Chapter 2

HIV Prevention Needs: Primary Prevention and Prevention for People Living with HIV/AIDS

Nalini Tarakeshwar, Seth C. Kalichman, Leickness C. Simbayi, and Kathleen J. Sikkema

Introduction

Chapter one of this volume provides an overview of the global scenario of HIV and AIDS. Available data suggests that the number of HIV infections has varied globally since 2000, with HIV rates in some countries such as Kenya and Malawi declining, while other countries such as Uganda and Thailand report setbacks in their previously declining rates of HIV infection. Moreover, HIV/AIDS seems to be gaining further ground in Russia and the most populous regions of the world including India and China. For a sustainable response to the epidemic, both prevention and treatment services need to be brought to scale simultaneously. Although 700,000 people began antiretroviral (ARV) treatment in 2006, around four million people became infected with HIV. As Kevin De Cock, the World Health Organization's (WHO) HIV/AIDS Director emphasized, "We cannot treat our way out of this epidemic. For every case going into treatment, six more are going to the back of the line." (Alcorn, 2007) This chapter provides a broad overview of primary prevention for at-risk populations and prevention interventions targeted to people living with HIV/AIDS.

HIV Primary Prevention Targeted to Populations At-Risk

While many primary prevention approaches were first tested in the US where the diagnosis of AIDS was first publicly made known, more recently testing of these approaches has occurred in the low resource settings of Africa and

Asia. Importantly, even if a prevention approach is found effective in Kenya, it does not assure success in other African countries. However, it does suggest that the approach may be culturally transportable. Here, we have organized the description of the primary prevention programs according to their known effectiveness in resource limited settings.

HIV Primary Prevention Approaches Found Effective in Resource Limited Settings

Voluntary, Counseling and Testing (VCT)

Usually integrated within a hospital or a community clinic that provides HIV care, VCT enables interested individuals to learn their HIV status, learn more about HIV, and potentially gain access to HIV care and treatment, if available. In Kenya and Tanzania, VCT has been shown to decrease unprotected sex between tested couples and with non-primary partners (Sweat et al., 2000). With the advent of low cost combination antiretroviral (ARV) therapies in developing countries, VCT has been expanding as a prevention strategy in these settings. In Uganda, home-based prevention counseling and partner VCT was integrated with an ARV therapy program (Bunnell et al., 2006) to produce decreased sexual risk behavior among a cohort of HIV positive persons, thereby lowering risk of transmission to uninfected partners. VCT is being adopted widely in India as well (Dandona et al., 2005) in order to reach rural populations, including pregnant women (Rogers et al., 2006). Prevention of mother-to-child transmission (PMTCT) at HIV clinics is now being merged with VCT centers to provide an integrated system of counseling, testing, and treatment. However, stigma, poor health care infrastructure and limited access to health services necessitate modification of prevention approaches across different settings. Finally, independent of HIV testing, risk reduction counseling in sexual health clinic settings has shown promising effects in South Africa (Kalichman et al., 2007b; Simbayi et al., 2004).

Promotion of Condom Use

As a primary prevention strategy, a core target group for condom promotion is commercial sex workers. The highly acclaimed 100% Condom Use Programme was initiated in 1989 in Thailand to target brothel owners, sex workers, and their clients to achieve 100% condom use in commercial sex. The principle of "No Condom, No Sex" for penetrative sex services was propagated through mass media and workplace programs while free condoms were made available in sex establishments. Condom use rates in sex work increased substantially, from 14% in early 1989 to over 90% in 1992 (Rojanapithayakorn & Hanenberg, 1996). While attempts have been made to replicate the Programme in other countries (Rojanapithayakorn, 2006), it remains to be seen whether and how these facility-based programs can be replicated for sex workers who are less organized, such as street-based sex workers or those who carry out their work in secret.

Couples where one of the partners is involved in a high-risk behavior are another group targeted for condom promotion. In many countries married women are at risk for HIV infection due to higher frequency of intercourse, lower rates of condom use, and the greater sexual risk behavior of their husbands (Clark,

2004). Couples' counseling that is integrated with VCT activities is reportedly effective in promoting condom use. In the VCT Efficacy Study (2000) in Kenya, Tanzania, and Trinidad, 586 couples (serodiscordant, seroconcordant, and HIV-unaffected couples) were randomly assigned to (a) a couple-based VCT emphasizing condom use or (b) a health information education intervention. Couples in the VCT arm of the trial significantly reduced unprotected sexual intercourse with their primary partner, when compared to those given health education. The HIV-risk among serodiscordant couples may vary across settings, however. A study by Mehendale et al. (2006) among a cohort of 412 such couples in Pune, India indicated that at 12 month follow-up, the HIV incidence among uninfected partners was 1.22 per 100 person-years (95% CI 0.45–2.66), which is much lower than rates reported in Africa. During the study, the couples were provided with routine pre and post-HIV test counseling, risk reduction counseling including condom use and provided with condoms. At the time of this writing, a community level trial of community-based VCT was being tested in South Africa, Zimbabwe, Tanzania, and Thailand. Project Accept is a community based VCT randomized trial in 32 communities in South Africa, Tanzania, and Zimbabwe and 14 communities in Thailand (Bertozzi et al., 2006). The community-level intervention is intended to remove barriers to VCT and make VCT routine and available, to engage the community through outreach, and to provide post test support. This trial has HIV incidence as its endpoint.

Peer-Based Programs

Based on Roger's diffusion of innovative theory (Rogers, 1983), peer approaches can use influential members of a community to disseminate information related to HIV and AIDS within community settings. Supported by evidence from the U.S. where diffusion-based interventions have resulted in greater condom use and lower unprotected sexual intercourse (Centers for Disease Control [CDC] AIDS Community Demonstration Projects Research Group, 1999; Sikkema et al., 2005), peer-based prevention has been applied outside the U.S. Recently, a two-arm randomized, controlled intervention trial of a peer-based diffusion of innovations approach was implemented among social networks of young men who have sex with men (MSM) in St. Petersburg, Russia and Sofia, Bulgaria (Amirkhanian et al., 2005). Of the 52 MSM social networks in these two sites, 25 participated in the peer-led intervention. At the 3-month follow up, experimental network members reporting unprotected intercourse (UI) declined from 71.8 to 48.4% and the percentage of those engaged in UI with multiple partners reduced from 31.5 to 12.9%. After 12 months, participants who had multiple recent sexual partners significantly reduced frequencies of UI and UAI. Little change was found in the control group networks. Kelly et al. (2006) reported similar findings with networks of Roma men in Bulgaria.

Another well-known endeavor is the Sonagachi project in Kolkata, India that targeted sex workers in this city's largest red-light district of Sonagachi. As the initial activity, influential sex workers are selected as leaders to diffuse messages of empowerment and advocacy. A randomized controlled trial of this model among 100 sex workers each in two urban communities showed that overall condom use increased significantly among sex workers in the intervention community (39%) compared with those in the control community (11%). In addition, proportion of sex workers reporting consistent condom use

increased by 25% in the intervention community compared to a 16% decrease in the control community (Basu et al., 2004).

