

SESSION 1 THE BASICS OF HIV/AIDS IN AFRICA

Purpose

The purpose of this session is to provide students with basic information about HIV/AIDS: its causes, transmission, progression, management, and challenges.

Learning objectives

By the end of the session, students will be able to:

- Discuss the scale of HIV/AIDS globally and in their countries
- Outline the cause, transmission, and disease progression of HIV/AIDS
- List factors that affect the risk of transmission of HIV and increase vulnerability to HIV infection
- Outline stages of HIV/AIDS diseases and complications faced at each stage
- Discuss strategies for caring for and supporting people living with HIV/AIDS and challenges in managing HIV/AIDS

Note: This topic will need to be updated regularly with changes in HIV/AIDS and new research findings.

Prerequisite knowledge

- Basic science (biology, physiology)

Estimated time: 60 minutes

Outline

Content	Methodology	Timing
<p>Definitions of HIV and AIDS Magnitude of HIV/AIDS in Africa Prevalence of HIV/AIDS in the country and by region/district (if data is available) Trends by age and sex (if data is available)</p> <ol style="list-style-type: none"> 1. Modes of transmission of HIV and related factors <ul style="list-style-type: none"> • Key modes of transmission and risk and proportion of all cases of infection <ul style="list-style-type: none"> ○ Sexual intercourse ○ Perinatal transmission/mother-to-child transmission (MTCT) ○ Parenteral (blood) transfusion ○ Unsafe injections or sharp materials 2. Factors affecting risk of HIV transmission <ul style="list-style-type: none"> • Viral • Host • Environmental • Sexual behaviors • Demographic • Economic • Political • Social 3. Stages of HIV <ul style="list-style-type: none"> • Early (acute or asymptomatic), middle (symptomatic), and late (full-blown AIDS) 4. Testing for the virus 	<p>Hold interactive lecture using PowerPoint 1</p> <p>Ask students to state what they understand by the terms HIV and AIDS</p> <p>If available, show rates of HIV in the country and by regions or districts</p> <p>Discuss factors that may affect regional or district differences in HIV prevalence</p>	<p>50 minutes</p>

Content	Methodology	Timing
<p>5. Impact of HIV/AIDS in Africa (in the country) on demographic patterns, food security, economic development, health and education, society, culture</p> <p>6. Comprehensive package of HIV/AIDS programs (at different stages of the disease, prevention of mother-to-child transmission (PMTCT), home-based care, behavior change communication (BCC), voluntary counseling and testing (VCT), nutrition, antiretroviral drugs (ARVs) or antiretroviral therapy (ART), care and support of orphans</p> <p>7. Challenges of addressing HIV/AIDS in Africa (in the country): technical, infrastructure, social, economic, political, human resources</p>	Brainstorm and discuss programs addressing HIV/AIDS transmission and care and support in the country	
Summary of the presentation through questions	Facilitate large group Discussion Points 1 Capture discussion points on a flipchart or board	10 minutes

Required materials

- LCD or overhead projector
- Flipchart stand and paper
- Writing pens

Recommended preparation

1. Review PowerPoint 1 and Lecture Notes 1.
2. Be familiar with the epidemiology of HIV/AIDS and its prevalence in the country (if possible, disaggregating the data by geographic area and by sex), HIV/AIDS activities in the country, and issues involved in these interventions.

3. Review **Discussion Points 1** to identify questions that can help students master the concepts and facilitate group discussion if time allows.

Materials provided

PowerPoint presentations

- **PowerPoint 1:** The basics of HIV/AIDS in Africa

Handouts

- **PowerPoint 1** presentation
- **Handout 1:** Royce, RA, A Sena, W Cates, and MS Cohen. 1997. Sexual transmission of HIV. *New Eng J Med* 336 (15): 1072-1078.

Suggested reading materials

Family Health International. 2001. HIV/AIDS prevention and care in resource-constrained settings: A hand book for the design and management of programs.

Fan, H, F Ross, RF Conner, and LP Villarreal. 2000. The biology of AIDS. 4th edition. Boston: Jones and Bartlett Publishers International.

