HIV and AIDS: Education, Care and Counselling (PYC2605)

written by
spacegirl

The Marketplace to Buy and Sell your Study Material

On Stuvia you will find the most extensive lecture summaries written by your fellow students. Avoid resits and get better grades with material written specifically for your studies.

www.stuvia.com
Summary of Part I of the prescribed book for PYC2605

HIV AND AIDS

Education, Care and Counseling

2015
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
<th>Study category</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Part 1 – Fundamentals about HIV and AIDS (Outcome 1)</strong></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>HIV and AIDS: A brief history</td>
<td>Compulsory</td>
</tr>
<tr>
<td>2</td>
<td>HIV and the immune system</td>
<td>Compulsory</td>
</tr>
<tr>
<td>3</td>
<td>Transmission and Prevention</td>
<td>Compulsory</td>
</tr>
<tr>
<td>4</td>
<td>HIV-associated symptoms and diseases</td>
<td>Compulsory</td>
</tr>
<tr>
<td>5</td>
<td>HIV tests</td>
<td>Compulsory</td>
</tr>
<tr>
<td>6</td>
<td>Antiretroviral therapy</td>
<td>Compulsory</td>
</tr>
<tr>
<td></td>
<td><strong>Part 2 – Education and empowerment (Outcome 2)</strong></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Theories of behaviour change</td>
<td>Compulsory</td>
</tr>
<tr>
<td>8</td>
<td>AIDS education</td>
<td>Compulsory</td>
</tr>
<tr>
<td>9</td>
<td>Changing unsafe practices</td>
<td>Compulsory</td>
</tr>
<tr>
<td>10</td>
<td>AIDS education for school children</td>
<td>Guidance Track</td>
</tr>
<tr>
<td>11</td>
<td>AIDS education in traditional Africa</td>
<td>Compulsory</td>
</tr>
<tr>
<td></td>
<td><strong>Part 3 – HIV Counselling (Outcome 3)</strong></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Counselling principles and skills</td>
<td>Compulsory</td>
</tr>
<tr>
<td>13</td>
<td>HIV counselling and testing</td>
<td>Compulsory</td>
</tr>
<tr>
<td>14</td>
<td>Ongoing counselling</td>
<td>Compulsory</td>
</tr>
<tr>
<td>15</td>
<td>Bereavement counselling</td>
<td>Compulsory</td>
</tr>
<tr>
<td>16</td>
<td>Spiritual counselling and the meaning of life</td>
<td>Guidance Track</td>
</tr>
<tr>
<td></td>
<td><strong>Part 4 - Care and Support (Outcome 4)</strong></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Home and community-based care</td>
<td>Care Track</td>
</tr>
<tr>
<td>18</td>
<td>Orphans and vulnerable children</td>
<td>Guidance Track</td>
</tr>
<tr>
<td>19</td>
<td>Infection control</td>
<td>Care Track</td>
</tr>
<tr>
<td>20</td>
<td>Care and nursing principles</td>
<td>Care Track</td>
</tr>
<tr>
<td>21</td>
<td>Care for the caregiver</td>
<td>Compulsory</td>
</tr>
<tr>
<td></td>
<td><strong>Part 5 – Legal and policy issues (Outcome 5)</strong></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Aids and the law (Only selected sections – see Tutorial Letter 102.)</td>
<td>Compulsory</td>
</tr>
<tr>
<td>23</td>
<td>AIDS and the workplace</td>
<td>Leave Out</td>
</tr>
</tbody>
</table>
CHAPTER 1: HIV and AIDS – A brief history

1.1 The birth of a new epidemic
- Aids was first reported in South Africa in 1983, and it was diagnosed in two homosexual men
- Dr. Luc Montagnier of the Louis Pasteur Institute in France discovered the virus causing AIDS in 1983
- Dr. Robert Gallo of the US propagated the virus in cell culture in 1984, and also played a huge role in the discovery of the first HIV antibody tests, which became available in 1985
- AIDS is short for Acquired Immunodeficiency Syndrome; the disease is acquired because it is caused by a virus (HIV or the human immunodeficiency virus)
- Immunodeficiency refers to the inability of the immune system to defend itself against infections
- A syndrome is a medical term for a collection of specific signs and symptoms that occur together and that are characteristic of a specific condition

1.2 The origin of HIV
- Little is known about the origins of any human virus, let alone HIV
- Many theories were disproved over the years, however the idea that the virus crossed the species barrier from primates to humans was correct
- It was discovered that HIV (the human virus) was related to SIV (the simian immunodeficiency virus), found in primates
As seen in Figure 1.1, HIV can be further divided into HIV Type 1 and 2
- HIV-1 has been classified into 3 groups: M (major), O (outlier) and N (non-M and non-O)
- The world epidemic is currently dominated by the M HIV-1 viruses
- The dominant virus in Southern Africa is HIV-1 subtype C
- HIV Type 2 (HIV-2) is mostly restricted to West Africa
- HIV-2 is less pathogenic than HIV-1, and its progression to disease is slower
- An ancestor of HIV-1 group M virus was transmitted from a chimpanzee, sometime around the 1930s, in equatorial West Africa
- HIV-1 group N probably originated from gorillas
- HIV-2 groups A, B and G originated from the sooty mangabey monkeys

1.3 The global AIDS epidemic
- Sub-Saharan Africa remains the most heavily affected region in the world
- HIV incidence is the percentage of new cases of infection in a defined period of time (usually in one year); this percentage is calculated by dividing the number of new infections by the number of previously uninfected people
- HIV incidence is very difficult to measure
- HIV prevalence is the percentage of people living with HIV (as a proportion of the total population) at a specific time
- HIV prevalence is measured based on data from a combination of the following surveys: antenatal clinic surveillance of pregnant women, population and community-based surveys, studies among specific groups who are involved in high-risk behavior and reports of AIDS-related deaths
- Antenatal (pre-birth) surveillance programme involves the annual testing of the blood of pregnant women in the public health sector who visit antenatal clinics
- The surveillance is anonymous and unlinked
- National household surveys consist of testing large samples of the national population, with their informed consent; those surveys are useful for assessing HIV trends in a country and for providing the prevalence of HIV in terms of age, sex, race and geographical areas
- It is impossible to know exactly how many people are infected with HIV at any given time, and only estimates can be given

1.4 The world’s response to the AIDS epidemic
- In South Africa, AIDS was seen by the apartheid government as a ‘gay’ disease, that would ‘sort itself out’
- The first major step was the creation of the National Aids Convention of South Africa (NACOSA) in 1993
- The Mandela government refused to provide AZT to pregnant women to prevent mother-to-child transmission in 1998 (four years after it was proven to be successful in the USA)
- During the Mbeki era, antiretroviral therapy was refused for pregnant women; eventually, in 2002, the South African High Court ordered the government to make nevirapine available to pregnant women, to prevent mother-to-child transmission of HIV
- New clinical guidelines for the management of HIV and AIDS, as well as guidelines to prevent mother-to-child transmission, were implemented on 1 April 2010
- Worldwide, no other virus has led to so much research and new developments than HIV
- In 1994, AZT (Zidovudine) was the first drug to be used for antiretroviral therapy, and it was recommended to pregnant women infected with HIV in the USA
- In 1995, the use of combination antiretroviral therapy or HAART was introduced, and two years later, the number of deaths due to AIDS began to decline in developed countries
- Great effort was put into developing ways to prevent HIV infection, such as vaccine research, the development of an effective microbicide and male circumcision research