The NIMH Collaborative HIV/STD Prevention Trial is testing the adaptation of the Popular Opinion Leader (POL) (Kelly et al., 1997; Sikkema et al., 2000) to multiple cultures and populations in China, India, Peru, Russia and Zimbabwe (Van Griensven & Kalichman, 2007). This intervention uses community identified peer leaders to serve as agents for change in their community. The community intervention's test of efficacy will include both behavioral and biological outcomes indices, with the goal of developing a prototype for technology transfer. In addition, global dissemination of the POL model was evaluated in a trial of distance communication transfer, with two-thirds of NGOs who received the experimental intervention of interactive distance learning computer training and individualized distance consultation adopting the intervention in their communities (Kelly et al., 2004). Most of the NGOs did not adopt the intervention with fidelity and use of core elements was selective. Unfortunately, minimal attention has focused on the implementation of community intervention approaches in practice, with little to no data available regarding its effectiveness on community members' risk behavior.

STI Screening and Treatment

Untreated sexually transmitted infections (STIs) and genital tract infections increase the risk for HIV transmission several-fold. Sex workers, clients, and their partners are usually a target group for HIV/STI prevention as they report higher rates of genital ulcerations and HIV (Van de Perre et al., 1985). Studies have found that STI treatment decreases both HIV and STI incidence (Ghys et al., 2002; Laga et al., 1994). In a study by Grosskurth et al. (1995) in Tanzania, the HIV risk ratio for adults in the community that was randomized to improved syndromic STI management was 0.58 (p = 0.007). Thailand's 100% Condom Use Programme discussed above had an STI service component for sex workers and resulted in a significant decrease in annual incidence of STIs, from 400,000 cases per year before the Programme to less than 15,000 cases per year since 2000 (Rojanapithayakorn & Hanenberg, 1996). However, there are reports of other large scale STI programs that have not produced a significant decrease in HIV transmission (Wawer et al., 1999). It is suggested that STI control programs may be most effective when initiated early in the course of the country's HIV epidemic and when sexual risk behaviors are high (Orroth et al., 2003).

Multilevel HIV Prevention Interventions and Programs Taken to Scale

Although the potential value of multilevel HIV prevention interventions is recognized (Zaric & Brandeau, 2007), there are few multilevel interventions for HIV prevention tested in developing countries. As discussed above, Thailand's 100% Condom Use Programme (Rojanapithayakorn &Hanenberg, 1996) and Uganda's social marketing for HIV prevention programs (Slutkin et al., 2006) offer examples of national efforts to scale up multilevel HIV prevention interventions. In a more recent example, Morisky et al. (2006) tested a multi-level HIV prevention intervention for female sex workers and sex work establishments in the Philippines. The study tested the effects of structural and social influence interventions on reducing STI and HIV risk behavior and included four conditions: manager influence, peer influence, combined manager-peer

influence, and control. Intervention effects were assessed at the establishment level in multilevel models because of statistical dependencies among women employed within the same establishments. Multilevel intervention groups demonstrated greater condom use, more HIV/AIDS knowledge, and less negative condom attitudes. Participants in the combination condition also reported more positive condom attitudes, more establishment policies favoring condom use, and fewer STIs. Participants exposed to the manager-only intervention reported fewer STIs, lower condom attitudes, less knowledge, and higher perceived risk than peer-intervention only participants. The findings therefore suggest that multilevel interventions may reduce risks for sex workers in developing countries.

There are also relatively few examples of coordinated multilevel programs taken to scale in developing countries. One example of such a program is South Africa's LoveLife program. LoveLife is a large scale coordinated media and social influence intervention that includes billboards, radio and television public service messages, community programs, and school-based life skills programs. The effort was launched in 1999 and is visible throughout urban and rural areas of South Africa. LoveLife represents a rare example of a multi-tiered HIV prevention campaign developed on a national scale. A range of methods were planned to evaluate the program including national household surveys and program monitoring. To date, the evaluation effort has encountered several significant challenges, and there remains limited data on the program's effectiveness (Pettifor et al., 2005, 2007).

HIV Primary Prevention Approaches with Limited Effectiveness Data in Resource Limited Settings

HIV prevention for Substance Using Populations

Alcohol use has long been identified as a determinant of risky sexual behavior. While alcohol is declining in developed countries, it is rising in many resource-poor countries (Kalichman et al., 2007c; Saxena, 1997). Typically, alcohol prevention programs occur within a specific setting, such as bath houses or wine shops (Latkin & Knowlton, 2005; Sivaram et al., 2004) where the likelihood of alcohol use and sexual risk taking could be high or the programs may be directed towards individuals at risk of alcohol consumption, such as those in alcohol rehabilitation programs or youth in schools (Karnell et al., 2006). Given that unsafe sex in a given situation is not just related to alcohol consumption, reducing alcohol use may not eliminate the high risk behavior once it has been established. For instance, personality traits such as sensation-seeking have been shown to be related to alcohol use in sexual contexts (Kalichman et al., 2006).

Injection drug users (IDUs) are at high risk for HIV infection/transmission due to sharing of unclean needles. Further, those who are "heavy drinkers" are also more likely to share needles (Latkin & Knowlton., 2005). The harm reduction approach for IDUs, which uses a combination of needle exchange programs (NEPs; needles/syringes are distributed or exchanged), access to drug treatment and substitution and provision of counseling and condoms, has been implemented very successfully in Brazil. In the developed countries, NEPs in particular have been found to be effective in reducing needle sharing behaviors, drug treatment counseling and condoms. In most developing countries,

especially South Asia, IDUs have not been prioritized in HIV prevention efforts (Kawichai et al., 2006; Panda & Sharma, 2006). Nevertheless, preliminary evidence suggests that NEPs in developing countries also reduce drug risk behavior and HIV infection. Apart from NEPs, methadone maintenance or other drug substitution (if permitted by law) and behavioral change interventions are also used in HIV prevention for IDUs. A recent meta-analysis of 39 randomized-controlled trials of behavioral interventions reported that such interventions facilitate condom use, promote entry into drug treatment, and reduce IDU and non-IDU drug use and sex trading (Copenhaver et al., 2006).

