

Research Africa Reviews Vol. 3 No. 3, December 2019

These reviews may be found on the *RA Reviews* website at:

<https://sites.duke.edu/researchafrica/ra-reviews/volume-3-issue-3-dec-19/>

HIV Treatment and Research in Sub-Saharan Africa: A Progress Report

John A. Bartlett, MD, Professor of Medicine, Global Health and Nursing
Duke University Medical Center; Professor of Medicine, Kilimanjaro Christian Medical
University College, Tanzania.

Charles Muiruri, PhD; Medical Instructor; Department of Population Health Sciences
Duke University School of Medicine; Visiting Lecturer; Kilimanjaro Christian Medical
University College.

Habib Omari, MD, PhD; Research Associate; University of Maryland School of Medicine.

Human immunodeficiency virus (HIV) is the causative agent of the acquired immune deficiency syndrome (AIDS). HIV infection has profoundly impacted sub-Saharan Africa with an estimated 20,000,000 deaths since the start of the epidemic, and by 2018 an estimated 25,600,000 were living with HIV infection¹. Such a burden of disease has dramatic consequences for health care, education, economic productivity, societal structure and culture. Since our last report in *Research Africa Reviews* in 2017², significant continued progress has been realized in treating persons with HIV and containing the epidemic. The current report will update this progress and identify remaining challenges to be addressed.

Epidemiology

Southern and Eastern Africa have an estimated 20.6 million, and Western and Central Africa have 5 million, persons with HIV¹. The numbers of persons newly infected has declined globally by 40% since the peak in 2004, but still an estimated 1.7 million persons acquired HIV in 2018 and almost 1.1 million of them reside in sub-Saharan Africa¹. The reasons for the decline in new infections are multiple, and include decreased numbers of sexual partners, treatment of persons living with HIV with resulting decreased infectivity, male circumcision, and condom use. Within sub-Saharan Africa, women account for approximately 60% of persons living with HIV. Among new HIV infections in women, many are occurring in young women age 15-24, and they are twice as likely as young men to be living with HIV¹. This epidemiologic observation of high incidence in young women is typical for a sexually transmitted disease, and may also reflect a biological predisposition to HIV acquisition in the immature female genital tract.

The Joint United Nations Programme on HIV/AIDS (UNAIDS) has identified key populations with increased risk for HIV acquisition; men who have sex with men, injection drug users, commercial sex workers, and transgender women. Worldwide they are estimated to account for 54% of new HIV infections, including 64% of new infections in Western and Central Africa

and 25% of new infections in Southern and Central Africa¹. Deaths due to HIV have declined by 33% since 2010, but still there were 770,000 deaths globally, including 470,000 in sub-Saharan Africa, in 2018¹. Tuberculosis is the leading cause of death for persons with HIV, and is responsible for 1/3 of all deaths¹.

Treatment

Antiretroviral treatment (ART) is highly efficacious, safe and relatively simple (1 pill daily) and has become widely available across sub-Saharan Africa. Globally, it is estimated that 23.3 million persons living with HIV have accessed ART, representing 62% of all persons living with HIV¹. In sub-Saharan Africa 16.4 million persons with HIV are on ART, (Southern and Eastern Africa 67%, Western and Central Africa 51%)¹. In general, the percentages of men and children who access ART are lower than women. The current WHO-favored regimen is a single pill containing three medications- dolutegravir, tenofovir and lamivudine, and its cost is approximately \$75/year as a result of licensure to generic manufacturing companies. Payment for ART is markedly discounted or free for persons attending clinics, although the costs for clinic visits, laboratory monitoring and transportation are frequently borne by patients and may be obstacles to retention in care³. Increasingly viral loads from blood samples are being measured in sub-Saharan Africa to monitor the success of ART, although there continue to be challenges in the timely reporting of results and clinical management of persons who experience virologic failure. An important consequence of full suppression of HIV replication in peripheral blood is the absolute lack of transmission risk through sexual contact, (undetectable=untransmissible)⁴.