Fauci A, D Panteleo, S Stanley, and D Weisman. 1996. Immunopathogenic mechanisms of HIV infection. *Annals of Internal Medicine* 124:653-4.

Joint United Nations Programme on HIV/AIDS. 2000. Report on the Global HIV/AIDS Epidemic. Geneva: UNAIDS.

Royce RA, A Sena, W Cates, and MS Cohen. 1997. Sexual transmission of HIV. *New Eng J Med* 336 (15): 1072-1078.

World Health Organization. 1997. *Weekly Epidemiological Record* 72: 81-88. Geneva.

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LECTURE NOTES 1: THE BASICS OF HIV/AIDS IN AFRICA

Introduction

HIV has affected 40 million people worldwide, 28.5 million of them in sub-Saharan Africa alone. People are infected with the virus through sexual, parenteral, and vertical transmission, and a variety of factors increase vulnerability to infection. HIV is recognized primarily through testing for the presence of the antibodies formed against the virus. Governments are increasingly mounting comprehensive interventions to prevent infection and mitigate its deleterious affects on all sectors. These efforts, however, are hampered by stigma, lack of political commitment, and resource constraints.

Purpose (slide 2)

The purpose of this session is to provide students with basic information about HIV/AIDS: its causes, transmission, progression, management, and challenges. The session:

- Introduces the scale of HIV/AIDS globally and in their countries
- Outlines the cause, transmission, and disease progression of HIV/AIDS
- Lists the factors that affect the risk of transmission of HIV and increase vulnerability to HIV infection
- Outlines the stages of HIV/AIDS diseases and complications faced at each stage
- Discusses strategies for caring for and supporting people living with HIV/AIDS and challenges in managing HIV/AIDS

Definitions and scope (slides 4, 5, 6, 7, 8, 9)

HIV was first identified in 1981. By the end of 2001, the disease was estimated to affect 40 million people worldwide and be responsible for 19 million deaths (UNAIDS 2002). This makes it the second largest epidemic of the twentieth century after influenza, which has caused 20 million deaths globally.

HIV/AIDS in Africa (slide 10)

Africa remains the continent by far the most affected by HIV/AIDS. Of 40 million people living with HIV/AIDS globally, 28.5 million are in sub-Saharan Africa (SSA), which is home to only 11 percent of the world's population. Of the 19 million deaths globally resulting from AIDS, 83 percent (16 million) have occurred in SSA. The estimated number of deaths in 2001 alone in the region was 2.2 million (UNAIDS 2002).

Seventy percent of people living with HIV/AIDS and 80 percent of children orphaned by AIDS are found in SSA. Globally more men than women are infected and dying, but in SSA women make up more than half of people living with HIV/AIDS.

The disease (slide 11)

Significant evidence now demonstrates that HIV (human immunodeficiency virus) causes AIDS. HIV belongs to a class of viruses called retroviruses. It attacks white blood cells, attaching itself to cells with the help of a specific surface protein called CD4. This protein is present on white blood cells known as T helper lymphocytes and macrophages and as a result mainly infects these cells. The T helper cells help stimulate the production of antibodies and multiplication of other white blood cells. The macrophages help destroy infected body cells.

When HIV binds itself to the cell surface, its particles enter the cytoplasm of the attacked cell. Then, with the help of a virus-specific enzyme called reverse transcriptase, the RNA of the HIV is incorporated into the attacked cell's DNA. The attacked cell then makes more copies of viral RNA, which may function as a messenger for producing viral proteins or become material for new virus particles that leave the cell by budding off the cell surface. This impairs the functioning of the attacked cell, and as more and more cells are attacked the body's immunity is

gradually weakened. The infected person becomes vulnerable to a variety of life-threatening illnesses and is said to have AIDS (acquired immune deficiency syndrome), which is characterized by signs and symptoms of severe immune deficiency.

Transmission (slide 12)

HIV is transmitted through three primary routes: sexual, parenteral, and vertical. The risk of transmission varies by mode of transmission and context.

