HIV Prevention for a Threatened Continent

Implementing Positive Prevention in Africa

Rebecca Bunnell, ScD, MEd
Jonathan Mermin, MD, MPH
Kevin M. De Cock, MD, FRCP, DTM&H

THE ENORMOUS HUMAN TRAGEDY REPRESENTED BY MORE than 2.4 million deaths and 3.2 million incident human immunodeficiency virus (HIV) infections in sub-Saharan Africa in 2005[1] highlights the inadequacy of current HIV prevention efforts in Africa. Although considerable expansion of antiretroviral therapy (ART) programs is occurring in Africa, prevention efforts have not kept pace. In low-income countries, substantial investment in prevention may be cost-effective, since future care and treatment costs will be averted. New approaches and new resources might reinvigorate underfinanced HIV prevention efforts and avoid a widening gap between the numbers of individuals needing and receiving ART.

Positive Prevention

Internationally, HIV prevention efforts traditionally have concentrated on reducing HIV acquisition risk, focusing primarily on uninfected individuals or ignoring the serostatus of target populations. When HIV prevention efforts began in Africa nearly 20 years ago, HIV testing was not widely available, and concerns about potential stigma and negative social outcomes related to knowledge of HIV status were paramount. These factors may have diverted attention from prevention approaches targeting individuals with HIV and instead resulted in mass media, community, and peer-education approaches targeting all those at risk.

However, only persons with HIV, a much smaller population than all those at risk, can transmit HIV. Preventive interventions for individuals with HIV ("positive prevention") help reduce their risk of transmission based on the principles of infectious disease epidemiology that focus on the infectious source. Several approaches to positive prevention have proven efficacy.[2] In Africa, provision of voluntary counseling and testing to serodiscordant couples was reported to reduce transmission by 56%.[3] In the United States, clinician-initiated communication, group counseling, and partner testing reduced the frequency of unprotected sexual acts and numbers of sexual partners among adults with HIV.[4] In addition, ART has been associated with an approximately 80% reduction in transmission within HIV-discordant couples.[5]

Positive prevention has been recommended by UNAIDS (the Joint United Nations Programme on HIV/AIDS),[6] is being implemented in industrialized countries,[7] and should now become a priority in Africa and other high-prevalence regions. We propose 10 approaches for implementing positive prevention in Africa that prioritize interventions with the largest potential impact on HIV transmission (TABLE). Some approaches have proven efficacy, some are being piloted, and some would benefit from exploration and development of evidence-based policy.

Implementation of Positive Prevention

Ensuring Individuals With HIV Learn Their HIV Status. The vast majority of individuals with HIV in Africa have never had an HIV test, although knowledge of HIV status has been associated with preventive behavior by individuals with HIV.[8] Expansion of traditional voluntary counseling and testing, routine HIV counseling and testing in clinical settings, and mobile, community-based, and door-to-door testing would increase the proportion of individuals living with HIV who know their status and has begun in several countries. In Lesotho, a government-sponsored campaign aims to offer voluntary counseling and testing to all adults to achieve universal knowledge of serostatus.[9] This should help to allow preventive behavior,[8] informed partner selection, and increased access to care and treatment for all individuals with HIV.

Disclosure of HIV Status to Partners. Traditional HIV programs focus on individuals rather than couples or families, and a shift in approach is required to reach partners of individuals with HIV. One challenge is disclosure of HIV status, as rates of disclosure to sexual partners in Africa are generally low.[10] Disclosure, especially to partners, may facilitate effective prevention of sexual transmission of HIV, prevention of mother-to-child transmission (MTCT), and treatment adherence. In Uganda, counselor-assisted disclosure for couples in their home or at a facility is being piloted, and in Kenya, partner disclosure by women with HIV has been associated with a 4-fold increase in reported condom use to nearly 70%.[11] Partner notification for sexually transmitted infections (STIs) has been implemented in some

Author Affiliations: Centers for Disease Control and Prevention–Uganda, Global AIDS Program, National Center for HIV, STD, and TB Prevention, Centers for Disease Control and Prevention, Entebbe (Drs Bunnell and Mermin); and Department of HIV/AIDS, World Health Organization, Geneva, Switzerland (Dr De Cock).
Corresponding Author: Rebecca Bunnell, ScD, MEd, Uganda Virus Research Institute, PO Box 49, Entebbe, Uganda (rrb7@cdc.gov).

