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HIV/AIDS: Update on Epidemiology, Prevention and Treatment - including Available South Sudan Literature

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Abstract

South Sudan borders countries with significant HIV epidemic profiles. Data on the status of HIV in South Sudan is limited. More than two decades of war have relatively sheltered the country from experiencing an epidemic similar to that in the neighbouring countries. Ironically the coming of peace has the potential of accelerating the development of an epidemic in South Sudan as a result of increased movement of people and altered economic and social activities. The return of refugees and internally displaced people and the influx of business people from surrounding countries brings along many circumstances which are known to be drivers of the HIV epidemic.

HIV/AIDS is a health, economic and security issue. The government of South Sudan has made a start in addressing this epidemic through the formation of the South Sudan AIDS Commission. Appropriate supportive statements have been made by the President of South Sudan, and the Vice President publicly undertook an HIV test. These are important beginnings of a comprehensive response to what can easily spiral into a devastating epidemic.

This article aims to give a synopsis of HIV/AIDS in a manner that allows a wide spectrum of health and non-health trained individuals to gain an understanding of the essentials of the disease. It covers HIV epidemiology, transmission, prevention and treatment and gives some data from South Sudan publications.

Introduction

The epidemiology of HIV is starkly different between Northern Africa and sub-Saharan Africa. While Northern Africa is relatively mildly affected, sub-Saharan Africa bears the brunt of the HIV epidemic. The epidemic in West Africa is intermediate in severity. I make this over-simplification of this profoundly complicated epidemic to bring out the unique position of South Sudan which lies between the countries with significant HIV epidemics such as Uganda, Kenya, Congo, Central Africa and Ethiopia on the one hand and on the other borders North Sudan which shares neighbourhood with countries with relatively low prevalence such as Egypt and Libya.

South Sudan has been embroiled in a war for more than 21 years only ending in 2005 with the signing of the Comprehensive Peace Agreement (CPA). The dynamics of the HIV epidemic during the period of conflict and the great movement of people and social changes that have followed the coming of peace remain largely unexplored. Several factors occurred during the war that would be relevant to the epidemiology of HIV in the south:

(a) large movement of soldiers between the North and the South
(b) internal displacement of people mainly from the South to the North, but also from rural to urban areas
(c) commercial sex work in the towns and garrisons with an impact on HIV infection in their clients especially soldiers and those with more disposable higher incomes.

The impact of these factors is undocumented and indeed one cannot expect reliable data during the war situation. Some data on HIV/AIDS has been obtained by groups, working for NGOs or for institutions such as the United States Centre for Disease Control and Prevention (CDC), but these are understandably limited in scope.

Epidemiology

The UNAIDS report of 2008[1] gives the estimate of people living with HIV/AIDS by the end of 2007 to be 33 million with 22 million (66.7%) of these living in sub-Saharan Africa (see Table 1). Other indicators of HIV/AIDS shown on Table 1 are also grim for sub-Saharan Africa. The distribution of the epidemic in Africa is variable with the southern African countries (South Africa, Botswana, Swaziland, Lesotho, Zimbabwe, Malawi and Zambia) bearing the greatest brunt of the epidemic followed by East and Central Africa. The epidemic in western Africa is less severe than the rest of Africa, but even here there is great variability in prevalence between countries.

Table 1. Global and Sub-Saharan Africa Adult HIV related Statistics for Adults

Description	Global, n	Sub-Saharan Africa (n, % of global)
PLWHA	33 Million	22 Million (66.7%)
Newly Infected	2.7 Million	1.9 Million (70.4%)
Prevalence	0.8%	5%
Deaths	2.0 Million	1.5 Million (75%)

PLWHA-People living with HIV/AIDS

Epidemiology in South Sudan

The epidemiology of HIV in South Sudan is poorly documented and most certainly in a state of rapid change. The Comprehensive Peace Agreement (CPA) which brought about peace after decades of war, displacement and isolation ushered in a period of normality which will have great impact on a wide spectrum of disease conditions and not least HIV/AIDS. The UNGASS report of 2008[2] gives the adult HIV prevalence in South Sudan as 3.1%; given a population estimate of 10 million this translates into 155,000 adults living with HIV/AIDS. This contrasts with a prevalence of 1.6% adults in North Sudan[3].