CHAPTER 2: HIV and the Immune System

2.1 The Immune System
- Has several lines of defense
- The first line of defense of the body is made up of the physical barriers (e.g. the skin), which are non-specific defenses (they will not keep pathogens out)
- The second line of defense: when the skin is broken and pathogens enter the body, there will usually be an inflammatory reaction at the area of the entry
- The inflammation is a wake-up call for the innate immune system to take over and deal with infectious agents or pathogens that entered the body (also a non-specific response)
- The innate immune system consists of plasma proteins and white blood cells (leukocytes)
- Plasma proteins identify invaders, assist antibodies with killing pathogens, call phagocytes (‘eating cells’) to the site of infection (so that they can eat the invader) or directly attacking and killing the enemy; one of the best known plasma protein is interferon (usually produced when the body is infected by a virus)
- White blood cells (leucocytes): the most important group is called the phagocytes, and their role is to rush to an infection site and devour the invading organisms. Macrophages (‘big eaters’) and neutrophils patrol the body, looking for invading organisms.

- The third line of defense (adaptive or acquired immune system): specifically designed for their task; this immune response has four phases: (1) recognition and warning, (2) mobilization and battle, (3) demobilization and (4) active and passive immunity

- (1) Recognition and warning: the antigens of a pathogen can be used by the body’s immune system to recognize foreign pathogens from outside the body, and to manufacture appropriate immune cells that can effectively combat the pathogens and destroy them

- When a pathogen has previously attacked a person, that person already became immune to that specific disease

- The immune system has a memory of all previous known antigens, stored in the memory cells of the immune system (memory T cells, manufactured by the thymus gland, and memory B cells, manufactured by the bone marrow)
• Some cells of the innate immune system act as antigen-presenting cells (APCs); they grab a part of the antigen from the invaders, and present it to the T cells
• Dendritic cells are the most important antigen presenting cells, being able to present antigens to both CD4+T cells and CD8+T cells
• (2) Mobilization and battle: Lymphocytes, a special type of white blood cells, are the main role players of the acquired immune system; they are subdivided into two main groups, namely T cells and B cells
• CD4+T cells (helper T cells) and CD8+T cells (killer T cells) are the main T cells involved in the mobilization of the immune system and killing of pathogens
• T cells recognize antigens of foreign pathogens by their shapes
• CD4+T cells regulate the innate and acquired immune responses, and help determine which types of immune response the body needs to combat a certain pathogen
• CD8+T cells kill infected cells
• B cells can recognize pathogens without the need for pathogens to be processed first, before the antigen can be recognized
• B cells divide many times and produce huge numbers of plasma B cells, which, in turn, start mass producing antibodies against the specific antigen
• Antibodies swarm around a pathogen and attach themselves to the antigens of the pathogen for which they were designed, completely covering their surface and acting as a shield between the virus and its potential host cells, thus preventing infection
• (3) Demobilization: the suppressor T cells order the CD4+T cells to stop mobilizing the immune system and the CD8+T cells cease their attacks and release a substance to stop B cells from making more antibodies
• (4) Two forms of immunological memory: passive short-term memory and active long-term memory
• Active long-term memory follows infection by a pathogen; some of the surviving T cells and B cells become memory T and memory B cells, and they will forever remember the specific antigen
• There are two kinds of long-term immunity: cell-mediated (T cells are only formed after the pathogen has already infected some of the body cells) and humoral immune responses (B cells are part of this response, where antibodies are produced to recognize and neutralize the pathogen before it can infect the body’s cells)
• Active immunity can also be generated by immunization (vaccination)
• Passive immunity is the short term immunity that a newborn gets from its mother (through IgG antibodies and breastfeeding)
- Protective passive immunity can also be given to adults by injecting them with antibody-rich serum to provide short-term protection; this passive immunity acts quicker because it doesn’t depend on the person’s immune system to first make its own antibodies
- HIV is an acquired condition, in the sense that a person is infected by (or acquires) a virus, which causes an immune deficiency

2.2 The Human Immunodeficiency Virus (HIV)

- The immune cells that are most affected by HIV are the CD+4T cells, for their numbers decline gradually, and are eventually drained from the system
- A virus is the smallest member of pathogens
- Viruses cannot reproduce or replicate themselves without the help of other cells
- Viruses attach themselves to cells and hijack them, causing those cells to reproduce the virus instead of reproducing themselves
- A specific virus can only infect cells that have the correct receptor cells on their surfaces; this makes the viruses highly specific
- Viruses (especially retroviruses) change, or mutate, so quickly that sometimes previously produced antibodies no longer fit onto the antigens of the virus
- HIV is a retrovirus, and it is roughly circular in shape; it can only be seen under an electron microscope
- The core or nucleus of HIV is cone shaped, and it contains the genetic material of the virus (single stranded RNA), as well as several enzymes (reverse transcriptase enzyme, protease enzyme and integrase enzyme)
- Those enzymes help in the copying of the virus inside the host cell, and are injected (along with the viral genetic material) into the host cell during infection
- The core membrane of the virus contains various unique proteins or antigens that are specific to the HI virus (such as p24)
- HIV directly attacks and infects the CD+4T cells, slowly reducing their number and weakening the immune system’s ability to fight against the attack of other pathogens that it would normally be able to kill (these co-infections are called opportunistic infections)
- HIV can be transferred through an intact mucous membrane in the vagina and elsewhere, because of the Langerhans cells, which act as APCs (antigen-presenting cells), but in the case of HIV, they actively spread the virus in the body and CD+4T cells in an attempt to warn them
- Steps of infection and replication of the HI virus:
1. The HI virus attaches to the CD4+T cells’ receptors and co-receptors
2. The CD4+T cell and HI virus join membranes
3. The HI virus injects its RNA and enzymes into the CD4 cell
4. Viral RNA is changed into proviral DNA through a process called reverse transcription
5. The proviral DNA joins with the cell’s DNA in the core of the cell, with the help of the integrase enzyme
6. The virus uses the host cell’s machinery to replicate RNA to manufacture new viruses
7. The viral RNA and viral proteins assemble into more HI viruses with the help of the protease enzyme; the new viruses break free from the cell, killing it and infecting more cells