African countries with mixed results, but could be adapted, in contextually appropriate ways, for HIV.[12] Operational research is required to determine how to make HIV partner disclosure routine, expected, and safe, while protecting the rights of persons with HIV.

HIV Testing of Partners. Human immunodeficiency virus discordance within couples is common in Africa. Of married individuals with HIV in East Africa, approximately 40% to 50% have spouses who are HIV negative.[13] However, in East Africa, only approximately 20% of adults with HIV are aware of their infection status, and condom use within marriage is low.[13] Seronegative partners in discordant couples are likely to be Africa's largest single risk group for HIV infection. In this context, knowledge of partners' HIV status and safer sexual activity are needed in conjunction with faithfulness by individuals with HIV to reduce HIV transmission. Many clinicians and individuals who are HIV positive assume that sexual partners of infected persons must also

Table. Positive Prevention Action Plan for Africa

Intervention	Potential Benefits	Possible Implementation Approaches
Ensuring individuals with HIV learn their HIV status	Allows for efficient targeting of prevention efforts Facilitates early entry into care and treatment	Implementation of a range of testing approaches, including routine HIV counseling and testing in clinical settings 100% access to voluntary counseling and testing through door-to-door programs Stand-alone, mobile, and family-based voluntary counseling and testing
Supporting HIV status disclosure by individuals who are HIV positive	Involves partner in prevention, care, and support	Disclosure by individual with HIV Counselor-assisted disclosure Voluntary partner notification
Testing and counseling of sexual partners of individuals with HIV	Identifies previously undiagnosed HIV infections and HIV-discordant couples Facilitates transmission prevention	Integration of partner testing as routine component of prevention, care, and treatment programs Facility, mobile, and home-based voluntary counseling and testing provision Counseling of couples
Provision of ART	Reduces viral load and risk of HIV transmission Provides opportunities for integrating prevention into ART programs	Ensure access to and provision of ART for those individuals clinically eligible Ensure education emphasizing that ART does not eliminate transmission risk Incorporate free condom and family planning services into ART programs
Behavioral interventions for individuals with HIV	Focuses on source of new infections Reduces frequency of unprotected sexual acts Reduces HIV transmission risk	Individual, group, and structural interventions for individuals with HIV to promote abstinence, reduced frequency of sex, partner reduction, condom use, and nonpenetrative means of sexual expression Addiction treatment and behavioral interventions for drug users with HIV Use of clinical practitioners as well as counselors and peer supporters Ongoing interventions for HIV-discordant couples
Selection of low-risk blood donors	Reduces risk of HIV transmission through blood transfusions	Volunteer blood donors with screening based on locally determined risk factors Emphasis on repeat donors
Prevention of unintended pregnancies among women with HIV	Prevents vertical transmission Reduces HIV infection risk for women who are HIV negative in HIV-discordant couples	Integration of family planning counseling and services into care, treatment, and MTCT prevention programs Training for AIDS service practitioners in family planning counseling and service delivery
Universal access to more effective prevention of MTCT for pregnant and delivering women with HIV	Reduces HIV transmission risk from HIV-positive mothers to their infants	Routine HIV testing and counseling for all pregnant and delivering women Full package of MTCT prevention interventions, including ART prophylaxis and treatment Provision of breast milk alternatives and early-weaning counseling, according to country guidelines
STI screening and treatment for individuals with HIV and their partners	Reduces HIV transmission and acquisition risks	Routine STI screening for all individuals with HIV in care and treatment programs and partner notification should be considered Guidelines for effective approaches to STI diagnosis and treatment for individuals with HIV should be developed
Promotion of leadership by individuals with HIV in positive prevention	Supports a human and civil rights approach and ownership by target group	Support for HIV/AIDS organizations that promote individuals with HIV to become implementers and leaders in advocating positive prevention