There are 8 centres providing transfusion services and all these are said to test for HIV and syphilis. There are however no data on the prevalence of HIV in donated blood. There are also no South Sudan wide data on the prevalence of HIV among pregnant women, patients with tuberculosis, etc. There are similarly no nationally collected data on the prevalence of HIV among high-risk groups such as commercial sex workers, truck drivers and members of the uniformed forces. The HIV behaviour surveillance survey of Juba conducted in April 2007 showed that the percentage of women and men who admitted to encounters with more than one sexual partner in the past 12 months and reporting use of a condom in the last sexual encounter was 39.6%.

A study in 1995 estimated the prevalence of HIV-1 infection in Southern Sudanese in Juba[4]. A total of 401 subjects were studied with details as shown in Table 2. The prevalence of HIV-1 was highest among

tuberculosis patients (19%), 16% among commercial sex workers and 3% among outpatients. There was no difference in prevalence between men and women among outpatients and tuberculosis patients. Compared to female commercial sex workers, female outpatients had a much lower HIV prevalence (2.2% vs 16% $p<0.001$). Among male outpatients who had sex with commercial sex workers during the past 10 years compared with those who denied such association yielded an HIV-1 prevalence of 13.5% vs 0%, $p<0.001$. In males with a history of sexually transmitted diseases the prevalence of HIV-1 was 12.9% vs 1.1% in those without such a history ($p<0.05$).

Table 2. HIV Prevalence Survey in Juba[4]

Subjects	Number	Age-mean±SD	HIV Prevalence
Outpatients	309	23.8±5.8	3%
Tuberculosis Patients	42	33.9±13.6	19%
Female Commercial Sex Workers	50	27.4±6.9	16%
TOTAL	401		

In 2002 and 2003 a survey was conducted in Yei town, Western Equatoria (and surrounding 20 km area) and in Rumbek town, Bahr-el Ghazal provinces[5]. HIV prevalence among individuals aged 15-49 years ranged from 0.4% in Rumbek town to 4.4% in Yei town.

Transmission

HIV is transmitted through sexual intercourse, transfusion of contaminated blood products, pricking or scarification by contaminated needles or instruments and from an HIV positive mother to her baby in the womb, at birth or through breast milk. The route of HIV transmission is largely heterosexual intercourse in sub-Saharan Africa. This is most likely the case in South Sudan too.

Without the implementation of strategies to prevent mother-to-child-transmission (pMTCT) up to 40% of children will be infected through this route.

Transmission through blood products especially transfusion of untested whole blood is important in parts of the world where blood transfusion services are not well established and testing for HIV and other diseases in blood is not routine. The blood transfusion service in South Sudan is not well developed and could pose a problem in disease transmission including HIV.

Other routes of transmission such as men who have sex with men, and intravenous drug use are also important. Commercial sex work is common in many areas of South Sudan, especially in urban areas. The prevalence of HIV among sex workers is largely unknown, but this is likely to become an increasingly important way that men get infected and in turn infect their wives or other HIV negative sexual partners. A study done in Juba in 1995 showed an HIV seropositivity of 16% among 50 sex workers tested[4].

Table 3. Routes of HIV Transmission

- Sexual intercourse
  - Between man and woman
  - Between man and man
- Mother to child transmission
  - In the womb
  - In labour
  - During breastfeeding
- Contaminated blood products
- Use of unsterilized needles and scarification instruments
- Intravenous drug use

Life Cycle of HIV

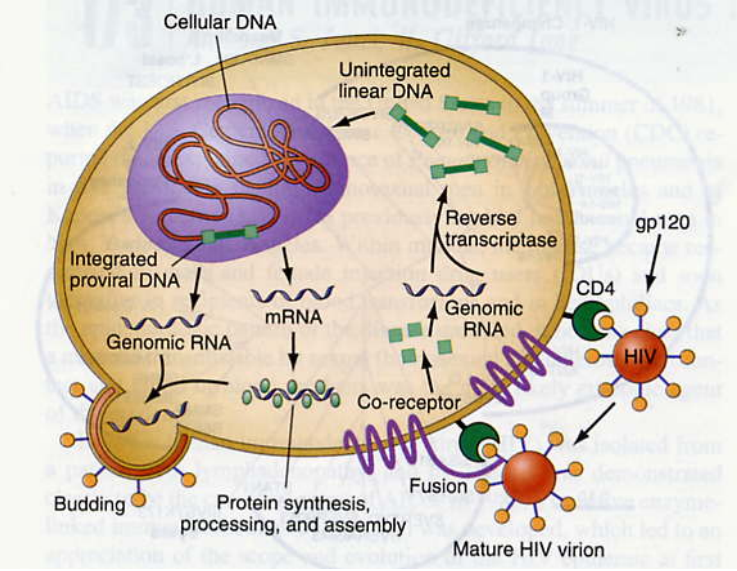

Figure 1: Replication Cycle of the HIV Virus[6]

HIV is an RNA virus belonging to the genus Lentivirus of the Retroviridae family[6]. There are two types of HIV virus, HIV-1 and HIV-2. The most widespread type is HIV-1 which is further classified into subtypes or clades (A, B, C, D, F, G, H, J, K and several circulating recombinants). HIV-2 is mainly found in West Africa and causes a milder clinical disease than HIV-1.