- HIV is able to mutate rapidly because of (a) the introduction of mutations into the viral genome during the reproduction, and (b) recombinations between viral genomes that shuffle these mutations
- The variability of HIV is due mainly to the inaccuracy of its genetic copying mechanisms and the tendency of this mechanism to make errors
- Approximately five errors are introduced every time an HI virus replicates (this is why different strains of the HI virus can be found in one HIV infected person)
- Some of the HIV subtypes also recombine to form circulating recombinant forms (CRFs)
- Recombinant viruses are generated when two viruses enter the same cell
- HIV strains are classified into one of three groups, namely M, N and O
- Group M is divided into the following subtypes: A, B, C, D, F, G, H, J, and K; there are many group M viruses that cannot be placed within the existing subtypes, and they are generally referred to as unique variants or unclassified recombinants
- There are currently over 40 recombinant forms in circulation
- Southern Africa is essentially driven by HIV-1 subtype C viruses
- Equatorial West/Central Africa contains just about every known subtype, with circulating recombinant forms and unique recombinant forms; this is also where it is believed that HIV originated
- HIV-2 is classified into genetic subtypes A, B and G, and are less pathogenic than HIV-1 infections
- It is important to know what the predominant subtype of HIV is in a specific part of the world, for vaccine development
- In the absence of antiretroviral therapy, the average time for an infected person to develop AIDS is eight to ten years
• If a person is not treated with antiretroviral drugs, they usually die within 18 months to two years after the diagnosis of AIDS
• Possible reasons why HIV infection progresses faster in some individuals than in others: different strains of HIV; different viral counts in the blood; different human bodies respond differently to the virus; the general health of a person affects the course of the disease

CHAPTER 3: Transmission and Prevention

• HIV infection is transmitted primarily by sexual intercourse, by HIV infected blood passing directly into the body of another person and by a mother to her baby during pregnancy or childbirth, or as a result of breastfeeding
• HIV is highly concentrated in blood, semen and vaginal fluids
• HIV is present in saliva, tears, sweat and urine, however the concentration is too low for successful transmission

3.1 Sexual transmission of HIV infection

• HIV infection is transmitted primarily through unprotected penetrative vaginal or anal intercourse, and through oral sexual contact under certain conditions
• HIV is transmitted when the virus enters a person’s bloodstream via the body fluids of an infected individual
• Women are more likely than men to become infected with HIV during unprotected vaginal intercourse, because, as the recipients of semen, women are exposed to semen for a longer time
• A woman also has a larger area of mucosa exposed to the partner’s secretions during sexual intercourse
• Many women may be unaware that they have a cervical or vaginal condition that facilitates the transmission of HIV
• Transmission of HIV is more likely to occur just before, during or immediately after menstruation because of the large, raw area of the inner uterine lining that is exposed
• Younger women are especially vulnerable to HIV infection because their genital tracts are not yet fully mature, their vaginal secretions aren’t so copious and they are more prone to lacerations of the vaginal mucosa
• Women become more vulnerable to HIV infection after menopause due to thinning and increasing dryness of the mucosal walls
• Women acquire HIV infection at least five to ten years earlier than men
• The high prevalence of intergenerational sexual partnerships may play an important role in young women’s disproportionate risk of HIV infection
• Individuals who have sexually transmitted infections (STIs) that cause genital ulcers and discharge are particularly prone to HIV infection; these conditions create openings in the epithelial barrier through which HIV can move, and discharges result in genital inflammation which attracts numerous immune cells with CD4+T cell receptors to the site of infection
• The effect of STIs on the probability of HIV transmission is generally greater when STIs are symptomatic
• HIV and other sexually transmitted infections are often more common in communities living in depressed socio-economic conditions
• High unemployment rates force men and women to migrate to cities, where they establish new sexual networks
• Tradition often accords a low status to women, and they are denied the authority to negotiate safe sex practices
• Extreme poverty forces women into selling sexual services
• Disempowered people often lack health-seeking behaviours
• Alcohol abuse lowers inhibition and compromises sensible decision making
• Several factors contribute to the chances of contracting HIV infection: frequency of sex, multiple sex partners, condom use, immunological status, the presence of other STIs, trauma or bleeding during sex and male circumcision
• HIV infected people are most infectious soon after becoming infected with the virus (during seroconversion) and during the final phase of AIDS, because the viral load in their blood is very high at these times

3.2 Transmitting HIV through contaminated blood
• The HI virus can be transmitted when a person receives HIV contaminated blood in a blood transmission, when a person uses needles that are contaminated with HIV-infected blood to inject drugs, or when someone is injured with blood-contaminated needles, syringes, razor blades or other sharp instruments
• The greatest risk of HIV infection from transfused blood arises from the window period of infectivity; the window period is the period between infection with HIV and detection of antibodies or virus particles by a laboratory test
• All blood donations in South Africa are screened for viral nucleic acid (a part of the virus itself) with a PCR procedure (also called nucleic acid testing or NAT)
• The South African National Blood Service (SANBS) try to obtain safe blood supplies by recognizing that the voluntary, unpaid donor, who donates regularly is the safest donor; by using information on epidemiology and risk
behavior to develop criteria to identify donors who are unlikely to be infected with HIV; and by not establishing donor clinics in areas with a high prevalence of HIV infection

- HIV is easily transmitted when needles are shared, because drug users usually inject drugs directly into their bloodstreams (and in order to make sure that the needle struck a vein, they first draw blood into the syringe, before they inject the drug)
- HIV can also be transmitted through tattooing with needles, ear piercing and ritual circumcision or scarification
- Healthcare workers also run the risk of being infected with HIV due to accidents (such as HIV infected blood accidentally splashing into the eyes or mouth of the caregiver)
- There is a small but insignificant risk of transmission of HIV due to occupational exposure
- Post-exposure prophylaxis (PEP) in the form of antiretroviral medication should be made available to all healthcare workers who have sustained needle-stick injuries or other accidents with HIV-infected blood and who are HIV uninfected at the time of the injury
- The risk of infection is much greater for hepatitis B than it is for HIV
- As soon as the HI virus in no longer in a body fluid, it becomes extremely fragile and dies (especially when exposed to oxygen, heat and dryness)
- The HI virus can survive and be infectious outside the body for up to 24 hours, as long as it remains in some body fluid, such as blood

### 3.3 Mother-to-child transmission of HIV (or vertical transmission)

- One of the major causes of HIV infection in children
- HIV can be transmitted from an infected mother to her baby via the placenta during pregnancy, through blood contamination during labour and delivery, or through breastfeeding
- It is more likely that a mother will pass the HI virus if (1) she becomes infected with HIV just before or during the pregnancy, or during breastfeeding, and if (2) she has advanced, symptomatic HIV disease with a high viral load, a low CD4+T cell count and symptoms of AIDS
- Generally speaking, if a mother has a low viral load (<1000 viral particles/ml) during pregnancy, childbirth or breastfeeding, the likelihood of transmitting the virus to her baby is low
- Antiretrovirals play an important role in decreasing the viral load in the mother’s blood or breast milk and keeping the baby safe
- Transmission of HIV can also occur in utero, if the mother has a high viral load
In women who have more advanced HIV disease, pregnancy may cause more rapid progress to AIDS.