Abbreviations: ART, antiretroviral therapy; HIV, human immunodeficiency virus; MTCT, mother-to-child transmission; STI, sexually transmitted infection.

be infected with HIV and see no need for partner testing.[14] Ensuring that partners of individuals with HIV receive voluntary counseling and testing is an essential part of a basic prevention and care package.[15]

Provision of ART. Provision of ART to persons who are infected in discordant relationships also reduces the risk of HIV transmission by reducing viral load in the individual with HIV.[5] Because ART is indicated for those persons with advanced HIV disease and the highest viral loads, widespread provision of ART could affect HIV incidence, provided that the preventive effects of ART are not offset by increases in risk behavior. In Africa, integrated prevention and ART programs that include partner testing, behavioral interventions, counseling, condom provision, and ART have been associated with an estimated 98% reduction in HIV transmission risk.[16]

Reduce Behaviors That Put Others at Risk. In addition to disclosure and partner testing, individual and small group behavioral interventions designed for use by persons with HIV to reduce sexual HIV transmission through abstinence, condom use, partner reduction, serosorting, reduced frequency of sex, and nonpenetrative sexual activity should be developed, evaluated, and expanded. Clinician attitudes, discomfort, and lack of skills in discussing sex with patients need to be addressed to ensure that individuals with HIV who choose to be sexually active can be supported to do so with minimal transmission risk and without stigma. Although prospective cohort data suggest that integration of prevention interventions into treatment programs can reduce HIV transmission risk,[16] randomized evaluations of different behavioral intervention models, including clinician-initiated communication, are needed. In areas in which HIV is spreading in drug-using populations, addiction treatment and behavioral interventions, such as the use of bleach for disinfecting needles and syringes, should be implemented. Selection of low-risk blood donors is a component of positive prevention that has been effective,[17] but selection criteria should be based on current HIV incidence patterns in generalized epidemics.

Prevention of Unintended Pregnancies and MTCT. Infants born to mothers with HIV constitute a numerically large group at risk for acquiring HIV in Africa. In 2005, the estimated 700 000 new infections in children worldwide constituted approximately 14% of a total of 4.9 million infections, and the vast majority were in Africa.[1] Prevention of HIV infection in women and of unintended pregnancy among women with HIV are the most cost-effective ways to prevent HIV infection of infants.[18] However, many MTCT prevention programs do not provide any family planning education or services. In Uganda, 35% of 1092 adults with HIV reported sex without contraception in the previous 3 months; however, 73% of these individuals did not want more children.[19]

Additional challenges regarding family planning are emerging. Life circumstances and feeling of well-being change with ART, and desire for children may increase. Additional training in family planning for staff and provision of free family planning services should be included in the context of ART scale-up.

For women who are pregnant, only routine, universally available HIV testing can ensure equitable delivery of prevention of MTCT. For women with HIV who desire more children in resource-limited settings, research on use of ART for viral suppression through late pregnancy, delivery, and time-limited, exclusive breastfeeding suggests promise for maximally reducing MTCT.