The HIV virus binds through its gp120 protein to CD4 receptors on CD4+ cells shown as "fusion" in Figure 1. Co-receptors CCR5 and CXCR4 are part of this process. RNA is internalized into the cell and with the assistance of reverse transcriptase genomic DNA is formed. This DNA integrates with cellular DNA catalyzed by the enzyme integrase. Viral protein is then formed and cleaved into final form by the aid of proteases. Viral particles are formed through assembly of proteins, enzymes and RNA. This is then extruded as mature virions by budding from the cell surface.

Clinical presentation

The presentation of HIV infection is very variable and in this article I can only touch on some of the principles of how patients with HIV may manifest illness. Indeed the majority of HIV infected individuals are not ill or are only mildly ill so may not be under medical care for several years. It is not uncommon to have HIV infected patients remain well for up to 8-10 years.

However, in advanced HIV infection opportunistic infections (OIs) which are diseases which would otherwise be uncommon in immunologically normal individuals become more common and there is also an increased risk of death from HIV infection per se. OIs can be viral, bacterial, fungal, parasitic and cancerous. Indeed the term OI is loosely used to include infective and cancerous conditions, but a more correct term - but less often used - is 'opportunistic conditions'.

The type and frequency of OIs depends on the endemicity of such conditions in the given geographical locality. Tuberculosis is very common in sub-Saharan Africa and is a frequent OI in HIV infected patients. Cryptococcal meningitis is another common OI. Viseral Leishmaniasis is associated with HIV infection so may become increasingly important in South Sudan because of its endemicity[7]. For simplicity the clinical presentation of HIV may be divided into 4 phases according to the degree of immunosuppression: primary, early, intermediate and advanced HIV infection[8].

Primary HIV infection

Soon after HIV infection some individuals may experience an illness characterised by fever, lymphadenopathy, skin rash, headache or diarrhoea (see Table 4). A full list of presenting conditions is given in the Figure 2. The CD4 count of patients with primary HIV infection may fall sharply initially, but recovers after several weeks

(Figure 2). The HIV-1 viral load rises sharply during this phase of HIV infection, but drops to a plateau, known as the 'set point'. Patients are extremely infectious during this phase of their illness. This clinical sero-conversion illness is not experienced by all infected patients, and is often missed because the presentation mimics many intercurrent illnesses such as common viral infections, malaria or gastroenteritis.

Table 4. Clinical Features of primary HIV infection

General	Skin	Neurological	Gastrointestinal	Respiratory
- Fever - Pharyngitis - Lymphadenopathy - Arthralgia - Myalgia - Lethargy/malaise - Loss of appetite /weight loss	- Erythematous rash - Urticaria - Mucocutaneous ulceration - Hair loss	- Headache - Neck stiffness /encephalitis - Peripheral neuropathy - Radiculopathy - Guillain-Barre syndrome - Cognitive disorders	- Oral/pharyngeal candidiasis - Nausea/vomiting - Diarrhoea	- Cough

Early Immune-deficiency (CD4 >500 cells/μL)

In this stage of HIV infection the patient is generally well, but several conditions which are largely believed to be of autoimmune origin may occur. These include Guillain Barre syndrome, reactive arthritis and Bell's palsy. Figure 2 gives a list of other conditions that may be seen. The CD4+ count is usually normal and is often greater than 500 cells/μL.