HIV Prevention for Men who have Sex with Men

A recent meta-analytic review of behavioral interventions for MSM across the globe (Herbst et al., 2005) suggests that these interventions reduce the rates of unprotected anal intercourse, decrease number of sexual partners, and increase condom use during anal sex; their effect on biological outcomes, such as STD or HIV incidence is less clear. Nonetheless, MSM have been marginalized in HIV prevention activities in most developing countries (with the exception of Brazil). Due to the stigma of homosexuality in many African and Asian societies, most of these men are also married. In India, the existence of many gender identities and sexual partnerships and their fluidity makes it difficult to apply the western constructs of homosexuality and heterosexuality (Asthana & Oostvogels, 2001). Furthermore, a recent study with 2,388 Indian men attending STI clinics (Hernandez et al., 2006) found that while all men reported sex with women, 11% reported sex with three genders (women, men, and male-to-female transgender). Importantly, efforts are being made by researchers and policy makers across the globe to gather evidence and document the vulnerability of this group to HIV infection, so that interventions can be put in place.

School-based Sex Education

A review of 22 school-based sex and HIV education programs in developing countries by Kirby et al (2006) reported that most programs reduced risky sexual behaviors (measured as delaying sex, reducing frequency of sex, decreasing number of sexual partners, increasing condom use, and decreasing unprotected sexual intercourse). However, only 13 of the 22 programs were rated by the authors as meeting rigorous methodological standards. They recommend more widespread implementation and rigorous evaluations of these programs. Studies of programs that promote abstinence indicate that although these may delay the onset of sexual activity initially, they do not decrease the likelihood of STIs or unplanned pregnancies, and increase the likelihood of unprotected sex (Kirby, 1997).

Future Directions for HIV Primary Prevention Research

Recent developments, especially important advances in biomedical research, provide support for optimism related to primary prevention of HIV infection. Interestingly, behavioral and social influences play a key role in the potential efficacy of most or all of these advances, underscoring the critical need to

utilize an interdisciplinary approach to HIV prevention that integrates biomedical, social and behavioral sciences.

Bio-behavioral Intervention Approaches

A number of promising new HIV prevention approaches are being evaluated that have the potential to significantly reduce HIV transmission around the world (Bertozzi et al., 2006; Cohen, 2005; Global HIV Prevention Working Group [GHPWG], 2006). Biomedical interventions that are currently in late-stage trials include: male circumcision, microbicides, cervical barriers, herpes suppression, antiretroviral treatment (ART) to prevent sexual transmission, and HIV vaccines. However, none of these prevention methods are expected to be fully protective and thus a combination of existing approaches, including behavioral change, are needed to reduce global HIV/AIDS. And, of concern, is the potential for behavioral disinhibition, where advances or potential advances in biomedical approaches result in an increase in HIV risk behavior, undercutting or decreasing the impact of biomedical approaches tested in controlled clinical trials (Eaton & Kalichman, 2007).

Many of the current biomedical approaches being evaluated stemmed from observational studies that identified factors associated with HIV infection. For example, observational studies have documented that countries with higher rates of circumcision have lower rates of HIV infection (Weiss et al., 2000). Following the original randomized clinical trial to determine the efficacy of adult circumcision (Auvert et al., 2005), which demonstrated a more than 50% lower risk of subsequent HIV acquisition among men in South Africa, trials in Kenya and Uganda recently revealed an approximate halving of risk of HIV infection among men who were circumcised (Bailey et al., 2007; Gray et al., 2007), confirming circumcision as an efficacious method to prevent HIV acquisition among adult men.

In preparation for the implementation of circumcision as a preventive intervention, studies have documented its acceptability (Westercamp & Bailey, 2007; Ngalande et al., 2006) and cost effectiveness (Kahn et al., 2006). However, the data on behavioral disinhibition remain equivocal (Auvert et al., 2005; Agot et al., 2007; Kalichman et al., 2007a) and understudied. The behavioral impact of circumcision must be further examined, and the effectiveness of circumcision in a community setting without the influence of clinical trial methodologies determined. It remains to be seen whether circumcising men also reduces risk of transmission to women. In any event, both the WHO and UNAIDS recommend that given that male circumcision does not provide complete protection against HIV, it be considered as part of a comprehensive HIV prevention package that includes the provision of HIV testing and counseling services, treatment for STI, the promotion of safer sex practices, and the provision of male and female condoms and promotion of their correct and consistent use (WHO, 2007).

Data also suggest that herpes simplex virus type 2 (HSV-2) infection, which causes genital ulcers, increases the risk of HIV acquisition and transmission. HIV negative individuals infected with HSV-2 are considered up to three times more likely to contract HIV during sexual intercourse (Freeman et al., 2006). Ongoing research is evaluating whether treatment with acyclovir, a drug that

suppresses HSV-2, will reduce the incidence of HIV transmission (Bertozzi et al., 2006; GHPWG, 2006). It is estimated that 70% of adults in Southern Africa are infected with HSV-2 (Hogrefe et al., 2002), many of whom are women. If effective, acyclovir treatment of HSV-2 could have a significant impact on the HIV/AIDS epidemic. Within the framework of drug treatment as a preventive approach, trials are underway to determine whether daily pre-exposure of ARVs, which are used in the treatment of HIV disease, can also prevent HIV transmission.

Two other prevention approaches, microbicides and cervical barrier methods, may provide women with female controlled methods, which are needed for women who are negatively impacted by social or economic power imbalances. Since most infections in the female genital tract are thought to occur within the cervix or endocervix (Moench et al., 2001) and cervical barriers (e.g., diaphragms) cover the cervix, use of such barriers could reduce HIV risk among women. In addition, numerous microbicide candidates are in the research pipeline (GHPWG, 2006), with extensive research conducted to date regarding interest and acceptability of using microbicides. Lastly, an HIV vaccine is considered the long-term hope in the prevention approaches currently under development. Since vaccine development has faced numerous scientific challenges and remains within early stages of development it is unknown if or when HIV prevention vaccine will be available.

Areas of HIV Prevention with Limited Research Currently Available

Several areas of significance for the prevention of HIV/AIDS have gone understudied and need further research. Evaluating structural or policy interventions, conducted at the population level, which address gender inequality, focus on education, housing, nutritional resources, and economic opportunities such as microfinance, access to credit and property rights is essential. A recent study showed that a structural intervention that combined microfinance and gender and HIV training reduced intimate partner violence among participating women in southern Africa (Pronyk et al., 2006). A greater understanding of the gendered dynamics of the epidemic is also needed, including new prevention strategies focused on men, especially those in high prevalence areas where women are disempowered. Reproductive health, including contraception and family planning services, should also be studied as a method of HIV prevention (Cates, 2006).

In regard to substance use and HIV risk, within the framework of drug treatment as HIV prevention, strong evidence has demonstrated that two opioid agonist medications, methadone and buprenorphine, are effective in treatment dependence on opioids (Sullivan & Fiellin, 2005; Tilson et al., 2006). Opioid agonist treatments are associated with reductions in the frequency of opioid use, fewer injections and injection risk-related behaviors, and lower rates of HIV prevalence and incidence (Sullivan et al., 2005), yet such treatment is limited in international settings.