The WHO goal for HIV care is to have 90% of persons living with HIV aware of their infections through testing, 90% of persons living with HIV in care and receiving ART, and 90% of those on ART with fully suppressed HIV in their peripheral blood in 2020. In 2018, 79% of persons with HIV knew their status, 78% of those knowing their status were in care and receiving ART, and 86% of those on ART were fully suppressed¹. Therefore, of all persons living with HIV 79% knew their status, 62% were in care and receiving ART, and 51% were virally suppressed. ART for pregnant women is essential to eliminate mother to child transmission; in 2018 it was estimated that 82% of pregnant women globally were receiving ART, (92% in Southern and Eastern Africa, and 59% in Western and Central Africa)¹.

Prevention

HIV prevention science has made significant advances in new technologies since our last report. Decreasing numbers of sexual partners, use of condoms, male circumcision, and ART for persons living with HIV continue to be important components of prevention strategies. One intervention with expanded use is pre-exposure prophylaxis (PrEP) for persons with higher risk for HIV acquisition. These persons could include the HIV negative sex partners of persons with HIV who are not virally suppressed, men who have sex with men, injection drug users, commercial sex workers, transgender women, and persons with a history of sexually transmitted disease⁵. PrEP contains 2 medications in a single pill that must be taken once daily.

Challenges with PrEP can include the need for adherence to a daily medication regimen, behavioral disinhibition with increased numbers of sexual partners, increased reporting of sexually transmitted diseases other than HIV, and pregnancy⁵. Newer forms of PrEP in development include long-acting PrEP which may be given as an injection every two-three months (cabotegravir)⁶, and implantable PrEP with a device elutes a preventative medication for up to one year (islatravir)⁷.

Other devices which may serve as PrEP include a dapivirine vaginal ring⁸, and vaginal microbicides which contain ART such as tenofovir⁹. These devices may offer the advantage that they are in the control of women. Efforts to develop an HIV vaccine continue, although significant scientific hurdles exist and it is unlikely that an efficacious vaccine will be available in the next five years.

Challenges

Sub-Saharan Africa does face continuing challenges in ending the HIV/AIDS epidemic. High on the list is stigma, which is a ubiquitous obstacle around the world. Stigma results in negative health outcomes by hampering testing efforts, access to care, retention in care, and medication adherence. Although most ART is provided free of charge, clinic visits, transportation to clinic and laboratory assessments are not usually free, and the relative poverty of sub-Saharan Africa may represent a barrier to care. Men are difficult to engage in testing and care, and substantial efforts are underway to reach this important population. In many settings, exposure to sexual health and HIV prevention education does not begin until after individuals reach 18 years of age; however, sexual debut can be much earlier. Early engagement to address the healthcare needs of the young individuals at risk for HIV and other STIs is critical in order to achieve an AIDS-free generation. Outreach to key populations such as men who have sex with men, injection drug users, commercial sex workers and transgender women is complicated by societal stigma, and in some sub-Saharan African countries, fear of legal prosecution. Adolescent girls and young women are at high risk for HIV acquisition, but societal norms, stigma and sometimes legal barriers may interfere with efforts to promote sexual health in this population.

Currently there are efforts to integrate sex education and family planning services into primary health care for adolescent girls and young women. Across sub-Saharan Africa, there is a powerful epidemiologic transition taking place with the emergence of non-communicable diseases such as cardiovascular disease, stroke, chronic kidney and lung disease, and cancer. Persons living with HIV have a higher risk for each of these non-communicable diseases, and increasingly these co-morbidities are being reported. In the context where health services for persons with HIV are “siloes”, medical management of multiple conditions simultaneously becomes difficult and requires adaptations in the health system. Finally, across sub-Saharan African countries Ministries of Health face competing priorities in their budget allocations, leaving HIV-related prevention, care and research programs under-resourced.