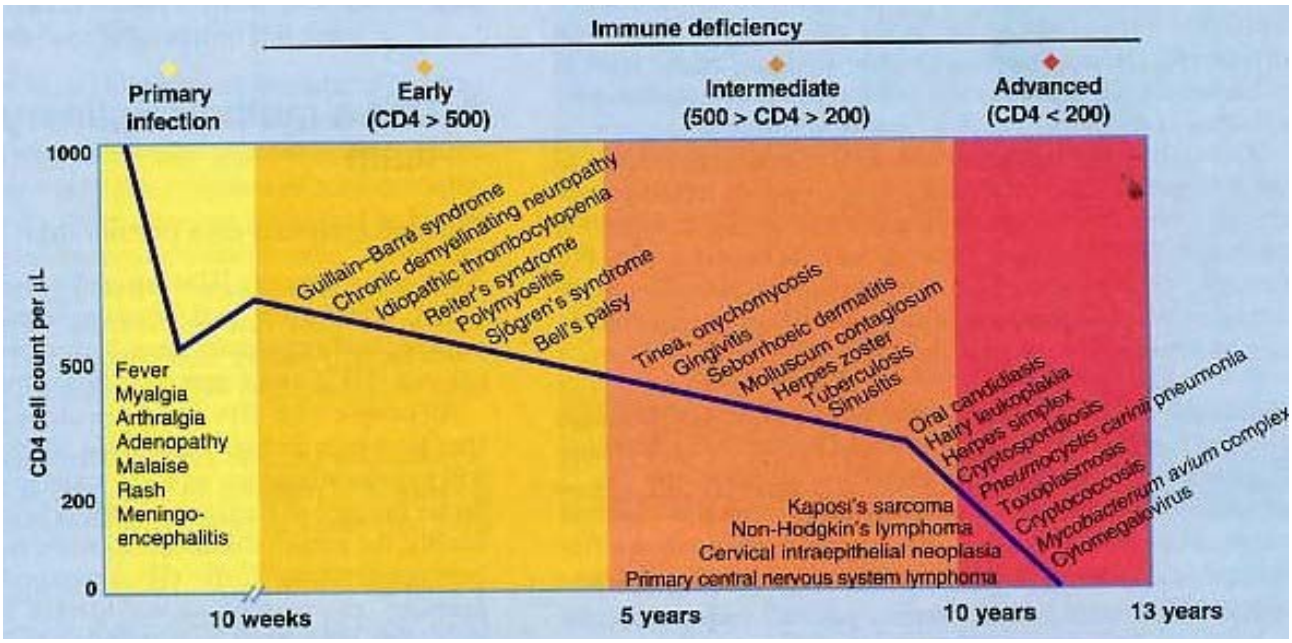

Figure 2. The Natural History of HIV Infection-CD4 decline and Occurrence of Opportunistic Infections and Cancers[8]

Intermediate Immune-deficiency (CD4 200-500 cells/μL)

At this stage the CD4 count drops to between 200 and 500 cells/ μL. Common conditions include fungal skin infections, seborrhoeic dermatitis, herpes zoster and tuberculosis. Other conditions are shown in Figure 2.

Advanced Immune-deficiency (CD4 <200 cells/μL)

At this stage the patients' immune status has been overwhelmed by the viral infection and CD4 count is less than 200 cells/μL. The conditions that occur are the classical AIDS defining illnesses, most of which are listed in WHO stage 4 (see Table 5) and in Figure 2.

WHO Staging of HIV

The clinical staging and case definition of HIV for resource-constrained settings were developed by the WHO in 1990 and revised in 2006 (see Table 5). Staging is based on clinical findings that guide the diagnosis, evaluation, and management of HIV/AIDS, and does not require a CD4 cell count. This staging system is used in many countries to determine eligibility for antiretroviral therapy. Clinical stages are categorized as 1 through 4, progressing from primary HIV infection to advanced HIV/AIDS. These stages are defined by specific clinical conditions or symptoms. For the purpose of the WHO staging system, adolescents and adults are defined as individuals aged ≥15 years[9].

Table 5. WHO Clinical Staging of HIV for Adults and Adolescents with Confirmed HIV Infection[9]

Clinical Stage 1 • Asymptomatic • Persistent generalized lymphadenopathy
Clinical Stage 2 • Unexplained moderate weight loss (<10% of presumed or measured body weight) • Recurrent respiratory tract infections (sinusitis, tonsillitis, otitis media and pharyngitis) • Herpes zoster • Angular cheilitis • Recurrent oral ulceration • Papular pruritic eruptions • Seborrhoeic dermatitis • Fungal nail infections
Clinical Stage 3 • Unexplained severe weight loss (>10% of presumed or measured body weight) • Unexplained chronic diarrhoea for longer than one month • Unexplained persistent fever (above 37.5C intermittent or constant for longer than 1 month) • Persistent oral candidiasis • Oral hairy leukoplakia • Pulmonary tuberculosis • Severe bacterial infections (e.g. pneumonia, empyema, pyomyositis, bone or joint infection, meningitis or bacteraemia) • Acute necrotizing ulcerative stomatitis, gingivitis or peridontitis • Unexplained anaemia (<8 g/dl), neutropenia (<0.5 X 10^9 per litre) and/or chronic thrombocytopenia (<50 X 10^9 per litre)
Clinical Stage 4 • HIV Wasting syndrome • Pneumocystis pneumonia • Recurrent severe bacterial pneumonia • Chronic herpes simplex infection (orolabial, genital or anorectal of more than one month's duration or visceral at any site) • Oesophageal candidiasis (or candidiasis of trachea, bronchi or lungs) • Extrapulmonary tuberculosis • Kaposi's sarcoma • Cytomegalovirus infection (retinitis or infection of other organs) • Central nervous system toxoplasmosis • HIV encephalopathy • Extrapulmonary cryptococcosis including meningitis • Disseminated non-tuberculous mycobacterial infection • Progressive multifocal leucoencephalopathy • Chronic cryptosporidiosis