Lastly, areas of future research that have received minimal attention include the relevance of mental health (e.g., depression, traumatic stress) in HIV risk behavior across culturally diverse settings, the impact on stigma and risk behavior among HIV negative individuals in relation to increased access to

ARV in their communities, and the differential impact of various testing strategies. Apart from VCT, the strategies that are currently being debated globally are Provider Initiated Testing and Counseling where health providers initiate HIV testing as part of their care, routine opt out testing where HIV testing is routinely recommended for all patients who come into the health clinic, and universal screening that attempts to test the population comprehensively. The latter could be mandatory, routine, or it may involve door-to-door or community by community VCT. Each of these approaches can be controversial. There are human rights concerns about potential abuse of aggressive testing and the absence of trained counselors and mental health support for tested patients in low resource settings. Operational research that compares VCT directly with each of these testing approaches is necessary to guide policy.

Prevention for Known HIV Infected Populations

As HIV has been effectively treated to the point of being considered a chronic illness in the U.S., U.K. and Western Europe, there has been an increased focus on shifting HIV prevention resources from at-risk populations to infected persons. The first research trials that tested the efficacy of HIV transmission risk reduction interventions targeted to people living with HIV/AIDS were conducted in the U.S. well into the second decade of AIDS. The delay in addressing the prevention needs of infected persons apparently stemmed from multiple factors including early emphasis on vulnerable at-risk populations, denial of continued transmission risks among people who know that they are HIV infected, fear of negative social repercussions against already stigmatized people with HIV in the form of "blaming the victim", and HIV/AIDS having high mortality in a context of few effective treatments. With the advent of effective combination ARV therapies, everything in AIDS changed, including the willingness of researchers, program implementers, and policy makers to address sexual and drug use practices among people who know they are HIV positive. The first generation of prevention interventions for people living with HIV/AIDS were grounded in Social Cognitive Theory (Bandura, 1997) and were based on the same principles of behavior change as interventions that were targeted to at-risk populations.

Findings from two independent meta-analyses summarizing the overall effects of 15 clinical trials have demonstrated significant reductions in HIV transmission risks among infected persons (Crepaz et al., 2006; Johnson et al., 2006). In fact, all but one of the intervention trials indicated significant risk reduction. Crepaz et al. (2006) found that risk reduction was demonstrated in interventions delivered in small group formats as well as individual counseling. Interventions with skills building components were more efficacious than those which introduced explicitly trained new skills. Interventions that articulated a specific theoretical basis were also more effective than those that were not grounded in theory. Interventions that were longer in duration were more efficacious than briefer interventions, although interventions that were based on ongoing service activities were not as effective. Johnson et al. (2006) reported similar patterns in their findings. While Crepaz et al. (2006) examined the follow-up point that was furthest from the intervention and Johnson et al.

(2006) analyzed the follow-up that was most proximal to the intervention, the two reviews together provide strong support for both the short-term and longer-term efficacy of prevention interventions on people living with HIV/AIDS.

There are several advantages to targeting HIV prevention interventions to people living with HIV infection. Individuals who are known HIV positive are at definite risk for HIV transmission when they engage in unprotected intercourse with an uninfected partner. Unlike prevention approaches that target populations at-risk, which require reaching large numbers of individuals, reducing HIV transmission risk behaviors among a small number of people with known HIV infection can avert entire subepidemics. For example, Kalichman et al. (2001b) showed that a small group risk-reduction intervention for men and women living with HIV/AIDS resulted in lower HIV transmission rates from male participants to male and female uninfected partners compared to the control condition. Specifically, among HIV positive men with uninfected male sex partners in the risk reduction intervention group, the rate of HIV transmission at the 6 month follow-up was one fifth that of men in the control group. This translation of experimental effect size to a public health benefit likely generalizes to other HIV prevention interventions targeting infected populations. Further mathematical modeling supports the population level impact of risk reduction among infected persons, where disclosing HIV status to sex partners by infected persons can reduce the risk of HIV transmission by as much as 40% (Galletly & Pinkerton, 2006). Targeting HIV prevention to infected persons can therefore be effective and cost-effective.

Another potential advantage of targeting HIV prevention to infected populations is the ability to integrate HIV prevention with HIV treatment and care. HIV infected persons who receive ARV therapy have regular contact with health care providers, affording opportunities for repeated delivery of prevention services. In the U.S., a randomized trial has demonstrated the effectiveness of provider delivered messages in reducing HIV transmission risk behaviors in clinical settings (Richardson et al., 2004). Finally, targeting people living with HIV for prevention may have generalized health benefits. Several factors influence HIV risk behavior across populations, such as negative affect, lack of social support and substance use, are also related to adverse health behaviors, including treatment non-adherence. Intervening at the level of underlying causal influences of HIV transmission risk behaviors can therefore filter across to other health-related behaviors.

Studies demonstrating that at least one in three people living with HIV infection continue high risk behaviors coupled with the promise of early HIV prevention interventions targeted to people living with HIV/AIDS, has brought the U.S. Centers for Disease Control (CDC) to make risk reduction for infected populations the center piece of its HIV prevention policy (CDC, 2003). These policies have driven funding streams to support community and clinical programs implementing what the CDC has termed "Prevention for Positives" and there are now several packaged and marketed HIV prevention interventions for people living with HIV.

Unfortunately, few studies have examined HIV transmission risks among people with HIV in developing countries. However, studies have indicated that continued high risk sexual behaviors are prevalent among people living with HIV/AIDS in India (Rabori, Gupta, Pandey et al., 2005), Uganda

(Bunnell et al., 2006), and Botswana (Kalichman et al., 2007d). Although HIV prevention research with HIV infected persons in developing countries is just emerging, the challenges to conducting this research are apparent. Here we examine three significant challenges to establishing HIV prevention for infected persons in developing and transitional countries; stigmas and discrimination, unmet mental health needs, and access to treatment and care services.

AIDS Stigmas

One of the most serious obstacles in the fight against HIV/AIDS the world over has been AIDS-related stigmas (Deacon et al., 2004; Shisana et al. 2005; Simbayi, 2002; UNAIDS, 2006a,b). HIV infection, as with other STIs, is widely perceived as the result of sexual excess and low moral character. At the time when those infected have the greatest need for support, people with HIV/AIDS who reveal their HIV status are often subjected to discrimination.

HIV stigmas are pervasive in many developing countries. For example, 26% of South Africans indicate that they would not be willing to share a meal with a person living with AIDS, 18% are unwilling to sleep in the same room with someone with AIDS, and 6% would not talk to a person they knew to have AIDS (Shisana et al., 2005). In a study of people living in a Cape Town township, individuals who had not been tested for HIV held significantly greater AIDS-related stigmas than individuals who had been tested (Kalichman & Simbayi, 2003). Individuals who were not tested were also more likely to believe that people with AIDS must have done something wrong to have AIDS and were more likely to endorse that they would rather not be friends with someone who has HIV/AIDS. Disclosure of HIV is necessary for accessing care and prevention services.