Sexual transmission

Sexual transmission accounts for 70 percent-80 percent of transmissions globally (UNAIDS 1996). Sexual transmission of HIV can occur from male to male, male to female, female to male, and female to female. Despite the fact that it is the dominant mode of transmission, sexual transmission carries a risk of only 0.1 percent-1 percent. The greatest risk of infection per episode seems to come from receptive rectal intercourse (0.1 percent-3 percent) and vaginal intercourse (0.1 percent-0.2 percent) (Royce et al 1997).

Parenteral transmission

Parenteral transmission occurs through transfusion of blood (the estimated risk of infection from a single unit of HIV-infected whole blood is over 90 percent); sharing of needles among intravenous or injecting drug users, which is responsible for 5 percent-10 percent of global HIV infections (the risk of transmission is 0.1 percent); and needle pricks among health workers (Royce et al 1997).

Vertical transmission

Vertical transmission from mother to child can occur in utero, during labor and delivery, and through breastfeeding. In SSA the risk of transmission through this means ranges between 10 percent and 30 percent. More information on perinatal transmission can be found in Session 7 on prevention of mother-to-child transmission of (PMTCT) of HIV.

Factors for transmission and increased vulnerability to HIV/AIDS (slides 13, 14)

Vulnerability to HIV infection and AIDS appears to depend on a number of factors. These include the type of HIV, the health of the host, hereditary resistance, and the stage of infection.

Viral factors

Evidence suggests that the properties of HIV influence transmission. The two known types of HIV are HIV1 and HIV2. Both are transmitted by sexual contact, through blood, and vertically from mother to child and both cause the same clinical AIDS.

HIV1, the predominant type worldwide, is divided into groups M, O, and N. Group M is further divided into sub-types A-K, which have distinct geographical distribution, apparently different tropism for the different target cells, and therefore different efficiency of transmission (Duer et al 2000; Kunanusont et al 1995; Soto Ramirez et al 1996). Sub-types A, C, D, and E are predominant in Africa and Asia, and sub-type B is predominant in the Caribbean, the United States, South America, and Western Europe.

HIV2 is primarily found in West Africa. Evidence suggests that this type is less transmissible, especially through vertical means, and is associated with a lower viral load and a slower rate of clinical disease progression. In addition to the viral properties, there is evidence to suggest that the concentration of HIV in blood is correlated with enhanced transmission by all routes (Busch et al 1996; Gray et al 2001; Quinn et al 1993; St Louis et al 1993).

Host factors

Host susceptibility depends on viral entry into cells through CD4 receptors. Host factors affecting infectivity may operate through several interrelated mechanisms. Susceptibility may be affected by factors linked to inflammation or immune activation that alter either the number of susceptible target cells or the receptivity of those cells to HIV. The presence of sexually transmitted infections (STIs) or reproductive tract infections is strongly associated with susceptibility to HIV. Chlamydia, gonorrhea, and trichomonas infection are associated with a relative

increase in HIV prevalence of 60 percent-340 percent in men and women (Royce et al 1997). Infections such as cytomegalovirus infection, gonorrhoea, and seminal urethritis are also associated with increased detection of HIV in semen (Royce et al 1997). Studies have shown that treatment of urethritis diminishes the detection of HIV in the urethra and the excretion of HIV in semen (Cohen et al 1997).

Other factors may induce microscopic erosions that provide the virus direct access to the bloodstream. Ulcerative genital tract diseases are associated with a much higher susceptibility to HIV than non-ulcerative genital tract infections.

Hereditary resistance to HIV

Data from recent studies suggest that some people have innate or acquired resistance to HIV infection. Sex workers in Nairobi were found to remain uninfected despite repeated unprotected sexual intercourse with HIV-infected partners. This resistance has been attributed to the possession of a variant type of cell receptor (the non-functional CCR-5 mutation) and the presence of specific antibodies directed against the HIV envelope (Fowke et al 1996; Hoffman et al 1997; Kaul et al 1999).

Stage of infection

The likelihood of transmission of HIV is very high during the late stage of infection. Studies (Royce et al 1997) show that HIV is more readily detected, and in some cases present in higher concentrations, in the blood and semen of men with low CD4 cell counts or more advanced HIV. Increased infectivity has also been associated with primary infection (the stage between exposure to HIV and appearance of HIV antibodies).