- Chronic isosporiais
- Disseminated mycosis (extrapulmomary histoplasmosis or coccidiodomycosis)
- Recurrent septicaemia (including non-typhoidal salmonella)
- Lymphoma (cerebral or B-cell non-Hodgkins)
- Invasive cervical carcinoma
- Atypical disseminated leishmaniasis
- Symptomatic HIV-associated nephropathy or symptomatic HIV-associated cardiomyopathy.

Laboratory Tests

The only way to confirm that an individual is infected by the HIV virus is to perform an HIV-1 test. This test is usually performed on blood and can be done as a rapid test in the clinic or field. Results are often ready within 20 minutes. Other more formal tests such as an ELISA or Western Blot require a laboratory set up. Because of the serious implications of a test result to the individual, it is important that HIV tests are done accurately by appropriately trained personnel before disclosing to the individual their HIV status.

The diagnosis of HIV infection in children less than 18 months cannot be made using the above serological tests because antibodies passed from the mother to the child will be detected and the child may then be falsely labelled as being HIV infected. Tests such as PCR DNA, which detect the actual virus, are necessary for confirmation of HIV infection in this young age group.

The CD4 Lymphocyte is an important cell in the body that is involved in protection against the effects of HIV. CD4 count is therefore performed to determine the immunological status of an individual. As noted above the severity of a patient's illness and the occurrence of opportunistic infections is often a reflection of how far the CD4 count has dropped. HIV-1 RNA level, usually simply referred to as viral load, is a measure of the level of HIV in a patients' blood. The aim during treatment is to suppress viral load to a level when tests cannot detect the virus. We say 'undetectable' rather than 'elimination' because there is as yet no way of eradicating the virus from the body. There are parts of the body where the virus hides and in spite of administration of drugs the virus remains latent and can resume destructive activity once suppression of replication is stopped.

HIV Testing and Counselling

Counselling is an important part of the management of HIV/AIDS. Early during the beginning of the HIV epidemic it was realized that individuals had to be prepared adequately psychologically before disclosure of a test result. The emphasis has been to wait for individuals to voluntarily come forward for HIV testing except in circumstances like pregnancy and in individuals suspected to be ill with HIV related conditions. The thrust at present is to test as many people as possible so that they can come into care soon as possible.

The push to promote provider initiated testing and counselling (PITC) has come from the WHO and others and has been shown to be feasible in various forms in many settings. This will, in addition, reduce stigma and discrimination, which is an important social barrier to the provision of prevention and therapeutic services to people living with HIV/AIDS. Determination of HIV status is beneficial to those who are negative by encouraging them to maintain or develop risk reduction behaviour. For those who test positive counselling is supportive and in time will enable them cope with progression of illness, bereavement, reduction of stigma and isolation, adherence to treatment including prophylaxis and antiretroviral therapy (ART).

Prevention

HIV infection has no cure thus far, so preventing infection is a critical way in which society can control the spread and devastating effects of HIV infection[10]. Important general measures in the prevention of HIV infection include:

- The community needs to have a high level of knowledge about the nature of HIV, its mode of transmission and treatment in order to accept and implement preventive strategies.
- Information and communication technology[11] are therefore important and all communication channels, including radio, television, the internet and cellphones, can disseminate HIV related information.
- Advocacy at political and community leadership levels, and in religious forums, is required to ensure that the community gives the appropriate level of importance and priority to implementing preventive strategies.