Mother to child transmission of HIV during pregnancy can be reduced by:
- Preventing new HIV infections
- Preventing and treating sexually transmitted infections
- Give nutritional supplements and multivitamins
- Provide prophylactic antiretroviral therapy from 14 weeks of pregnancy or lifelong antiretroviral therapy as soon as possible
- Encourage frequent follow-up visits to the clinic
- Perform foetal monitoring with non-invasive procedures
- Offer PCP (pneumocystis pneumonia) and TB (tuberculosis) prevention prophylaxis if necessary
- Offer counseling on safer sex practices, family planning, postnatal contraception and partner testing
- Provide guidance on safe infant feeding practices

Mother to child transmission of HIV during labour can be reduced by:
- Provide antiretroviral therapy to the mother during labour and to the baby post delivery
- Avoid unnecessary artificial rupture of the membranes
- Avoid episiotomy (cutting of the vulva)
- Minimize trauma to the baby
- Perform an elective Caesarean section if possible

Mother to child transmission after the birth can be reduced by:
- Avoiding trauma to the newborn
- Wiping away secretions from baby’s face
- Provide nevirapine (ARV medication) to the baby and counsel the mother on continuation of nevirapine
- Counsel the mother about alternatives to breastfeeding

It has been established that the optimum period to exclusively breastfeed a baby is six months

Mother-to-child transmission of HIV may be prevented if breast milk is expressed and pasteurized

If a mother decides to use replacement feeding, this should be done exclusively and all breastfeeding should be avoided

Complementary foods can be introduced after 6 months

Condoms are the best choice for contraception because they also prevent HIV transmission during sexual intercourse.
• HIV-infected mothers who breastfeed should be encouraged to use condoms to prevent re-infection with new strains of the virus

3.4 Myths about the transmission of HIV

HIV is NOT transmitted through the following:

- Airborne routes, such as coughing and sneezing
- Casual skin contact, such as handshaking and hugging
- Sharing food, water, plates, cups, spoons, toilet seats, showers or beds
- Sharing clothing, towels and bed linen
- Public swimming pools
- Pets or insects, such as mosquitoes, bedbugs or moths
- Playing team sports
- Restaurants and cafeterias
- Living with and AIDS person and sharing household facilities (take necessary precautions: do not share shaving razors or toothbrushes, avoid contact with body fluids and cover possible blood spills with a bleach solution)
- Social contact between school children and sharing school facilities
- Kissing
- Donating blood

The virus is transmitted only when body fluids are exchanged in sexual intercourse, when a person is exposed to contact with HIV contaminated blood and from a pregnant or breastfeeding HIV-infected mother to her child.

3.5 Prevention of HIV

a) Behavioral interventions

• Focus on safer sexual practices and harm reduction in injecting drug use
• Prevention of HIV infection due to sexual transmission is based on the following strategies:
  - Total abstinence from sex
  - Postponing or delaying sexual intercourse
  - Reducing the number of sexual partners
  - Faithfulness to one partner
  - Correct and consistent use of condoms in relationships where partners are not mutually faithful
• These choices are not always under a person’s control (many disempowered women and girls don’t have a say in sexual relationships)
• Preventing HIV infection in injecting drug users are based on harm-reduction strategies such as:
  - Needle-exchange programs
- Wide availability of clean needles
- Education of drug users on the prevention of HIV infection
- Methadone treatment

b) Biomedical intervention

Four of the most effective biomedical interventions are: male circumcision, microbicides, ARV’s and vaccines.

- Male circumcision:
  - Protects against several diseases including urinary tract infection, syphilis, penile cancer and HIV
  - Male circumcision should never be seen as sufficient protection against HIV
  - The area under the foreskin is a warm, moist environment that may enable some pathogens to persist and replicate, especially when penile hygiene is poor
  - Tissue from the inner surface of the foreskin mucosa further contains HIV-1 receptors which transfer the virus to the lymph nodes
  - Counselors should be sensitive when they promote male circumcision and they should take cultural beliefs and practices into account
  - Informed consent, confidentiality and absence of coercion should be assured

- Microbicides:
  - A microbicide is a substance that kills microscopic organisms such as bacteria, viruses and parasites
  - As a female controlled prevention method, microbicides would empower women to take control over their own sexual health
  - Researchers doubt that a microbicide will ever be able to provide 100% percent protection against HIV and other STIs

- Antiretrovirals (ARVs)
  - The use of antiretrovirals is a well-proven method to prevent HIV infection from a mother to her baby, as well as to prevent HIV infection after occupational exposure and after rape or sexual assault
  - Pre-exposure prophylaxis (PrEP) is based on the principle of taking ARVs before exposure to HIV to prevent infection; timing is very important in order for this to be effective
  - Researchers believe that treating the HIV infected individual who is part of a discordant couple (where one partner is HIV infected, and the other is HIV free) will decrease the chances of the negative partner becoming infected
HIV Vaccines
- The vaccine will prevent infection or slow disease progression; it is not a cure
- There are three strategies for making vaccines: by using live weakened pathogens, by using killed whole organisms or by using purified proteins or polysaccharides
- Vaccines attempt to mimic two processes in which the immune system interacts with an infection: the humoral (or antibody) response, where the body produces antibodies that recognize a specific pathogen in the blood and neutralize its activity before it can infect the body’s cells, and the cellular response, where white blood cells (CD4+T and CD8+ cells) are formed after the pathogen has infected some of the body’s cells, in order to recognize and destroy the infected cells
- The ultimate HIV vaccine would have to stimulate both humoral and cellular responses
- Vaccine development has been hampered by the high genetic diversity of the virus, its ability to hide the places on its surface where antibodies could attach and the flexibility of HIV which hinders antibody recognition

c) Structural intervention
- Necessary where social, politic and economic structures make people vulnerable to HIV infection and restrict their access to prevention, treatment and care
- Will have to address the reduction of stigma and discrimination as well as violation of human rights
- Women in Africa are often dying of AIDS because they were too ashamed to go for HIV testing and to access ARTs, or they didn’t adhere their medication out of fear of discrimination

CHAPTER 4: HIV-associated Symptoms and Diseases

- If we measure the number of CD4+T cells, we would have a very accurate indicator of the current status of the HIV-infected person’s immune system
- The CD4+T cells count is the best predictor of how easily opportunistic infections will be able to take root in an HIV-infected person

4.1 The CD4+T cell count, the viral load and the stages of HIV infection

- A higher viral load will go hand in hand with a lower CD4+T cell count
- Disease progression will depend on the viral load and on the CD4+T cell count in the blood
The higher the viral load is, and the lower the CD4+T cell count is, the easier it will be for all kinds of infections to attack the body.

The CD4+T cell count can **decrease** in response to infections such as flu or herpes, stress, smoking or menstruation, and **increase** in response to exercise, positive living and antiretroviral therapy.

Any infection in the body results in an immune response to fight the infection; white blood cells will then be produced, and, as you know, the HI virus replicates in white blood cells – thus, the viral load will increase (the same process happens when a person is vaccinated).

**4.2 The stages of HIV infection**

HIV infection can be divided into the following clinical stages: primary HIV infection (or pre-clinical stage), clinical stage 1 (the asymptomatic latent stage), clinical stage 2 (the minor symptomatic stage), clinical stage 3 (the major symptomatic stage) and clinical stage 4: the severe symptomatic stage (AIDS-defining conditions).

- **Primary HIV infection:**
  - Begins as soon as seroconversion has taken place
  - Seroconversion: the point at which a person’s HIV status converts or changes to from being HIV negative to HIV positive
  - The HIV viral load is usually very high during the primary phase, due to the very rapid multiplication and replication of the virus after infection
  - The viral levels reach a steady state 16 to 24 weeks after infection (this is called the set point)
  - The set point is reached after the immune system has developed HIV antibodies and begins to attempt to fight the virus
  - Most HIV infected people in the primary stage of infection are asymptomatic, but some develop acute retroviral syndrome, which is characterized by flu-like symptoms

*An undetectable viral load means that the virus is still in the body, but at very low levels.