Sexually Transmitted Infections. Although population-based STI interventions have shown mixed results regarding HIV risk in Africa,[20] at the individual level, STIs increase risk of HIV transmission and acquisition and are associated with increased HIV viral load in genital secretions.[21] A syndromic approach to STI management, which is widely used in resource-limited settings where laboratory diagnostics are limited, has not been evaluated in Africa for individuals with HIV infection. The usefulness of syndromic management may be different among people with HIV in this setting, where the prevalence of herpes simplex virus type 2 infection, syphilis, and other genital infections is greater than in the general population.[22] Effective approaches for STI diagnosis and treatment for individuals living with HIV and their partners should be identified and systematically integrated into all HIV care and treatment programs. An especially important group to target for STI control, consistent condom use, and other aspects of positive prevention is commercial sex workers and their partners who have the potential to transmit HIV across sexual networks.[23]

Leadership by Individuals With HIV. To effectively reduce HIV transmission in Africa, individuals living with HIV/AIDS should be active leaders in positive prevention efforts.[6] Involvement of individuals with HIV will likely help prevent discrimination and ensure that positive prevention is seen as a necessary approach that is mutually beneficial for infected and uninfected individuals. For individuals with HIV, positive prevention not only provides protection from acquisition of other STIs, it also protects those they love from HIV infection and their children from orphanhood. Widespread commitment to the pledge "HIV stops with me" among individuals with HIV is needed,[24] without reducing the responsibility of individuals who are HIV negative to remain so.

Promising Interventions and Prevention Research. In a recent trial in South Africa, circumcision of men who were HIV negative was associated with a two-thirds reduction in HIV acquisition.[25] Other circumcision trials will soon provide efficacy data, as well as information on the impact of male circumcision on HIV transmission to partners uninfected with HIV. Results from these trials should be rapidly translated into programmatic interventions if benefit is shown, especially if similar high levels of protection are demonstrated. Several

other potential interventions, such as acyclovir prophylaxis for those individuals with herpes simplex virus type 2 coinfection and microbicides, also appear promising and some trials are now under way. Increased resources for evaluating the efficacy of new prevention interventions and for rapid translation of research into policy are needed concurrently with increased prevention programmatic resources. Ideas for other prevention interventions may be best developed by those individuals currently working on program implementation. Technical and financial resources are necessary to ensure scientifically rigorous evaluations.

Conclusions

There is an ethical and public health imperative to implement effective prevention strategies and treatment. Epidemiological surveillance can indicate in which populations HIV transmission is most intense. Combining prevention services for the most at-risk HIV-negative groups with universal access to HIV testing and positive prevention offers the best opportunity to control HIV/AIDS in Africa.