- The general population including the youth[12] and vulnerable populations must be involved in this communication strategy. High-risk groups such as commercial sex workers, the uniformed forces[13, 14] and truck drivers should be targeted with appropriate messages.
- HIV behavioural change that should be promoted include delayed onset of sexual debut (initiation), faithfulness to one partner and use of condoms. This requires intervention strategies that target both the individual and the community.
- Sexually transmitted infections (STI) surveillance and control is important although the evidence for its direct prevention of HIV is weak[10]. Other preventive strategies are listed in Table 6.

Table 6. Preventive Strategies

- Prevention of mother to child transmission of HIV*
- Single dose nevirapine or combination treatment (nevirapine and zidovudine or HAART)
- Contraception
- Male Circumcision-highly effective and recommended
- Diaphragm-not effective
- Microbicides-None in the market yet. Promising.
- Pre-exposure prophylaxis (Tenofovir or Truvada)-Under investigation
- Anti-retroviral drugs for prevention-Ongoing research. Promising.
- Vaccines-No effective vaccine yet

*Also see article 'Feeding infants whose mothers are HIV-positive' Southern Sudan Medical Bulletin vol 2 number 2 page 12.

Treatment

Primary Prophylaxis for Opportunistic Infections

Before the advent of ART, the use of prophylaxis to decrease the risk of acquiring OIs was the only intervention available to delay the onset of life threatening infections[15]. With the introduction of highly active antiretroviral therapy (ART) in the 1990s in industrialized countries, the prevalence of many OIs has been greatly reduced, and the use of prophylaxis has decreased correspondingly[16]. Nevertheless, prophylaxis for OIs remains necessary in resource limited settings where many patients still lack access to ART.

Antiretroviral Therapy (ART)

Treatment of HIV infection *with* combination ART is associated with reduced mortality, reduced morbidity and improved quality of life. The emphasis is now on 'combination therapy' which is the use of a minimum of 3 drugs - at least initially. The WHO has issued guidelines for scaling up ART access[17]. The most commonly used antiretroviral drugs fall into three classes:

(a) Nucleoside analogue reverse transcriptase inhibitors (NRTIs) which were the first type of drugs available to treat HIV infection in 1987
(b) Non-nucleoside reverse transcriptase inhibitors (NNRTIs) became available in 1997. Like NRTIs, non-nucleosides also interfere with HIV's ability to infect cells by targeting reverse transcriptase
(c) Protease inhibitors (PIs) were first approved in 1995. PIs interfere with viral replication by binding to the viral protease enzyme and preventing it from processing viral proteins into their functional forms. Examples of antiretroviral drugs are given in Table 10. Several new classes of antiretroviral drugs are now available in resource-rich countries such as fusion inhibitors, integrase inhibitors and CCR5 inhibitors. These are rarely used in the developing world, but drug availability is a fast changing field.

WHO Guidelines on ART

A health provider requires training before they use antiretroviral drugs (ARVs) to ensure that patients derive maximum benefit from treatment and are not put into any unnecessary danger. The issues that need to be addressed include:

(a) preparing patients for ART including advice on strict adherence to medication, reporting of any untoward effects, regular clinic follow-up visits and generally following advice given to them by their health provider
(b) when to start ART?
(c) which ARVs to start with?

(d) monitoring (clinical and laboratory) for toxicity and taking appropriate action if this occurs e.g. stopping ARVs or changing of specific ARVs
(e) clinical and laboratory monitoring for efficacy (CD4 count and viral load) to recognize when a patient has failed a given first-line regimen
(f) choice of an appropriate second-line regimen (e) use of ARVs in special circumstances such as during tuberculosis co-infection and during pregnancy.

Table 7. CD4 Criteria for initiation of ART in Adults and Adolescents[17]

CD4 (cells/mm3)	Treatment Recommendations
<200	Treat irrespective of WHO clinical stage
200-350	Consider treatment and initiate before CD4 counts drops below 200
>350	Do not initiate treatment

Table 8. Recommendations for starting ART in Adults and Adolescents according to WHO Clinical stage[17]

WHO Clinical Stage	**CD4 Testing NOT Available**	**CD4 Testing Available**
1	Do not treat	Treat if CD4 <200
2	Do not treat	
3	Treat	Consider treatment if CD4 is below 350 and initiate ART before CD4 drops below 200
4	Treat	Treat irrespective of CD4 count

