retinopathy-due to CMV retinitis
- Visual impairment-progresses to blindness if untreated

Malignancies

- Kaposi's sarcoma-aggressive tumor involving skin, lymph nodes, GI tract, lungs
- Non-Hodgkin's lymphoma and lymphomas
- Cervical carcinoma

Diagnostic evaluation

Positive blood test for HIV

- Enzyme linked immunosorbent assay (ELISA) - serologic test for detecting antibody to HIV
- Western blot test - used to confirm a positive result on ELISA

When infected with HIV, it usually takes the body up to 12 weeks to develop enough antibody to HIV for the test result to be positive, resulting in a false negative test if evaluated early

Evaluation

- History of risk factors/high risk behaviors
- Lymphocyte panel - shows decreased CD4+ count
- Complete blood count - may show anemia and low WBC count
- Presence of indicator disease
  - PCP
  - Candidiasis of esophagus
  - Kaposi's sarcoma
- Diagnostic procedures (biopsies, imaging procedures) of the organ system involved - to confirm opportunistic infection, malignancies or other causes
- Neuropsychological testing - to identify cognitive deficits associated with AIDS dementia complex

Viral load

- A measure of amount of HIV in the blood
- Higher number (greater than 750000 copies per mL) indicates greater viremia
- High viral loads are usually found in acute seroconversion and late disease, but also occur when patients have another infectious process in the body
- A viral load test result can be undetectable, meaning the amount of virus is less than 50 copies per mL
- This does not indicate that the body is free of HIV
- Latent reservoirs exist in the lymphoid tissues and definitely

Complications

Complications

- Development of HIV virus resistant to antiretroviral treatment
- Repeated overwhelming opportunistic infections
- Respiratory failure
- Wasting
- Medication related conditions
  - -- Lipodystrophy
  - -- Hyperlipidemia
  - -- Insulin resistance
  - -- Lactic acidosis

Management

General Considerations

- Treatments are available for the underlying immunodeficiency and are usually successful in patients receive at least 90% of doses
- Patient education that stresses adherence to treatment and monitoring adherence are essential elements of treatment success
- Treatment is available for some opportunistic infections and other diseases associated with AIDS

Specific treatment

HAART - Highly Active AntiRetroviral Therapy

Consists of medications that belong to 4 different classifications because they act to prevent HIV replication at 4 different points along the replication process

Standard: Take a minimum of 3 different drugs from at least 3 different drug classifications

Classes of antiretroviral drugs

1. **Nucleoside/nucleotide reverse transcriptase inhibitors (NRTI)**

- Historically the first class of medications used in the treatment of HIV

2. **Nonnucleoside reverse transcriptase inhibitors(NNRTI)**

3. **Protease inhibitors (PI)**

- The second class of HIV medications
- Transformed HIV from a terminal illness to a chronic illness for many patients became available in 1996

4. **Entry inhibitors**

- newest class of HIV treatment

Goals of antiviral therapy

- Prolong life and improve quality of life
- Reduce viral load to as low as possible for as long as possible
- Increase the CD4+ count to allow immune reconstitution
- Maintain options for future treatment by preventing the development of treatment resistant virus
- Avoid drug toxicities

Supportive care

- Treatment of reversible illnesses
- Nutritional support
- Palliation of pain
- Evaluation and management of psychological and social aspects of HIV/AIDS infection
- Treatment to relieve symptoms (cough, diarrhea)
- Antidepressant drugs, psychiatric interventions

Nursing management

Nursing assessment

- History of risk factors
- Constitutional signs and symptoms
- Recent infections
- Positive blood test for HIV antibodies
- Most recent CD4+ count
- HIV RNA viral load
- Review present complaints e.g. cough, shortness of breath, diarrhea
- Evaluate nutritional status - weight loss, body mass depletion, hypoalbuminemia, decreased iron binding capacity, anemia
- Complications of drug toxicities (hyperlipidemia, hyperglycemia, lipodystrophy)

Nursing assessment contd

- Assess respiratory rate and depth, auscultate lungs for breath sounds
- Assess for skin color and temperature, palpable lymph nodes, evidence of fever, night sweats
- Inspect mouth for lesions (Candida in the posterior pharynx)
- Examine skin for rash, sores, Kaposi's sarcoma lesions, record number, size, locations
- Ask about bowel patterns, changes in habits, constipation, abdominal cramping, number and volume of stools, presence of perianal pain and ulceration
- Neuro exam - oriented to time place and person, affect, any problem with memory and concentration, headaches or seizures