Throughout Asia, stigmas interfere with disclosure to health service providers (Yoshioka & Schustack, 2001) and can be perpetuated by social structures and policies. For example, in India, the Indian Supreme Court ruled in 1998 that a person with HIV/AIDS does not have the right to marry and start a family, events of utmost importance in Indian culture (Ekstrand et al., 2005). Pre-marital HIV testing policies and other mass screening programs can also support AIDS stigmas when they are not accompanied by enforced anti-discrimination laws.

Culturally held stigmas can become internalized for some people living with HIV and these internalized stigmas likely pose problems in coping, disclosure, and perhaps practicing safer sex (Lee et al., 2002; Parker & Aggleton, 2003). AIDS stigmas that interfere with HIV prevention and diagnosis can also create barriers to treatment and can become internalized by people living with HIV/AIDS. Internalized stigmas have only recently been examined in developing countries. One study examined the prevalence of discrimination experiences and internalized stigmas among HIV positive men and HIV positive women recruited from AIDS services in Cape Town South Africa (Simbayi et al., 2007). Anonymous surveys found that 40% of people with HIV/AIDS had experienced discrimination resulting from having HIV infection and one in five had lost a place to stay or a job because of their HIV status. More than one in three HIV positive persons indicated feeling dirty, ashamed, or guilty

because of their HIV status. Similar patterns of internalized stigma have also been observed in Swaziland (Simbayi et al., 2007).

AIDS stigmas can directly interfere with HIV prevention for people with HIV by inhibiting HIV status disclosure, particularly disclosure to sex partners. Research has shown that disclosing HIV status to sex partners is among the strongest predictors of sexual risk reduction among people who have HIV (Galletly & Pinkerton, 2006). In a study in Botswana, nearly all, 91%, of HIV positive persons who only have one sex partner indicate that they have disclosed their HIV status to that partner whereas only half of persons with more than one sex partner indicate having fully disclosed their HIV status to their partners (Kalichman et al., 2007d). In South Africa and Swaziland, more than one in three people living with HIV/AIDS indicate that there are people in their life that they conceal their HIV status from and in both countries concealing HIV from others was closely associated with internalized stigmas. In India, HIV status disclosure is also impaired by stigmas (Ekstrand et al., 2005). However, when people with HIV in India can disclose and experience a positive outcome from the disclosure, there are clear quality of life benefits (Chandra et al., 2003). HIV stigmas therefore inhibit HIV status disclosure, including disclosure to sex partners, and create a significant barrier to HIV prevention efforts targeted to people living with HIV/AIDS.

Unmet Mental Health and Coping Needs

Although previous research has shown a strong association between HIV/AIDS and depression in Africa, much of this research predated the availability of ARV treatment. However, it appears that depression is persistent among people with HIV/AIDS even in the ARV era (Kaaya et al., 2002; Olley et al., 2004, 2005). The considerable amount of psychological distress reported by people infected with HIV is at least in part accounted for by internalized AIDS stigmas discussed above (Olley et al., 2004, 2005; Wight, 2000). Depression is also part of the expected emotional reaction to learning one is infected with HIV. Of course, depression is widely considered a predisposing risk factor for HIV infection among at-risk populations. In India, the predisposing effects of emotional distress on behavior are a recognized risk factor for HIV that carries over to infected persons (Chandra et al., 2005). In addition, research in China indicates that many people with HIV who experience depression do not seek mental health treatment because of AIDS stigmas (Jin et al., 2006). Thus, it is likely that pre-HIV depression persists and is probably exacerbated following an HIV diagnosis. The association between HIV/AIDS and depression has implications for the clinical management of AIDS and has important implications for preventing the spread of HIV.

Access to Treatment and Care

While the rollout of ARV treatment in developing and transitional countries presents an unprecedented opportunity for prolonging the lives of people living with HIV/AIDS, treatment expansion is also linked to HIV prevention opportunities. There is a great deal of excitement, for example, about the potential for reductions in HIV transmission resulting from reduced viral load in genital secretions (Vernazza et al., 2000). Bringing HIV replication to a point

of undetectable HIV RNA in blood plasma is the hallmark of effective ARV treatment and is associated with parallel reductions of virus in semen and vaginal secretions. In Uganda, for example, where Quinn et al. (2000) observed a dose-relationship between an infected partner's blood plasma viral load and the risk of HIV transmission to their uninfected partner; more than 50% of infections occurred in couples with partners who had higher blood plasma viral loads. Unfortunately, the strongest correlation observed between blood plasma viral load and semen viral load is .67 (Gupta, et al., 1997), with most studies reporting correlations closer to .40 (Eron et al., 2000) and some studies reporting virtually no association between the two plasma compartments (Kalichman et al., 2001a; Medeiros et al., 2004). Thus, at best only 45% of the variability in genital secretion viral load can be accounted for by blood plasma viral load. It is clear that ARV regimens are not fully suppressive of HIV replication in reservoirs that harbor the virus and that non-adherence to treatment regimens and co-occurring STI/urethritis negate any reduction in genital secretion viral load that could occur with ARV treatment (Cohen, 2003; Cohen & Hosseinipour, 2005).

A belief that ART can offer protection against the spread of HIV in the U.S. and Europe has been associated with reductions in condom use (Crepaz et al., 2006). In developing counties, however, there is no evidence that access to HIV treatments increases HIV transmission risk behaviors. For example, a study conducted in Cote d'Ivoire compared HIV-related risk behavior among sexually active persons treated with ARVs and sexually active non-ARV treated respondents (Moatti et al., 2003). This study found that access to ARV treatment was not associated with an increase in HIV-related risky sexual behavior. In fact, only 18% of patients receiving treatment reported unprotected intercourse over the previous 6-months compared to 82% of patients who were not receiving treatment. Similarly, Bateganya et al. (2005) found that patients receiving ARV treatment in Uganda were more likely to have disclosed their HIV status, used condoms consistently, and received treatment for an STI than patients not receiving therapy. Additional research in Uganda has shown similar results (Bunnell et al., 2006). In a qualitative study conducted in a Cape Town township, Levy et al. (2005) found that the availability of ARV treatment has facilitated HIV prevention efforts through energizing HIV/AIDS health education efforts. The study found that HIV testing, condom use, and female condom uptake were all positively influenced by the availability of ARV treatments.