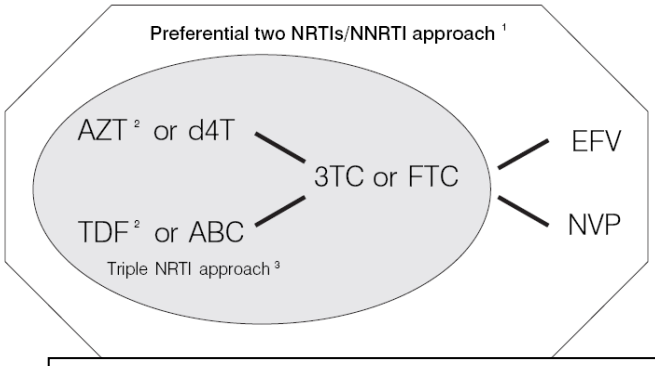

Figure 3. First-line ARV Combinations for Adults and Adolescents ©WHO[17]

Note: See Table 10 for explanation of abbreviations. A 3 drug regimen is constructed from the choices above e.g. d4T + 3TC +NVP or TDF + FTC + EFV.

Table 9. Clinical, CD4 (immunologic) or Virologic definition of treatment failure

Clinical Failure	New or recurrent WHO stage 4 condition
CD4 Cell failure (immunologic)	Fall of CD4 to pre-treatment levels or lower or 50% fall from the on-treatment peak value or Persistent CD4 levels below 100 cells/mm3
Virologic failure	Plasma viral load above 10,000 copies/ml

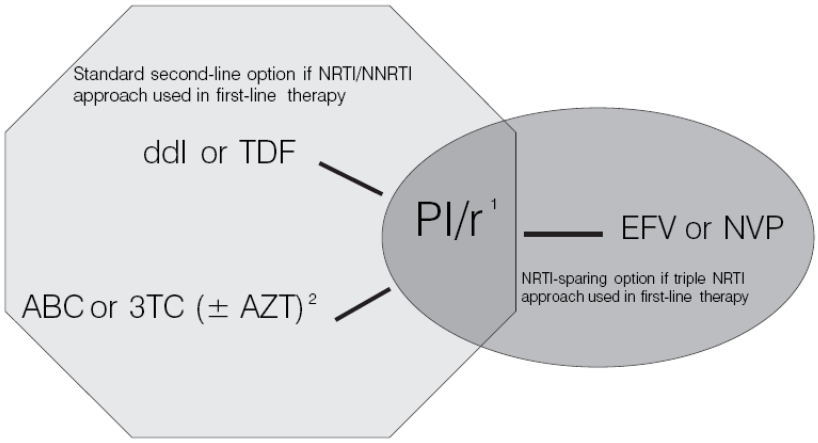

Figure 4: Second-line ARV Combinations for Adults and Adolescents©WHO[17]

Note: See **Table 10** for explanation of abbreviations. PI/r-refers to a Protease Inhibitor boosted with Ritonavir. A 3 drug regimen is constructed from the choices above e.g. ddI + PI/r + NVP or ABC + PI/r + EFV.

The WHO guidelines are available from the WHO website or country offices and should be consulted regarding all aspects of ART management including first line and second line therapy. In this article I have not addressed the management of children or special circumstances such as prevention of mother-to-child transmission of HIV. Please note that WHO guidelines are under constant review and new versions or amendments are frequently published.

Treatment was inaccessible to most people with HIV infection or AIDS in the developing world at the beginning of this decade. Activism and a number of initiatives such as the Global Fund for AIDS, Malaria and TB (GFAMT), the President's Emergency Program for AIDS Relief (PEPFAR), national initiatives, etc. have made it possible for more patients in sub-Saharan Africa and other parts of the developing world to access ART.

The WHO estimated that in 2003 there were 400,000 people on ART most of who lived in the developed world or in medium economy countries such as Brazil and Thailand. However, by the end of 2007 the number had risen to 3 million with most people on ART living in sub-Saharan Africa. Thus ART has brought a lot of relief to many people whose fate was certain death. The number of people on treatment in South Sudan is unknown, but certainly small. The 2008 Southern Sudan UNGASS report gave a figure of only 303 individuals on treatment in 6 treatment sites[2].