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REFERENCES

1. UNAIDS. AIDS Epidemic Update December 2005. http://data.unaids.org/Publications/IRC-pub06/epi_update2005_en.pdf. Accessibility verified July 12, 2006.
2. Crepaz N, Lyles CM, Wolitski RJ, et al. Do prevention interventions reduce HIV risk behaviours among people living with HIV? a meta-analytic review of controlled trials. *AIDS*. 2006;20:143-157.
3. Allen S, Tice J, van de Perre P, et al. Effect of serotesting with counselling on condom use and seroconversion among HIV discordant couples in Africa. *BMJ*. 1992;304:1605-1609.
4. Gordon CM, Forsyth AD, Stall R, Cheever LW. Prevention interventions with persons living with HIV/AIDS: state of the science and future directions. *AIDS Educ Prev*. 2005;17(1 suppl A):6-20.
5. Castilla J, Del Romero J, Hernando V, et al. Effectiveness of highly active antiretroviral therapy in reducing heterosexual transmission of HIV. *J Acquir Immune Defic Syndr*. 2005;40:96-101.
6. UNAIDS. Intensifying HIV prevention (UNAIDS policy position paper). http://data.unaids.org/Publications/IRC-pub06/jc1165-intensif_hiv-newstyle_en.pdf. Accessibility verified July 12, 2006.
7. Centers for Disease Control and Prevention. Incorporating HIV prevention into the medical care of persons living with HIV: recommendations of CDC, the Health Resources and Services Administration, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. *MMWR Recomm Rep*. 2003;52(RR-12):1-24.
8. Marks G, Crepaz N, Senterfitt JW, Janssen RS. Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: implications for HIV prevention programs. *J Acquir Immune Defic Syndr*. 2005;39:446-453.
9. Morris M. Lesotho to offer free HIV tests. *BBC News*. November 29, 2005. http://news.bbc.co.uk/go/pr/fr/-/2/hi/africa/4480108.stm. Accessibility verified July 10, 2006.
10. Medley A, Garcia-Moreno C, McGill S, Maman S. Rates, barriers and outcomes of HIV serostatus disclosure among women in developing countries: implications for prevention of mother-to-child transmission programmes. *Bull World Health Organ*. 2004;82:299-307.
11. Farquhar C, Kiarie JN, Richardson BA, et al. Antenatal couple counseling increases uptake of interventions to prevent HIV-1 transmission. *J Acquir Immune Defic Syndr*. 2004;37:1620-1626.
12. Gichangi P, Fonck K, Sekande-Kigondu C, et al. Partner notification of pregnant women infected with syphilis in Nairobi, Kenya. *Int J STD AIDS*. 2000;11:257-261.
13. Tanzania Commission for AIDS (TACAIDS), National Bureau of Statistics (NBS), and ORC Macro. *Tanzania HIV/AIDS Indicator Survey 2003-4*. Calverton, Md: TACAIDS, NBS, and ORC Macro; 2005. http://www.measuredhs.com/pubs/pdf/AIS1/08Chapter08.pdf. Accessibility verified July 12, 2006.
14. Bunnell RE, Nassozi J, Marum E, et al. Living with discordance: knowledge, challenges, and prevention strategies of HIV-discordant couples in Uganda. *AIDS Care*. 2005;17:999-1012.
15. Mermin J, Bunnell R, Lule J, et al. Developing an evidence-based, preventive care package for persons with HIV in Africa. *Trop Med Int Health*. 2005;10:961-970.
16. Bunnell R, Ekwaru JP, Solberg P, et al. Changes in sexual behavior and risk of HIV transmission after antiretroviral therapy and prevention interventions in rural Uganda. *AIDS*. 2006;20:85-92.
17. Heyns Adu P, Benjamin RJ, Swanevelder JP, et al. Prevalence of HIV-1 in blood donations following implementation of a structured blood safety policy in South Africa. *JAMA*. 2006;295:519-526.
18. Sweat MD, O'Reilly KR, Schmid GP, Denison J, de Zoysa I. Cost-effectiveness of nevirapine to prevent mother-to-child HIV transmission in eight African countries. *AIDS*. 2004;18:1661-1671.
19. Nakayiwa S, Abang B, Packel L, et al. Desire for children and pregnancy risk behavior among HIV-infected men and women in Uganda [published online ahead of print May 20, 2006]. *AIDS Behav*. 2006.
20. Korenromp EL, White RG, Orroth KK, et al. Determinants of the impact of sexually transmitted infection treatment on prevention of HIV infection: a synthesis of evidence from the Mwanza, Rakai, and Masaka intervention trials. *J Infect Dis*. 2005;191(suppl 1):S168-S178.
21. Cohen MS. Sexually transmitted diseases enhance HIV transmission: no longer a hypothesis. *Lancet*. 1998;351(suppl 3):5-7.
22. Wawer MJ, Sewankambo NK, Serwadda D, et al; Rakai Project Study Group. Control of sexually transmitted diseases for AIDS prevention in Uganda: a randomised community trial. *Lancet*. 1999;353:525-535.
23. Leonard L, Ndiaye I, Kapadia A, et al. HIV prevention among male clients of female sex workers in Kaolack, Senegal: results of a peer education program. *AIDS Educ Prev*. 2000;12:21-37.
24. US Department of Health and Human Services. Achieving an HIV-free generation: recommendations for a new American HIV strategy. http://www.pacha.gov/pdf/PACHArev113005.pdf. Accessibility verified July 10, 2006.
25. Auvert B, Taljaard D, Lagarde E, et al. Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 trial [published online ahead of print October 25, 2005]. *PLoS Med*. 2005;2:e298.