As mortality among HIV-infected men and women reduces worldwide, there is greater recognition of their reproductive health needs. Studies in the U.S. and Africa have shown that many HIV-infected women choose to have children even after learning of their infection (Chen et al., 2001; Nebie et al., 2001; Oladapo et al., 2005). Although there may be medical risks associated with pregnancy, for many women in Asia and Africa, psychosocial factors (e.g., partner and family influence, societal norms about fertility) outweigh these risks. Of course, there may also be other factors, such as stigma, parental disease status, and fear of a child being orphaned, that conflict with the desire to reproduce (Myer et al., 2005). An urgent need exists for providers with sufficient expertise to counsel and empower infected men and women to make informed and safe decisions regarding their desires for reproduction. In addition, little is known about the application of assisted reproductive technologies such as sperm

washing and intracytoplasmic sperm injection (ICSI), found to be successful in developed countries (Mencaglia et al., 2005; Sauer, 2005), to serodiscordant or seroconcordant couples in developing countries interested in having children.

Lack of treatment access and the clinical contexts within which prevention services may be delivered to infected persons can present challenges to prevention. It is unlikely that ARV treatment centers in most developing countries will be able to serve as feasible delivery points for HIV prevention services. Resource rich countries often experience difficulty in delivering HIV prevention services in clinical settings. Clinics that specialize in HIV care and treatment are busy and medically focused. In places with extreme AIDS stigma many people avoid testing for HIV, often testing only after they become ill with advanced stage illnesses. Health care providers have very limited time with their patients, making provider delivered prevention unrealistic no matter how brief the approach. Although HIV prevention-dedicated counselors could potentially be placed within treatment settings, constraints on clinic space will be quite limiting. The challenge to implementing HIV prevention in clinical care settings in developing and transitional countries remain daunting and will require careful consideration before allocating such resources.

Future Directions for HIV Prevention with Infected Populations

There is clearly interest in scaling up HIV prevention efforts targeted to people living with HIV/AIDS in developing countries. While there are great advantages to aiming prevention strategies to people who know they are HIV infected, there are also dangers. Any efforts to target people with HIV for prevention must guard against the potential for placing the burden of prevention on the shoulders of those infected. In every country in the world the majority of HIV infected persons do not know that they are infected. Targeting HIV prevention toward those at highest-risk will surely engage unknown infected persons. Addressing the mental health and substance use treatment needs of infected persons will likely have far-reaching HIV preventive benefits. The needs for generalized HIV prevention efforts are especially critical in settings with generalized HIV epidemics. In many ways, it seems easier to allocate prevention efforts to those who are known HIV infected. The challenge we face is to de-stigmatize AIDS to allow for comprehensive care and prevention services to those infected while not diminishing resources directed toward prevention with at-risk populations.

Conclusions

Understandably, the pre-existing problems related to access to health care in low resource settings exacerbates the difficulties of providing effective HIV prevention and care. The stigma tied to HIV/AIDS poses another significant stumbling block. Moreover, there is an urgent need for collaboration among researchers, policy makers, and public health administrators to develop "best practice" models of HIV prevention, identify ways to contextualize these models to "real-world" settings, and plan to scale-up these models based on evidence. As resources are not unlimited, cost-effectiveness of models also needs

to be examined (Bertozzi et al., 2006). The situation is rather hopeful as noteworthy efforts have already been made in the developed and developing world in the delivery of HIV primary prevention programs and HIV care and treatment services to those who are infected, and promising efforts are underway.

References

Agot, K. E., Kiarie, J. N., Nguyen, H. Q., Odhiambo, J. O., Onyango, T. M., & Weiss, N. S. (2007). Male circumcision in Siaya and Bondo Districts, Kenya: Prospective cohort study to assess behavioral disinhibition following circumcision. *Journal of Acquired Immune Deficiency Syndromes*, *44*(1), 66–70.

Alcorn, K. (2007, April 17). HIV treatment now reaching 28% of those in need worldwide, says WHO. *AIDS map news*. Retrieved April 24, 2007, from http://www.aidsmap.com/en/news/0937FEED-10D3-4224-952A-44DC9EE05976.asp

Amirkhanian, Y. A., Kelly, J. A., Kabakchieva, E., Kirsanova, A. V., Vassileva, S., Takacs, J., DiFranceisco, W. J., McAuliffe, T. L., Khoursine, R. A., & Mocsonaki, L. (2005). A randomized social network HIV prevention trial with young men who have sex with men in Russia and Bulgaria. *AIDS*, *19*(16), 1897–1905.

Asthana, S. & Oostvogels, R. (2001). The social construction of male 'homosexuality' in India: Implications for HIV transmission and prevention. *Social Science and Medicine*, *52*, 707–721.

Auvert, B., Taljaard, D., Lagarde, E., Sobngwi-Tambekou, J., Sitta, R., & Puren, A. (2005). Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: The ANRS 1265 Trial. *PLoS Medicine*, *2*(11), e298.

Bailey, R. C., Moses, S., Parker, C., Agot, K., Maclean, I. et al. (2007). Male circumcision for HIV prevention in young men in Kisumu, Kenya: A randomized controlled trial. *Lancet, 369*, 643–656.

Bandura A. (1997). *Self-efficacy: The Exercise of Control*. New York: Freeman.

Basu, I., Jana, S., Rotheram-Borus, M. J., Swendeman, D., Lee, S. J., Newman, P. & Weiss, R. (2004). HIV prevention among sex workers in India. *JAIDS*, *36*(3), 845–852.

Bateganya, M., Colfax, G., Shafer, L. A., Kityo, C., Mugyenyi, P., Serwadda, D., Mayanja, H., & Bangsberg, D. (2005). Antiretroviral Therapy and Sexual Behavior: A Comparative Study between Antiretroviral-Naive and -Experienced Patients at an Urban HIV/AIDS Care and Research Center in Kampala, Uganda. *AIDS Patient Care and STDs*, *19*(11), 760–768.

Bertozzi, S., Padian, N. S., Wegbreit, J., DeMaria, L. M., Feldman, B., Gayle, H., Gold, J., Grant, R., & Isbell, M. T. (2006). HIV/AIDS Prevention and Treatment. In D. T. Jamison, J. G. Breman, A. R. Measham, G. Alleyne, M. Claeson, D. B. Evans, P. Jha, A. Mills & P. Musgrove (Eds.), *Disease Control Priorities in Developing Countries* (2nd. ed., pp. 1452). Washington, DC: Oxford University Press, World Bank.

Bunnell, R., Ekwaru, J., Solberg, P., Wamai. N., Bikaako-Kajura, W., Were, W., Coutinho, A., Liechty, C., Madraa, E., Rutherford, G., & Mermin, J. (2006). Changes in sexual behavior and risk of HIV transmission after antiretroviral therapy and prevention interventions in rural Uganda. *AIDS*, *20*, 85–92.

Cates, W., Jr. (2006). Contraception and prevention of HIV infection. *JAMA*, *296*(23), 2802; author reply 2802.

Centers for Disease Control and Prevention (2003). Advancing HIV Prevention: New Strategies for a Changing Epidemic—US. MMWR; 52(15):329–332.