People from all population groups may be exposed to HIV infection, but some groups are more vulnerable than others. Social norms that affect sexual practices, including patterns of sexual partnering, contraceptive choices, and the use of substances that lower sexual inhibitions, can determine a group's vulnerability to infection. As discussed earlier, receptive anal or vaginal intercourse has a greater risk of HIV transmission. In most countries in the SSA region, gender inequalities subject women to limited choices in sexual relationships, sexual violence, or pressure to trade sex for food. Traditional perceptions about sexuality and STIs and the lack or late

presentation of STI symptoms in women decrease the likelihood that women will seek treatment when infected. This further increases women's vulnerability to HIV infection.

Youth are more vulnerable than adults to infection because of unclear perceptions about what constitutes risky behavior and insufficient knowledge and incorrect information about sex, sexuality, and sexual health. This vulnerability is further complicated by traditional beliefs about what should be discussed and practiced during this stage of life. Such beliefs can either limit the availability of correct information or increase susceptibility to infection. Initiation ceremonies may promote early engagement in sex as part of the sexual maturation process.

Some population factors may affect the average rate of sex partner change, which in turn may affect the growth of the HIV/AIDS epidemic. Vulnerable groups include populations on the move in emergency situations whose basic security of life is threatened, occupational groups accustomed to leaving their homes and families for extended periods, and street children.

The length of time HIV/AIDS has been present in a community affects the probability of exposure, and the number of people with AIDS in different geographic areas affects awareness, which influences both individual behavior and the social response. The risk of secondary (new) cases of HIV has been described as R_0 , where $R_0 = \beta \times C \times \delta$ (beta represents the efficiency of transmission, C the number of sexual partners, and delta the duration of infectivity of the index case (Anderson and May 1991)).

Phases of HIV infection (slides 15, 16)

Generally four phases of HIV disease are recognized. These are the acute phase, the asymptomatic phase, the symptomatic phase, and the late symptomatic phase.

1. Acute phase (initial infection)

As soon as HIV enters the body, it replicates rapidly. This rapid replication requires energy from the host's body. The virus relies entirely on the host for survival and will deplete the host of whatever is required for its multiplication and survival. HIV

infection may have a rapid onset, leading to hypermetabolism with catabolism. Although some infected people may not have any symptoms at this stage, the host's energy and nutrient requirements increase significantly, and food intake should increase accordingly. This period varies from 1 to 6 weeks.

After the first 6 (sometimes up to 12) weeks, levels of the virus decrease, but the body produces antibodies to fight it (seroconversion). The body needs additional energy and begins to use its fat stores and muscle. Muscle is used to repair the cellular and tissue damage. If the additional energy and nutrients taken are not replaced, the host loses weight and gradually develops malnutrition that weakens the immune system and make the host vulnerable to opportunistic infections.

2. Asymptomatic phase

The length of the asymptomatic phase varies and may reach several years, depending on the health and nutritional status of the host before the infection. The asymptomatic phase is marked by hypermetabolism and increased energy needs.

3. Symptomatic phase

Initial symptoms start at the onset of opportunistic infections. The HIV-infected person presents symptoms such as fever, night sweats, tuberculosis, fungal infection of the mouth, chronic diarrhea, and weight loss. The onset of opportunistic infections is a sign of a weakened immune system.

Negative nitrogen balance occurs early in acute infections because of decreased food intake and increased urinary protein losses. Immunologic response to infection activates cytokines, which cause fever and anorexia, thereby leading to increased energy expenditure and decreased caloric intake. The opportunistic infections further increase the nutritional needs of the host and continue to weaken the immune system, speeding up the progression of the disease.

Early immune failure occurs when the persistence of symptoms and opportunistic infections lead to increased energy needs, reduced food intake, malabsorption of nutrients, weight loss, and wasting. The persistence of these conditions will lead to full-blown AIDS.

4. Late symptomatic phase (full-blown AIDS)

The late phase is marked by metabolic alteration, weight loss, and wasting. Other characteristics include high viral load, a decreased CD4 count, pneumonia, Kaposi's sarcoma, systemic fungal infection, bacterial infection, and cancer.