Table 10. Antiretroviral Drugs

Nucleoside Reverse Transcriptase Inhibitors (NRTIs)	**Non-Nucleoside Reverse Transcriptase Inhibitors (NNRTIs)**	**Protease Inhibitors (PIs)**
• Zidovudine (AZT) • Lamuvudine (3TC) • Didanosine (ddI) • Stavudine (d4T) • Abacavir (ABC) • Tenofovir (TDF)* • Emtricitabine (FTC)	• Nevirapine (NVP) • Efavirenz (EFV)	• Lopinavir/r (Aluvia/Kaletra) • Saquinavir (SQV) • Ritonavir (RTV) • Atazanavir (ATV) • Darunavir (DRV) • Nelfinavir (NFV) • Indinavir (INV)

*Tenofovir (TDF) is a nucleotide reverse transcriptase inhibitor (NtRTI) which has similar properties to NRTIs

Conclusion

The HIV/AIDS epidemic is a cause of high morbidity and mortality in many parts of the world especially in sub-Saharan Africa. The advent of ART has brought relief to many AIDS suffers and their families, but the number of new infections occurring annually is alarming and worrying. This number outstrips those who are being put on ART. There is an urgent need to scale up preventive efforts to ensure that the number of people requiring treatment is reduced. South Sudan has recently emerged from war. There is suddenly a beehive of activity with movement of large numbers of people across borders. With the poor knowledge of HIV/AIDS in South Sudan, low literacy and poor infrastructure the scene is set for a major escalation of the epidemic. The time to establish a proper national and public health response to the epidemic is now.

References

1. UNAIDS, AIDS. *Epidemic update*: June 2008. UNAIDS: Geneva; 2008. http://www.unaids.org/Epi2008/doc/report_pdf.html.
2. UNGASS *HIV/AIDS in Southern Sudan.* UNGASS Report January 2008.
3. UNGASS *HIV/AIDS in Northern Sudan.* UNGASS Report January 2008.
4. McCarthy MC, Khalid IO, El Tigani A. *HIV-1 infection in Juba, Southern Sudan.* J of Med Virol 1995;46:18-20.
5. Kaiser R, Kedamo T, Lane J, Kessia G, Downing R, Handzel T, Marum E, Salama P, Mermin J, Brady W, Speigel P. *HIV, syphilis, herpes simplex virus 2 and behavioural surveillance among conflict-affected populations in Yei and Rumbek, Southern Sudan.* AIDS 2006;20:942-944.
6. Fauci AS, Lane HC, editors. *Human immunodeficiency virus disease: AIDS and related disorders.* Harrison's Principles of Internal Medicine 16th Edition. New York, McGraw-Hill Medical Publications Division 2005.
7. Ritmeijer K, Davidson RN. *Medecins Sans Frontieres interventions against kala-azar in the Sudan, 1989-2003.* Trans R Soc Trop Med Hyg 2003;67:609-613.
8. Graeme JS, Irvine SS, Scott M, Kelleher AD, Marriott DJE, McKnight I, Pethebridge AM, Wodak A, Ziegler J. Editors. *Strategies of care in managing HIV*. In Managing HIV. Sydney: Australasian Medical Publishing Company Limited 1997.
9. World Health Organization, *WHO Case Definitions of HIV for Surveillance and Revised Clinical Staging and Immunological Classification of HIV-related disease in Adults and Children, August 7, 2006*.
10. Wegbreit J, Bertozzi S, DeMaria, Padian NS. *Effectiveness of HIV prevention strategies in resource-poor countries: tailoring the intervention to the context. AIDS* 2006;20:1217-1235.
11. Wambua P, Kay A, Atsbeha T, Khamis G. *Key findings from a qualitative BCC formative assessment study in Western Equatoria state, Southern Sudan, December 2007*. [refTHPE0496] XVII International AIDS Conference 2-8 August 2008.
12. Asego J. *Youth in participatory education theatre against HIV/AIDS in Juba, South Sudan.* XVII International AIDS Conference 2-8 August 2008.
13. Karutu C, McMahan. *Gearing up the Southern Sudanese military to prevent HIV/AIDS*. [refWEAE0404] XVII International AIDS Conference 2-8 August 2008.
14. Munywoki M. *HIV and AIDS in a peacekeeping scenario: the case of Sudan.* [ref XVII International AIDS Conference 2-8 August 2008.
15. Kitahata MM, Koepsell TD, Deyo RA, Maxwell CL, Dodge WT, Wagner EH. *Physicians experience with the acquired immunodeficiency syndrome as a factor in patients' survival.* N Engl J Med 1996;334:701-6.
16. Palella, F. J., M. Deloria-Knoll, J. S. Chmiel, A. C. Moorman, K. C.Wood, A. E. Greenberg, and others. 2003. *Survival Benefit of Initiating Antiretroviral Therapy in HIV-Infected Persons in Different CD4 Cell Strata.* Ann Intern Med 2003;138:620–26.
17. WHO. *Antireteroviral therapy for HIV infection in adults and adolescents in resource-limited settings-towards universal access*. Geneva 2006.