- **Clinical stage 1: The asymptomatic latent stage:**
  - Most infected individuals do not display any symptoms
  - Infected individuals are often not even aware that they are carrying the HI virus
  - A positive HIV antibody test is often the only indication of HIV infection during this latent stage
  - The only symptom that is sometimes seen in Clinical stage 1 is persistent generalized lymphadenopathy or PGL (when lymph nodes are swollen or...
enlarged to more than 1 cm in diameter and they occur in at least two sites like the neck, below the jaw or in the armpits)
- This stage is associated with a CD4+T cell count > 500 cells/mm$^3$

× **Clinical stage 2: The minor symptomatic stage**
  - Minor and early symptoms of HIV disease usually begin to manifest
  - One or more of the following symptoms are usually present:
    - Moderate, unexplained weight loss
    - Recurrent respiratory tract infections
    - Herpes zoster (‘shingles’): Affects nerve cells and is characterized by an extremely painful skin rash on the face, limbs or body; it can also affect the eyes, causing pain and blurred vision
    - Recurrent oral ulcers
    - Angular cheilitis (cracks or splits on the lips and in the corner of the mouth)
    - Seborrhoeic dermatitis (itchy scaly skin condition)
    - Popular pruritic eruptions (itchy rash that occurs on the legs)
    - Fungal nail infections of the fingers
  - Associated with a CD4+T cell count between 350 and 499 cells/mm$^3$ (mild immunosuppression)

× **Clinical stage 3: The major symptomatic stage**
  - Opportunistic infections: caused by micro-organisms that do not normally become pathogenic (make a person sick) in the presence of a healthy immune system
  - Symptoms that are usually an indication of advanced immune deficiency:
    - Severe unexplained weight loss (more than 10% of body weight)
    - Unexplained chronic diarrhea for longer than one month
    - Unexplained persistent fever or night sweats for longer than one month, that don’t respond to antibiotics
    - Oral candidiasis (trush) is characterized by persistent creamy to yellow small plaques on normally coloured mucosa, which can be scraped off and by red patches on the tongue, palate or lining of the mouth
    - Oral hairy leukoplakia (small linear patches on the lateral borders of the tongue)
    - Pulmonary tuberculosis characterised by chronic symptoms (lasting for three or more weeks)
    - Severe bacterial infections (pneumonia, meningitis or bacteraemia)
- Acute necrotizing ulcerative gingivitis or necrotizing ulcerative periodontitis
  - CD4+T cell count of between 200 and 349 cells/mm$^3$ (advanced immunosuppression)

Clinical stage 4: The severe symptomatic stage (AIDS-defining conditions)
- It usually takes about 18 to 24 months for the major symptomatic stage to develop into AIDS in patients who do not receive antiretroviral therapy
- More persistent and untreatable opportunistic conditions and cancers begin to manifest themselves and the immune system deteriorates exponentially
- The following symptoms, conditions or opportunistic infections can occur in the AIDS patient:
  - HIV wasting syndrome: unexplained weight loss of more than 10% of body weight and visible thinning of the face, waist and extremities, plus either unexplained chronic diarrhea or unexplained prolonged fever
  - Bacterial pneumonia for two or more episodes within one year
  - Chronic herpes simples virus infections
  - Pneumocystis pneumonia (PCP)
  - Malaria
  - Oesophageal candidiasis (chest pain and difficulty swallowing)
  - Extrapulmonary TB
  - Kaposi’s sarcoma (rare form of skin cancer)
  - The cytomegalovirus (CMV)
  - CNS toxoplasmosis (protozoal infection of the brain)
  - Cryptococcal meningitis (fungal infection in the central nervous system)
  - HIV encephalopathy (memory loss, poor concentration, tremors)
  - Disseminated non-tuberculosis mycobacteria infections
  - Etc (see pages 68-71 of the prescribed book)

- High viral loads and CD4+T cell counts lower than 200 cells/mm$^3$

4.4 The prevention of opportunistic infections

The best way to prevent opportunistic infections is to strengthen the immune system with antiretroviral therapy

There are three ways to prevent opportunistic infections: (a) by preventing exposure, (b) by providing chemoprophylaxis, and (c) by immunization

(a) Preventing exposure by:
  - Assuring a safer water supply
  - Proper food hygiene
  - Prevent exposure to tuberculosis by proper education and by improving living conditions
- Malaria vector control in areas with a high incidence of malaria
- Safer sex practices

(b) Chemoprophylaxis
- The use of antimicrobial agents to prevent opportunistic infections
- Generally based on CD4+ T cell count
- Primary prophylaxis: prevents an opportunistic infection that has never occurred in the patient before
- Secondary prophylaxis: prevents the re-occurrence of infection
- Tuberculosis occurs when CD4+ T cell counts are less than 350 cells/mm³
- Co-trimoxazole (an antibiotic) is the drug of preference to give to all patients with HIV infection as soon as they show evidence of immune depression
- Tuberculosis is the most frequent life-threatening opportunistic infection among people with HIV infection
- Tuberculosis prevention reduced the risk of TB by 33% in HIV infected people
- CD4+ T cells are no longer used to initiate TB preventive therapy
- Populations particularly at risk who should be offered TB preventive therapy are miners, prisoners, TB contacts, healthcare workers and children

(c) Immunization
- HIV-infected people with severe immune depression should not receive vaccinations with live organisms
- Vaccines responses are poor when patients have a CD4+ T cell count <200 cells/mm³
- Vaccinations to be considered for adults:
  - Pneumococcal vaccination
  - Hepatitis B vaccination
  - Influenza (flu) vaccination
  - Hepatitis A vaccination
  - Human papillomavirus (HPV) vaccination
- Children with HIV infection should be fully immunized (no vaccines are contraindicated in HIV-infected children, with the exception of the TB vaccine, which should be carefully considered)
- All babies and children (healthy and symptomatic) should be immunized with the following vaccines:
  - Oral polio vaccine
  - Diphtheria, tetanus and pertussis
  - Mumps, measles and rubella
  - Hepatitis B vaccine
  - Haemophilus influenza type B
  - Pneumococcal vaccine
- Annual influenza vaccination
- Rotavirus

**4.5 Tuberculosis**

- The most common opportunistic disease in Africa
- The combination of TB and HIV is dangerous because:
  - An HIV-infected patient with a deficient immune system has a much greater risk of developing TB or having a latent infection reactivated
  - HIV shortens the time between exposure to the TB bacillus and the development of active TB
  - The mortality rate from TB is significantly higher in people who are co-infected with HIV
  - TB can probably shorten the time it takes for HIV to become final phase AIDS, and it can also worsen the condition of someone with AIDS
  - HIV-infected people have a much greater chance of developing extra-pulmonary TB
  - Miliary TB is more common in patients with HIV
  - TB can diminish the number of CD4+T cells in the body, while correspondingly increasing the HI viral load
  - The presence of HIV reduces the accuracy of the methods used to detect TB infection
  - The recurrence of TB is more common in HIV-infected individuals
  - Adverse or unwanted reactions to the drugs used to treat TB may be more likely in HIV-infected patients
  - Diagnosis of TB can be confused with the diagnosis of other HIV-related lung conditions
  - Development of multiple drug resistance in HIV-infected people
  - Drug interactions

**TB is an infectious disease** caused by a microorganism (the bacillus Mycobacterium tuberculosis) is spread by airborne particles when people with pulmonary or respiratory tract TB sneeze, cough, speak or sing

- The infected person is not likely to transmit the disease unless they also have TB of the lungs
- Development of TB:
  - **The primary stage**: occurs when an individual breathes in the TB bacilli and becomes infected, and the only evidence of infection is a positive skin test result. The TB bacillus usually remains dormant for a number of years, and the person shows no symptoms and cannot
infect others. 90% of people who become infected with TB will never become ill with TB.