Disease recognition

HIV is recognized primarily through testing for the presence of the antibodies formed against the virus. Other tests are available to test for HIV itself, but they are very expensive and less commonly used.

HIV antibody tests (slides 17, 18, 19)

- The test results may be negative during the first 3 months after infection.
- Two tests are recommended. If results are conflicting, a third confirmatory test, which is usually more specific for HIV, is done.
- A test should be repeated 3 months after the initial testing because a person who was just infected at the time of the initial test may not yet have seroconverted.
- Pregnant women normally pass on antibodies to their babies. A baby born to an HIV-infected mother therefore might test positive for HIV antibodies without being infected.

Types of HIV antibody tests include blood tests, urine tests, and oral fluid tests.

Blood tests

- Enzyme immune assay (EIA) and enzyme linked immunosorbent assay (ELISA)
- Western blot
- Radioimmunobinding assay

- Dot-blot immunobinding assay

Urine tests

- EIA
- Western blot

Oral fluid test

- EIA
- Western blot

Tests for HIV itself

Polymerase chain reaction (PCR) looks for HIV genetic information. This test is very useful for detecting infection during the acute stage and among children born to HIV-infected mothers.

Impact of HIV/AIDS

HIV affects the mortality trends, food security situation, and health and education indicators of a society.

Demographic impact (slides 20, 21, 22)

More than 60 million people have been infected with HIV since the epidemic began. HIV/AIDS is now the leading cause of death in SSA and the fourth largest global killer. The average life expectancy in SSA is now 47 years, compared with an estimated 62 years without AIDS. In high-prevalence areas life expectancy has decreased severely (see PowerPoint 1). An additional 55 million deaths are projected in SSA between 2000 and 2020 as a result of AIDS, 39 percent more than would be expected without AIDS (UNAIDS 2002). The impact of HIV/AIDS on mortality among children between the ages of 1 and 5 years has been even stronger. In 7 countries in the region, under-five mortality has increased by 20 percent-40 percent.

Impact on food security (slide 23)

HIV/AIDS is a potentially significant threat to food security and nutrition. Food consumption may drop as a result of the illness and death of productive household members. A study in Tanzania found that per capita food consumption decreased by 15 percent after the death of an adult in the poorest households (FAO 2001).

Reduction in agricultural work or even abandonment of farms is likely. With fewer people, households farm smaller plots of land or resort to less labor-intensive subsistence crops, which often have lower nutritional or market value.

Impact on the health sector (slide 24)

Health expenditure per capita in the SSA region is generally low, and the demands of HIV/AIDS further strain already stretched health budgets and systems. The kind of strain varies depending on the level of services, the number of people who seek the services, the nature of the demands, and the capacity to deliver that care. During early HIV infection, the demand is mostly for primary care and out-patient services. As the infection progresses to AIDS, demand for hospitalization increases. Shortages of beds tend to lead to admission of HIV patients only at the later stage of the disease, limiting their chances of survival.

Aside from the increased demand for hospitalization, the increased patient load and the toll the epidemic takes on health workers leads to staff shortages and staff burnout. The complex nature of some of the opportunistic infections associated with HIV/AIDS demands more time and money spent on diagnosing and investigating cases. The demand for specialized services such as counseling also increases.

Impact on the education sector (slide 25)

A decline in school enrollment is one of the most visible effects of HIV/AIDS. Research from South Africa showed a 20 percent drop in the number of pupils enrolling in the first year of primary school in parts of Kwazulu Natal Province between 1998 and 2001 (UNAIDS 2002). In the Central African Republic and Swaziland, school enrollment is reported to have fallen by 20 percent-36 percent because of AIDS and orphanhood, with girls the most affected (2002). The following factors contribute to the decline in school enrollment:

- Removal of children from school to care for parents and family members
- Inability to afford school fees and other expenses
- AIDS-related infertility and a decline in birth rate
- Infection of more children who do not survive through the years of schooling

The capacity to deliver the basic social mandate is reduced as a result of illness or death of teachers. A study in Manicaland, Zimbabwe (UNAIDS 2002), found that 19 percent of male teachers and almost 29 percent of female teachers were infected with HIV. Education budgets are further strained by the need to train new teachers to replace those lost to AIDS, which affect the funds available for materials and infrastructure needed to provide quality educational services.