CDC AIDS Community Demonstration Projects Research Group (1999). Community-level HIV intervention in 5 cities: Final outcome data from the CDC AIDS community demonstration projects. *American Journal of Public Health*, *89*, 336–345.

Chandra, P. S., Deepthivarma, S., Jairam, K. R., & Thomas, T. (2003). Relationship of psychological morbidity and quality of life to illness-related disclosure among HIV-infected persons. *Journal of Psychosomatic Research*, *54*(3), 199–203.

Chandra, P. S., Desai, G., & Ranjan, S. (2005). HIV & psychiatric disorders. *Indian Journal of Medical Research, 121*(4), 451–467.

Chen, J. L., Philips, K. A., Kanouse, D. E., Collins, R. L., & Miu, A. (2001). Fertility desires and intentions of HIV-positive men and women. *Family Planning Perspectives*. *33*(4), 144–152, 165.

Clark, S. (2004). Early marriage and HIV risks in sub-Saharan Africa. *Studies in Family Planning*, *35*(3), 149–160.

Cohen, J. (2005). HIV/AIDS Prevention cocktails: Combining tools to Stop HIV's spread. *Science*, *309*(5737), 1002–1005.

Cohen, M. S. (2003). HIV and sexually transmitted diseases: Lethal synergy. *Topics in HIV Medicine*, *12*, 104–107.

Cohen, M. S. & Hosseinipour, M. (2005). HIV treatment meets HIV prevention: Antiretroviral therapy as prophylaxis (pp. 137–161). In K. Mayer & H. F. Pizer (Eds.), *The AIDS Pandemic: Impact on Science and Society*. New York: Elsevier Science.

Copenhaver, M. M., Johnson, B. T., Lee, I. C., Harman, J. J., & Carey, M. P. (2006). SHARP Research Team. Behavioral HIV risk reduction among people who inject drugs: Meta-analytic evidence of efficacy. *Journal of Substance Abuse Treatment*, *31*(2), 163–171.

Crepaz, N., Lyles, C., Wolitski, R., Passin, W., Rama, S., Herbst, J., Purcell, D., Mallow, R., & Stall, R. (2006). Do prevention interventions reduce HIV risk behaviours among people living with HIV? A meta-analytic review of controlled trials. *AIDS*, *20*, 143–157.

Dandona, L., Sisodia, P., Ramesh, Y. K., Kumar, S. G., Kumar, A. A., Rao, M. C., Someshwar, M., Hansl, B., Marshall, N., Marseille, E., & Kahn, J. G. (2005). Cost and efficiency of HIV voluntary counselling and testing centres in Andhra Pradesh, India. *National Medical Journal of India*, *18*(1), 26–31.

Deacon, H., Stephney, I., & Prosalendis, S. (2004). *Understanding HIV/AIDS Stigma: A Theoretical and Methodological Analysis*. Cape Town: Human Sciences Research Council Press.

Eaton, L. A. & Kalichman, S. C. (2007). Risk Compensation in HIV Prevention: Implications for Vaccines, Microbicides, and Other Biomedical HIV Prevention Technologies [abstract]. *Current HIV/AIDS Reports*. *4*, 165–172.

Ekstrand, M., Bharat, S., & Ramakrishna, J. (2005). India. In S. C. Kalichman (Ed.), *Positive Prevention: Sourcebook for HIV Risk Reduction with People Living with HIV/AIDS*. Dordrecht: Springer/Kluwer Publishing.

Eron, J. J., Smeaton, L. M., Fiscus, S. A., Gulick, R. M., Currier, J. S., Lennox, J. L., D'Aquila, R. T., Rogers, M. D., Tuyng, R. & Murphy, R. L. (2000). The effects of protease inhibitor therapy on human immunodeficiency virus type 1 levels in semen. *Journal of Infectious Diseases*, *181*(5), 1622.

Freeman, E. E., Weiss, H. A., Glynn, J. R., Cross, P. L., Whitworth, J. A., & Hayes, R. J. (2006). Herpes simplex virus 2 infection increases HIV acquisition in men and women: Systematic review and meta-analysis of longitudinal studies. *AIDS*, *20*(1), 73–83.

Galletly, C. & Pinkerton, S. (2006). Conflicting Messages: How Criminal HIV Disclosure Laws Undermine Public Health Efforts to Control the Spread of HIV. *AIDS & Behavior*, *10* (5) 451–61.

Ghys, P. D., Diallo, M. O., Ettiegne-Traore, V., Kale, K., Tawil, O., Carael, M., Traore, M., Mah-Bi, G., De Cock, K. M., Wiktor, S. Z., Laga, M., & Greenberg, A. E. (2002). Increase in condom use and decline in HIV and sexually transmitted diseases among female sex workers in Abidjan, Cote d'Ivoire, 1991–1998. *AIDS*, *16*(2), 251–258.

Global HIV Prevention Working Group (GHPWG, 2006). *New Approaches to HIV Prevention: Accelerating Research and Ensuring Future Access*. (Accessed April 24, 2007) http://www.globalhivprevention.org/pdfs/New%20Prevention20 Approaches.pdf.

Gray, R. H., Kigozi, G., Serwadda, D., Makumbi, F., Watya, S., Nalugoda, F., Kiwanuka, N., Moulton, L. H., Chaudhary, M. A., Chen, M. Z., Sewankambo, N. K., Wabwire-Mangen, F., Bacon, M. C., Williams, C. F., Opendi, P., Reynolds, S. J., Laeyendecker, O., Quinn, T. C., Wawer, M. J. (2007). Male circumcision for HIV prevention in Rakai, Uganda: A randomized trial. *Lancet*, *369*, 657–666.

Grosskurth, H., Mosha, F., Todd, J., Mwijarubi, E., Klokke, A., Senkoro, K., Mayaud, P., Changalucha, J., Nicoll, A., ka-Gina, G., et al. (1995). Impact of improved treatment of sexually transmitted diseases on HIV infection in rural Tanzania: Randomised controlled trial. *Lancet*, *346*(8974), 530–536.

Gupta, P., Mellors, J., Kingsley, L., Riddler, S., Singh, M. K., Schreiber, S., Cronin, M. & Rinaldo, C. R. (1997). High viral load in semen of human immunodeficiency virus type 1- infected men at all stages of disease and its reduction by therapy with protease and nonnucleoside reverse transcriptase inhibitors. *Journal of Virology*, *71*(8), 6271–6275.

Herbst, J. H., Sherba, R., T., Crepaz, N., Deluca, J. B., Zohrabyan, L., Stall, R. D., & Lyles, C. M. (2005). HIV/AIDS prevention research synthesis team. A meta-analytic review of HIV behavioral interventions for reducing sexual risk behavior of men who have sex with men. *JAIDS*, *39*(2), 228–241.