- **Secondary or reactivation TB**: results from endogenous (from within) reactivation of latent infection, or from exogenous (from outside) re-infection. If the patient’s body can recover from this illness, the TB bacilli once again revert to dormancy.

- The infectiousness of a person with TB is determined by the concentration of TB bacilli in the lungs, and their spread into the air surrounding that person.

- The most infectious cases are those with a positive smear by microscopy.

- TB is the only major AIDS-related opportunistic infection that endangers HIV-negative people.

- **Symptoms of pulmonary TB**:
  - Persistent cough for two weeks or more
  - Unexplained weight loss
  - Drenching night sweats
  - Fever for more than two weeks
  - Sputum production which may occasionally be blood-stained
  - Shortness of breath and chest pain
  - Loss of appetite
  - A general feeling of illness
  - Tiredness, loss of motivation and loss of strength

- TB can be diagnosed by: chest X-rays, sputum for acid-fast bacilli, TB sputum culture, other tissue cultures for extra-pulmonary TB and a tuberculin skin test.

- A sputum examination for acid fast bacilli (AFB) is the most important test for diagnosing pulmonary TB; if AFB are detected, then the person is said to be smear-positive (active TB with large numbers of TB bacilli in the lungs).

- Chest X-rays are often questionable because many diseases mimic TB on chest X-rays (which may lead to an incorrect diagnosis) and they also do not tell if a person is infectious.

- TB can be completely cured in almost every case of infection if the patient completes a course of antibiotic treatment.

- HIV-infected people are treated for TB in exactly the same ways as HIV-uninfected people:
  - Pulmonary and extra-pulmonary TB are treated with the same anti-TB drugs.
  - The treatment regimen for first-time TB patients differs from that of second time patients or those in whom treatment has failed.
  - A combination of drugs is always used.
  - First time users receive therapy for at least six months.
  - Second time users receive therapy for at least eight months.
Treatment recommendations are that TB treatment is given daily (for seven days)
- Compliance is absolutely essential to avoid multi drug resistance
- Directly observed treatment short course is indicated for individuals who find it difficult to take every dose of medication
- TB treatment should not begin before there is a definite diagnosis of TB
- Sputum samples should be negative after three to five months
- HIV-infected TB patients should receive co-trimoxazole to reduce the risk of other opportunistic infections
- ARVs commenced during TB treatment may reduce HIV viral loads, reduce the rate of AIDS-defining illnesses and have a pronounced effect on mortality

- Combinations and dosages are different for TB treatment of children under 8 years of age
- Resistance to anti-TB drugs: this means that the standard anti-TB drugs can no longer be used for patients who are infected with resistant strains of the bacilli; we are currently dealing with multi-drug resistant TB (MDR TB) and extensively drug-resistant TB (XDR TB)
- Multi-drug resistant TB develops when the treatment for TB is inadequate or when patients do not comply with the treatment. MDR TB is present if a patient does not respond to treatment with a drug regimen containing isoniazid and rifampicin and if there is clinical and laboratory evidence of resistance to these drugs.
- MDR patients should be referred to a TB specialist centre for correct management and therapy
- Extensively drug resistant TB is highly virulent and resistant to most or all the available TB drugs. XDR TB patients have limited treatment options and a very high mortality rate.

4.6 Sexually transmitted infections

- are not opportunistic infections
- people with STIs, especially those with genital ulcers, are especially susceptible to HIV infection
- the concentration of HI viruses is also very high in genital discharges and secretions, which are increased by STIs
- HIV may also alter the natural history of some STIs and may make them more severe and difficult to treat
- The probability of HIV transmission is generally greater when the STIs are symptomatic
- Treatment of STIs:
- The diagnostic approach (ideal): establish a definitive diagnosis of the STI by identifying the causing organism, and treat the infection with absolute precision
- The syndromic approach: recognizing clinical signs and patient symptoms, and prescribing treatment for the major causes of that syndrome

- Advantages of the syndromic approach: easy to use, inexpensive, does not require highly trained STI specialists, does not require laboratory support and it allows treatment of the infection at the time of the first visit
- Disadvantages of the syndromic approach: overtreatment of patients and the fact that it does not address the problem of people with asymptomatic infections who do not come for treatment

CHAPTER 5: HIV Tests

The diagnosis of HIV infection should be based on a combination of the following: assessment of the clinical history of the patient, identification of risk factors, clinical assessment of signs and symptoms and testing for HIV.

5.1 HIV testing as a diagnostic tool

- The first kits for antibody testing became available in 1985
- Those tests were designed on the ELISA principle, which is the most widely used test for detecting viral antibodies in the blood
- The sensitivity of a test refers to its ability to pick up very low levels of antibodies
- The specificity of a test refers to its ability to ignore the presence of antibodies that are not specific (able to distinguish specific HIV antibodies from other antibodies)
- HIV testing is carried out to: screen donated blood; research the transmission patterns and prevalence of the virus; diagnose HIV infection in individuals; monitor progress of the infection; monitor responses to ART; detect drug failure
- It is hoped that people who know they are sero-negative will be motivated to use preventive measures to prevent future infection, and that people who are sero-positive will apply prevention methods and access care, support and treatment
- Two main approaches to diagnosing HIV:
  o Identification of the virus: some tests can detect the p24 viral antigen in blood, while other tests can detect viral nucleic acids in the blood
  o Detection of an immune response to HIV: by production of antibodies and a cellular response including specific CD4+T cells responses
- A combination test is also available, which is based on the detection of HIV antibodies, as well as p24 virus antigens

5.2 HIV antibody tests

- Usually done on blood; HIV antibodies can also be detected in other body fluids such as saliva and urine
- Two of the best known HIV antibody tests are the ELISA test (for diagnostic purposes) and the Western Blot tests (as a confirmatory test)
- These tests cannot trace the virus in the blood, but they react to the HIV antibodies that are formed when the immune system attempts to protect the body against the virus
- An antibody test only becomes positive after the host has mounted an immune response and has seroconverted
- ELISA antibody tests can detect antibodies to HIV-1 and its variants, as well as to HIV-2
- These tests are done in a laboratory, however the ELISA test is also available in a rapid format, which does not require laboratory facilities
- The ELISA antibody test:
  - Is widely available and inexpensive
  - Is highly sensitive and reliable; it produces very few false negative results
  - Third-generation ELISA tests can detect antibodies three weeks (approx. 22 days) after infection, while fourth-generation ELISA tests can detect antibodies after approximately 16 days
  - An HIV antibody positive test should always be confirmed by means of a second confirmatory test to exclude the occurrence of a false positive result
  - The window period is the time between HIV infection and the appearance of detectible antibodies to the virus
- Rapid HIV antibody tests:
  - ELISA tests are also available as rapid tests
  - Can be performed outside of a laboratory
  - Results are usually available within 10 minutes
  - Easy to use, less invasive, inexpensive, easily transported and can be stored at a whole range of temperatures
  - All positive rapid HIV antibody test results should be confirmed with a second rapid test, or with a laboratory based ELISA antibody test
  - Saliva rapid tests are painless, less intrusive, avoid the potential hazard of a needle-stick injury to the person doing the test and it can be used where blood is difficult to take (e.g. children, intravenous drug users)
  - It takes about 20 minutes to indicate whether HIV antibodies are present in the saliva
Saliva test sensitivity is good, but positive results must be confirmed by conventional ELISA testing on blood before a patient can be diagnosed as HIV positive.