Comprehensive HIV/AIDS package (slides 26, 27)

Key elements of a comprehensive package to address HIV/AIDS include involving political and social leaders, mitigating the impact of the disease, reducing vulnerability to infection, preventing infection, providing care and support, and addressing cross-cutting issues.

Leadership

Leadership is required from the national to the community level. Strong personal commitments from political and civil society leaders are vital to promote national and local understanding and cooperation, avoid denial and stigma, and secure the full commitment and accountability of all sectors. The commitment of Uganda's president contributed significantly to the increased openness and some of the strides made in curbing HIV infection in Uganda.

Mitigating the social and economic impact of HIV

HIV/AIDS increases poverty and vulnerability and depletes the capacity of society and individuals to respond to the epidemic. Special attention should be given to the growing number of orphans and children made vulnerable through HIV/AIDS. Such attention should ensure access to basic education, health, and social services and regularly monitoring the care, health, and well-being of such children.

Reducing vulnerability to infection

The epidemic is driven by forces of social and economic vulnerability that inhibit people's capacity to control their risk of infection. A comprehensive package should therefore include strategies to reduce vulnerability, particularly for women and girls, people living with HIV/AIDS, and people in war or conflict and emergency situations. Such strategies include empowering people to combat poverty, hunger, and disease through education, life skills building, microfinance services, and legislative and policy measures to promote and protect basic human rights.

Prevention

A strong focus on prevention is essential to significantly reduce the spread of HIV and its impact. Special attention has to be given to young people, as over 30 percent of people currently living with HIV/AIDS are under the age of 24. Efforts also need to be targeted to other vulnerable populations such as sex workers. Prevention methods should include health and sex education not only to provide information but also to build life skills to reduce vulnerability, access to female and male condoms, expanded services for preventing mother-to-child transmission, expanded demand and harm reduction programs for intravenous drug users, and expanded access to voluntary counseling and testing (VCT).

Care and support

Prevention is inseparable from care and support for people affected by HIV/AIDS and should be closely linked with care and support interventions. This synergy is central to reversing the spread of the epidemic. Care and support strategies should clearly indicate the range of services to be provided and the standards to which they will adhere. Strategies should include voluntary counseling and testing, which acts as a vital point of entry for prevention and care interventions. When carried out

effectively, care and support interventions help to overcome stigma and denial, lead to better management of illnesses and opportunistic infections, and prevent further transmission including from mother to newborn infants. In addition, care and support strategies should include health services and psychosocial support, PMTCT, and counseling and care for children orphaned by HIV/AIDS.

Cross-cutting issues

Key cross-cutting issues include promoting the full participation of people living with HIV/AIDS and affirming and strengthening the capacity of communities to respond to the epidemic.

Challenges in managing HIV/AIDS (slide 28)

The global response to HIV/AIDS has been limited by the following major challenges:

Political commitment is still lacking at all levels of government, even in some of the most severely affected countries.

Resources and funds available globally and nationally cannot provide the full package for managing HIV/AIDS, particularly for accessing antiretroviral drugs (ARVs) for the majority of people affected.

Stigmatization and discrimination limit the impact of prevention and care interventions.

Scaling up interventions to reach all vulnerable groups faces two challenges. Current programs are still small and have been unable to reach large numbers of the population, and scaling up raises issues of resources and the difficulty of ensuring the same level of quality on a larger scale.

Lack of a vaccine is a challenge. There is not yet a cure for HIV. As with most viral infections, building natural immunity would be one of the most effective ways to reduce new infections, but no effective vaccine has been produced.

References

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DISCUSSION POINTS 1

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1. What factors in the country are likely to influence transmission of HIV?
2. What factors in the country are likely to increase vulnerability to HIV infection and the impact of HIV/ADS?
3. Which HIV tests are known to be available and are currently used in the country?
4. Discuss the main impact of the HIV/AIDS epidemic on the country.
5. Which of the elements of a comprehensive HIV/AIDS package are most likely to affect the nutrition of people affected by or infected with HIV/AIDS?