The Way Forward

Increasingly, the tools to end the HIV epidemic are available in sub-Saharan Africa; the scientific evidence base is strong and, with international assistance, many of the tools are provided at reduced cost. However, the optimal use of these tools in sub-Saharan African context may remain to be identified. Achieving optimal health outcomes requires addressing the sociocultural, behavioral, economic, health system, legal and political context for persons living with HIV. Adapting proven strategies and interventions requires tailoring to the complex local environment.

In this scenario, the use of implementation and dissemination science methods becomes critically important. Implementation science may be defined as the use of rigorous methods and strategies to promote the routine uptake of interventions with proven health benefit in real-world settings¹⁰. To ensure that these evidence-based interventions are optimized, implementation science studies measure acceptability, affordability, appropriateness, cost, feasibility, fidelity, penetration, and sustainability. Implementation science may use study design approaches from

established disciplines such as epidemiology, statistics, clinical trials, behavioral sciences, policy science, and health economics. The tools for HIV prevention and treatment are at our fingertips, and now we must understand how to employ them with optimal impact. Increasingly sub-Saharan scientists are being trained in implementation science techniques, with multiple short course training programs across the continent and several leading universities now offering Masters of Science degrees.

Conclusion

Substantial progress has been made in the past two years with regard to HIV testing, scale-up of ART, and prevention options. Survival among persons with HIV is significantly improved, the numbers of new infections have declined, and prevention of mother to child HIV transmission is highly successful. However, sub-Saharan Africa continues to bear the brunt of HIV disease burden. Now the focus for African researchers is to build upon these successes with an array of powerful tools and implement them to achieve optimal outcomes.

Citations

1. UNAIDS; Fact Sheet- Global AIDS Update 2019. https://www.unaids.org/sites/default/files/media_asset/UNAIDS_FactSheet_en.pdf; accessed November 18, 2019.
2. Bartlett J, Muiruri C, Ramadhani H. The Current State of HIV Treatment and Research in Africa. Research Africa, November 2017.
3. Ayieko J, Brown L, Anthierens S et al. “Hurdles on the path to 90-90-90 and beyond”: Qualitative analysis of barriers to engagement in HIV care among individuals in rural East Africa in the context of test-and-treat. PLoS One 2018; <https://doi.org/10.1371/journal.pone.0202990>
4. Cohen M, Chen Q, McCauley M et al. Antiretroviral therapy for the prevention of HIV-1 transmission. New Engl Jour Med 2016; 375:830-839.
5. CDC; <https://www.cdc.gov/hiv/risk/prep/>; accessed on November 18, 2019
6. Markowitz M, Frank I, Grant R et al. Safety and tolerability of long-acting cabotegravir injections in HIV-uninfected men (ÉCLAIR): a multicenter, double-blind, placebo-controlled phase 2a trial. The Lancet HIV 2017; doi: 10.1016/S2352-3018(17)30068-1.
7. Matthews R, Barrett S, Patel M et al. First-in-human trial of MK-8591 eluting-implants demonstrates concentrations suitable for HIV prophylaxis for at least one year. Abstract TUAC0401LB presented at the International AIDS Society Conference 2019; Mexico City.
8. Nel A, van Niekerk N, Kapiga S et al. Safety and efficacy of a dapivirine vaginal ring for HIV prevention in women. New Engl Journ Med 2016; 375:2133-2143.
9. Abdool Karim Q, Abdool Karim S, Frolich J et al. Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. Science 2010; 329:1168-1174

10. Adapted from the definition of implementation science provided by University College London, <https://www.ucl.ac.uk/gacd/research/implementation-science>, accessed November 19, 2019.

Research Africa

Copyright © 2019 by Research Africa, (research_africa-editor@duke.edu), all rights reserved. RA allows for copy and redistribution of the material in any medium or format, provided that full and accurate credit is given to the author, the date of publication, and the location of the review on the RA website. You may not distribute the modified material. RA reserves the right to withdraw permission for republication of individual reviews at any time and for any specific case. For any other proposed uses, contact RA's Editor-in-Chief. The opinions represented in the reviews and published on the RA Reviews website are not necessarily those held by RA and its Review editorial team.

ISSN 2575-6990