- The Western Blot antibody test:
  o More expensive and less widely available than ELISA
  o Never used as a screening test (to diagnose HIV infection), but only as a confirmatory test which is used under special circumstances

5.3 HIV virus tests

- Detect particles of the actual HIV virus in the blood
- Do not rely on the development of antibodies
- Yield a positive result much sooner after infection
- Diagnosis of HIV using viral tests is based on:
  o Detection of viral antigens such as p24
  o Detection of viral nucleic acid
  o Isolation of the virus in lymphocyte cell culture
- Two of the best known HIV viral tests are the p24 antigen test and the HIV PCR techniques
- P24 antigen test detects the p24 antigen in fluids
- HIV PCR technique is used to detect the virus nucleic acid in its RNA or DNA form
- A HIV PCR technique that detects proviral DNA is called a quantitative PCR, while a HIV PCR technique that detects viral RNA is called quantitative PCR (or a viral load test)
- The HIV p24 antigen test:
  o Detects the predominant HIV antigen (p24) in the blood
  o P24 is the main protein of the core of the virus
  o P24 can be detected in blood shortly (16 days) after HIV infection
  o Useful when early detection is important
  o Only sensitive in the very early phase of HIV infection when the viral load is high
- The dried blood spot (DBS) test:
  o Convenient way to test HIV infection in young babies
  o The test reacts to the p24 antigens in the baby’s blood
  o Inexpensive, easy to use, less invasive and less hazardous for healthcare workers
  o A DBS sample has a longer lifespan with reduced need for refrigeration
  o Has high levels of sensitivity and specificity
- Proviral DNA detection:
  o A qualitative PCR technique is used to detect the presence of proviral DNA in cells
  o The DNA PCR is especially useful when early diagnosis is required
- DNA PCR test is also used to diagnose babies younger than 18 months
- Estimated window period for a DNA PCR test is 16 days

  - **Viral RNA detection:**
    - A quantitative PCR technique detects the presence of viral RNA in fluids
    - Can be used in early detection of HIV infection (newborn babies or occupational exposure)
    - RNA may be detected within 5 days of infection
    - Measures how many viral copies there are in the blood
    - Mainly used to measure the response to antiretroviral therapy, to monitor progress, to test new therapies and detect drug failure

- HIV tests such as ELISA or rapid tests cannot be used to test babies younger than 18 months
- A person who received an HIV vaccine will test false positive on HIV antibody tests

### 5.4 HIV testing algorithms

- HIV testing algorithms (protocols) for individuals and groups for HIV counseling and testing set by the Department of Health:
  - All individuals who consent to an HIV test
  - HIV-exposed babies younger than 18 months
  - HIV-exposed children older than 18 months
  - Special cases (abandoned babies)
  - Child survivors of rape
  - Special populations (pregnant women, healthcare providers)

- **HIV testing algorithm for all HIV testing:**
  - Where consent has been obtained, a rapid HIV antibody test should be carried out
  - If the first test is negative, the client should receive appropriate post-counseling and encouraged to repeat the test three months after the negative result to exclude the possibility of the window period
  - If the first HIV rapid antibody test is positive, a confirmatory test should immediately be performed
  - A client is considered to be HIV infected if the second rapid test is also positive
  - Give the results and provide post-test counseling and refer for appropriate individualized services (CD4+T cell count, TB screening, clinical staging, etc)
  - If the two rapid tests are discordant, blood should be drawn from a vein and sent to a laboratory for an ELISA antibody test
  - The client should be asked to return within five days for the results
HIV testing algorithm for HIV-exposed children younger than 18 months:
- If the mother is infected, start the baby on co-trimoxazole prophylaxis and do an HIV DNA PCR (both when the baby is six weeks or older)
- DBS samples can also be used
- Counsel the mother on HIV testing and offer her a rapid test (with consent)
- If the baby’s HIV DNA PCR is positive, do a RNA PCR (viral load) to confirm status and refer baby for ART
- If the HIV DNA PCR is negative, stop the co-trimoxazole prophylaxis if no breastfeeding occurred in the previous six weeks; if the child is still breastfeeding, repeat the HIV DNA PCR six weeks after the cessation of breastfeeding

HIV testing algorithm for HIV-exposed children older than 18 months:
- Test using the rapid HIV antibody test
- If the result is positive, it should be confirmed with another rapid test
- If the rapid test is negative, the child is HIV uninfected

HIV uninfected breastfed babies must receive an age appropriate HIV test six weeks or more after breastfeeding is stopped, or if clinical features of HIV infection develop during breastfeeding

CHAPTER 6: Antiretroviral therapy (ART)

The first antiretroviral drug, AZT (zidovudine) was approved for use in 1987. In 1996, the use of triple-drug therapy or HAART (highly active antiretroviral therapy) was introduced, and changed the status of AIDS, from a disease without much hope to that of a manageable disease.

6.1 Clinical assessment
- once a patient has been diagnosed HIV positive, it is important to do a full clinical assessment of his or her health
- clinical assessments also help the healthcare worker to make decisions on when to start prophylaxis (treatment to prevent opportunistic infections) and when to start ART (antiretroviral therapy)
- regular medical and growth checks are important for monitoring the health of HIV-infected children

Assessing immune status and viral load
- in order to manage HIV infection, it is important to monitor the individuals’ level of CD4+T cell lymphocyte count, as well as the viral load in the blood on an ongoing basis
- CD4+T cells are important to evaluate the status of the immune system; indicate when to start preventing or treating opportunistic infections and diseases; and to indicate when to start ARV treatment
- A viral load test (RNA PCR) is important to assess the severity of HIV infection; to prescribe relevant antiretroviral medication; to measure the patients’ response to ART; and to detect ARV resistance
- The viral load is usually undetectable after six months of treatment

6.2 Goals of antiretroviral therapy (ART)

ART has the following 4 primary goals:

1. Virological: to reduce HIV viral load as much as possible, for as long as possible
2. Immunological: to restore and/or preserve immunological function so as to improve immune functioning, reduce opportunistic infections and delay the onset of AIDS
3. Therapeutic: to improve the quality of the HIV-infected persons’ life
4. Epidemiological: to reduce HIV-related sickness and death, and to reduce the impact of HIV transmission in the community

ART is used mainly:

1. To treat established HIV infection (long term treatment)
2. To prevent HIV infection (short term treatment) e.g. preventing mother-to-child transmission and post-exposure prophylaxis after occupational exposure, rape or sexual assault

6.3 Classes of ARVs and their mechanisms of action

Revising viral enzymes:

- Reverse transcriptase enzymes: essential for completion of the early stages of HIV replication
- Protease enzymes: required for the assembly of new viral RNA and viral proteins, and for the maturation of fully infectious new viruses that bud from the CD4+T cells
- Integrase enzymes: assist with HIV DNA integration into the nucleus of CD4+T cells

The main classes of ARV drugs that interfere with the viral enzymes are:

- Reverse transcriptase inhibitors (NRTIs and NNRTIs)
  - Disturb the life cycle of the HIV virus by interfering with the reverse transcriptase enzyme in the early replication of the virus
  - Prevent the virus from changing its RNA to proviral DNA
• Protease inhibitors (PIs)
  o Interfere with the formation of new viruses by paralysing the protease enzyme and preventing the assembly and release of newly replicated HI viruses from infected cells

• Integrase inhibitors (not available in Southern Africa)
  o Interfere with the integrase enzyme and prevent HIV DNA to integrate into the nucleus of CD4+T cells, making the virus unable to replicate

• Entry inhibitors
  o prevent the virus from entering the target cells (very expensive and not available in Africa)

6.5 Guidelines for the use of ART

• Highly active antiretroviral therapy (HAART) with three antiretroviral agents is recommended for optimal results
• Single-drug regimens (monotherapy) should not be used for treatment of HIV infection, because it will most likely lead to rapid development of drug resistance
• Dual therapy (treatment with two drugs) is currently used in the treatment of mother-to-child transmission of HIV
• HAART is recommended as the standard of care
• Fixed-dose combination pills (combining two or three drugs into one pill) are recommended as they reduce the pill burden and have the potential to improve adherence
• ART should be delayed until the patient is prepared to commit to long-term treatment and to maintaining good adherence to therapy. Current guidelines suggest that therapy should be initiated when:
  o the CD4+T cell count is less than or equal to 350 cells/mm³ irrespective of the clinical stage
  o on all patients with WHO Stage 4 symptoms irrespective of CD4+T cell count
  o MDR/XDR TB irrespective of CD4+T cell count

• The World Health Organisation (WHO) advocates a standardized drug regime approach:
  o two NRTIs plus one NNRTI; or
  o three NRTIs; or
  o two NRTIs plus one PI

6.6 Adverse effects of ART

- Early ARV side-effects that are common in the early stages of treatment include gastrointestinal and flu-like symptoms, headache, dizziness, vivid dreams, rash and hepatitis
- If there is a need to discontinue ART, all antiretroviral medications must be stopped together.
- Patients should be counselled about the possibility of immune reconstitution inflammatory syndrome (IRIS) that often occurs within the first three months of ART. IRIS is a condition in which the immune system begins to recover due to ARVs, but instead of getting better the patient initially gets sicker, because the immune system has now restored enough to respond to a previously acquired opportunistic infection with an overwhelming inflammatory response.

6.7 How to know if ART is effective

- Effectiveness of the treatment should be assessed by monitoring the HI viral load.
- We know that the treatment is effective if the viral loads are low (preferably to undetectable levels).

6.8 When to change treatment

- Antiretroviral medication should be changed if:
  - The patient shows intolerance of the medication
  - Drug toxicity occurs
  - Virological failure occurs (viral load increases or shows insignificant decrease despite treatment)

6.9 The development of drug resistant viruses

- Two main factors influence the development of drug resistance in HIV:
  - High genetic variability of HIV
  - The relative fitness of these variations in the presence of ARVs
- Previously untreated patients have a lot of viruses in their blood: wild-type (dominant viruses) and mutant viruses (make up the minority)
- When a patient adheres to their ART, the wild-type virus will be suppressed by the drugs, while the mutants will be ‘taken care of’ by the immune system.
- When a person does not adhere to their treatment, or when the treatment is inefficient, the majority of the wild-type viruses will be killed, but the mutants will gain fitness and replicate, which leads to them becoming the now dominant virus in the person’s blood.
- Mutations are drug-resistant; this will eventually lead to an increase in the viral numbers in the blood.
- Resistance to one drug, may lead to resistance to other drugs in the same class, which is also known as cross resistance.

6.10 Adherence to antiretroviral therapy
- an adherence level of at least 90% is needed to suppress the virus sufficiently, to avoid risk of mutation, and to prevent the development of drug resistant strains and drug failure

- reasons given for not adhering to ARVs:
  - Person-centered or psychosocial barriers (forgetfulness, bad planning, running out of ARVs, sharing ARVs with friends, depression, alcohol abuse, etc.)
  - Relationship between patient and healthcare worker (lack of healthcare support, lack of sharing information with the patient, no understanding of why they should adhere)
  - Practical problems (transport problems to the clinics, not enough food to eat with the ARVs, working shifts that makes taking ARVs difficult)
  - Medication related (side-effects, difficult treatment regime to follow)
  - Service-related barriers (clinics not having enough stock, healthcare workers on strike)
  - Stigma (secrecy, hiding of pills, non-disclosure, fear of community rejection)
  - Health control (fatalistic attitude, external locus of control)
  - Cultural aspects (using medicine from traditional healers)

- strategies for improving adherence to ARVs:
  - Don’t underestimate patient’s ability and intention to adhere
  - Fixed dosage regimes have higher adherence levels
  - Develop individualized plan to support patients
  - Use of teaching techniques, pamphlets and visual aids when explaining how to take medication
  - Reminder strategies might help some patients to adhere (alarm clocks)
  - Facilitate ARV users in skills to cope with stigma, negative attitudes and discrimination
  - Patients should be made aware of side-effects
  - Refer patients with financial problems to relevant social service departments for assistance and disability grants

6.11 Prevention of mother-to-child transmission

- ART shown to be the most effective

- criteria for starting ART in a pregnant woman:
  - CD4+T cell count of more than 350 cells/mm3 and WHO stage 1 or 2 disease should receive antiretroviral prophylaxis
  - CD4+T cell count of 350 cells/mm3 or less or who have WHO stage 3 or 4 disease should receive life-long antiretroviral treatment
- lifelong ART benefits the mother’s health, contributes to her survival and reduces mother-to-child transmission

- women who are on lifelong ART who become pregnant should continue with their ARV treatment

- antiretroviral prophylaxis given soon after birth to all HIV-exposed infants is effective in reducing mother-to-child transmission whether the mother is on ARV’s or not

6.12 Post-exposure prophylaxis after occupational exposure

- post-exposure prophylaxis (PEP) can significantly reduce the risk of HIV infection after percutaneous exposure to HIV-infected blood

- PEP with ARTs must start within 72 hours after exposure to reduce the chances of viral reproduction

- PEP should not be offered to HIV positive individuals

6.13 PEP after rape or sexual assault

- begin prophylactic treatment with ART as soon as possible (no later than 72 hours)

- rape survivor should be counselled and tested for HIV before ART is started

- in South Africa, rape survivors are provided with free antiretroviral drugs at public hospitals and clinics