Nursing assessment contd

- Ask about how much they know about HIV and AIDS
  - Etiology, signs and symptoms, mode of transmission, methods for limiting exposure
  - Disease progression and importance of CD4+ count and viral load monitoring

- Find out about premorbid personality, experience, skills, social support system

- Assess the adherence to medications
  - Review all prescribed medications, dose, how often they are taking the medication
  - Ask how many times over the last day or week they may have missed a dose

Nursing diagnosis

- Activity intolerance
- Disturbed body image
- Fatigue
- Hopelessness
- Hyperthermia
- Imbalance nutrition less than body requirements
- Impaired oral mucous membranes
- Impaired skin integrity
- Impaired tissue integrity
- Ineffective coping
- ineffective health maintenance
- Ineffective protection
- Ineffective sexuality patterns
- Interrupted family processes
- Noncompliance with treatment regimen
- Powerlessness
- Risk of deficient fluid volume
- Risk for infection
- Social isolation

Key outcomes

- The patient will verbalize the importance of balancing activity, as tolerated with rest
- Verbalize feelings about a changed body image
- Express that they have more energy
- Make decisions on their own behalf
- Maintain a normal body temperature
- Maintain current weight or achieve ideal weight
- Patient's oral mucous membranes will remain intact

Key outcomes contd

- Patient will voice feelings about changes sexual identity
- Wounds and lesions will heal without complications
- Site of impaired tissue will have reduced redness, swelling, pain
- Use support systems to assist with coping
- Perform health maintenance activities according to the level of their ability
- Demonstrate use of protective measures including conserving energy, maintaining a balanced diet, getting plenty of rest

Key outcomes contd

- Patient or family will state way to support and assist themselves
- Comply with treatment regimen
- Express feelings of control over their condition and situation
- Maintain adequate fluid balance
- Experience no fever, chills, other signs and symptoms of illness
- Maintain peer and family relationships

Nursing interventions

- Recognize that a diagnosis of AIDS is profoundly distressing because of the disease's social impact and discouraging prognosis
- Patient may lose their job, financial security, family and friends
- Coping with an altered body image, emotional burden of serious illness, and threat of death may overwhelm the patient
- Monitor for fever, noting any pattern comments of skin breakdown, cough, sore, diarrhea
- Assess for swollen, tender nodes
- Check laboratory values regularly
- Avoid glycerin swabs for mucous membranes
- Try normal saline or bicarbonate mouthwash for daily oral rinsing

Nursing interventions contd

- Record the patient's caloric intake
- Ensure adequate fluid intake and episodes of diarrhea
- Provide meticulous skin care especially if the patient is debilitated
- Encourage the patient to maintain as much physical activity as they can tolerate
- Make sure their schedule includes time for both rest and exercise
- If the patient develop Kaposi sarcoma, monitor the progression of lesions
- Monitor opportunistic infections or signs of disease progression
- Treat infections as ordered

Patient teaching

- Combination antiretroviral therapy is used to maximally suppress HIV replication, thereby improving survival
- Poor drug compliance may lead to resistance and treatment failure
- Patients must understand that medication regimens must be followed closely and may be required for many years if not throughout life
- Urge the patient to inform potential sexual partners and healthcare workers that they have HIV infection
- Teach the patient hoe to identify the signs of impending infection
- Stress the importance of seeking immediate medical attention
- Involve the patient with hospice care early in treatment so they can establish a relationship
- If the patient develops AIDS dementia in stages, help them understand the progression of the symptoms

Preventing AIDS transmission

- Use precaution all situations that risk exposure to blood, body fluids, secretions
- Standard precautions can prevent the inadvertent transmission of AIDS, hepatitis B, and other infectious diseases
- Educate the patients and their partner and family, sexual partners, friends, about disease transmission and prevention of extending the disease to others
- Inform the patient not to donate blood, blood products, organs, tissue, sperm
- If the patient uses IV drugs, caution them not to share needles

Preventing AIDS transmission

- High risk sexual practices for AIDS transmission are those that exchange of body fluids, like vaginal or anal intercourse without a condom
- Discussed safe safer sexual practices such as hugging, petting, mutual masturbation, protected sexual intercourse
- Abstaining is also the most protective method of not transmitting the disease
- Advise female patients of childbearing age to avoid pregnancy
- Explained that an infant may become infected before birth during delivery or during breast feeding

Can disease progression be delayed?

Absolutely!!

By doing the following:

- Prevention and early treatment of opportunistic infections
- Antiretroviral therapy
- Positive living