Hernandez, A. L., Lindan, C. P., Mathur, M., Ekstrand, M., Madhivanan, P., Stein, E. S., Gregorich, S., Kundu, S., Gogate, A., & Jerajani, H. R. (2006). Sexual behavior among men who have sex with women, men, and Hijras in Mumbai, India—multiple sexual risks. *AIDS & Behavior*, *10*(4 Suppl):S5–16, 2006.

Hogrefe, W., Su, X., Song, J., Ashley, R., & Kong, L. (2002). Detection of herpes simplex virus type 2-specific immunoglobulin G antibodies in African sera by using recombinant gG2, Western blotting, and gG2 inhibition. *Journal of Microbiological Methods*, *40*(10), 3635–3640.

Jin, H., Atkinson, J., Yu, X., Healton, R., Shi, C. et al. (2006). Depression and suicidality in HIV/AIDS in China. *Journal of Affective Disorders*, *94*, 269–275.

Johnson, B. T., Carey, M. P., Chaudoir, S. R., & Reid, A. E. (2006). Sexual risk reduction for persons living with HIV: Research synthesis of randomized controlled trials, 1993 to 2004. *JAIDS*, *41*, 642–650.

Kaaya, S. F., Fawzi, M. C. S., Mbawambo, J. K., Lee, B., Msamanga, G. I. & Fawzi, W. (2002). Validity of the Hopkins Symptom Checklist-25 amongst HIV-positive pregnant women in Tanzania. *Acta Psychiatrica Scandinavica*, *106*, 1–19.

Kahn, J. G., Marseille, E., & Auvert, B. (2006). Cost-effectiveness of male circumcision for HIV prevention in a South African setting. *PLoS Medicine*, *3*(12), e517.

Kalichman, S. C. & Simbayi, L. C. (2003). HIV testing attitudes, AIDS stigma and voluntary HIV counseling and testing in a Black township in Cape Town, South Africa. *Sexually Transmitted Infections, 79*, 442–447.

Kalichman S. C., Cage, M., Rompa, D., Austin, J., Luke, Barnett, T., Tharnish, P., O'Mowrey, & Schinazi, R. (2001a). Human immunodeficiency virus in semen and plasma: Investigation of sexual transmission risk and behavioral correlates. *AIDS Research and Human Retroviruses, 1717*, 1695–1703.

Kalichman, S. C., Rompa, D., Cage, M., DiFonzo, K., Simpson, D., Austin, J., Luke, W., Buckles, J., Kyomugrsha, F., Benotsch, E., Pinkerton, S., & Graham, J. (2001b).

Effectiveness of an intervention to reduce HIV transmission risks in HIV positive persons. *American Journal of Preventive Medicine*, *21*, 84–92.

Kalichman, S. C., Simbayi, L. C., Jooste, S., Cain, D., & Cherry, C. (2006). Sensation seeking, alcohol use, and sexual behaviors among sexually transmitted infection clinic patients in Cape Town, South Africa. *Psychology of Addictive Behaviors*, *20*(3), 298–304.

Kalichman, S. C., Eaton, L. A., & Pinkerton, S. (2007a). Concerns about predicting the benefit of male circumcision for HIV prevention (Correspondence). *The Lancet*, *369*, 1597.

Kalichman, S. C., Simbayi, L. C., Vermaak, R., Cain, D., Jooste, S., & Peltzer, K. (2007b). HIV/AIDS risk reduction counseling for alcohol using sexually transmitted infections clinic patients in Cape Town South Africa. *Journal of Acquired Immune Deficiency Syndrome*, *44*, 594–600.

Kalichman, S. C., Simbayi, L. C., Kaufman, M., Cain, D., & Jooste, S. (2007c). Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. *Prevention Science*, *8*, 141–151.

Kalichman, S. C., Ntseane, D., Nthomang, K., Segwabe, M., Phorano, O., & Simbayi, L. C. (2007d). Recent multiple sexual partners and HIV transmission risks among people living with HIV/AIDS in Botswana. *Sexually Transmitted Infections*, *83*, 371–375.

Karnell, A. P., Cupp, P. K., Zimmerman, R. S., Feist-Price, S., & Bennie, T. (2006). Efficacy of an American alcohol and HIV prevention curriculum adapted for use in South Africa: Results of a pilot study in five township schools. *AIDS Education & Prevention*, *18*(4), 295–310.

Kawichai, S., Celentano, D. D., Vongchak, T., Beyrer, C., Suriyanon, V., Razak, M. H., Srirak, N., Rungruengthanakit, K., & Jittiwutikarn, J. (2006). HIV voluntary counseling and testing and HIV incidence in male injecting drug users in northern Thailand: Evidence of an urgent need for HIV prevention. *JAIDS*, *41*(2), 186–193.

Kelly, J. A., Murphy, D. A., Sikkema, K. J., McAuliffe, T. L., Roffman, R. A., Solomon, L. J., Winett, R. A., & Kalichman, S. C. (1997). Randomised, controlled, community-level HIV-prevention intervention for sexual-risk behaviour among homosexual men in US cities. Community HIV Prevention Research Collaborative. *Lancet*, *350*(9090), 1500–1505.

Kelly, J. A., Somlai, A. M., Benotsch, E. G., McAuliffe, T. L., Amirkhanian, Y. A., & Brown, K. D., et al. (2004). Distance communication transfer of HIV prevention interventions to service providers. *Science*, *305*(5692), 1953–1955.

Kelly, J. A., Amirkhanian, Y. A., Kabakchieva, E., Vassileva, S., Vassilev., B., McAuliffe, T. L., DiFranceisco, W. J., Antonova, R., Petrova, E., Khoursine, R. A., Dimitrov, B. (2006). Prevention of HIV and sexually transmitted diseases in high risk social networks of young Roma (Gypsy) men in Bulgaria: randomised controlled trial. *British Medical Journal*, *333*, 1098.

Kirby, D. (1997). *No Easy Answers: Research Findings on Programs to Reduce Teen Pregnancy*. Washington DC: National Campaign to Prevent Teen Pregnancy.

Kirby, D., Obasi, A., & Laris, B. A. (2006). The effectiveness of sex education and HIV education interventions in schools in developing countries. *World Health Organization Technical Report Series. 938:103–150; discussion* 317–341.

Laga, M., Alary, M., Nzila, N., Manoka, A. T., Tuliza, M., Behets, F., Goeman, J., St. Louis, M., & Piot, P. (1994). Condom promotion, sexually transmitted diseases treatment, and declining incidence of HIV-1 infection in female Zairian sex workers. *Lancet*, *344*(8917), 246–248.

Latkin, C. A. & Knowlton, A. R. (2005). Micro-social structural approaches to HIV prevention: A social ecological perspective. *AIDS Care*, *17*, (Suppl 1), S102–S113.

Lee, R., Kochman, A., & Sikkema, K. (2002). Internalized stigma among people living with HIV/AIDS. *AIDS and Behavior*, *6*, 309–319.

Levy, N. C., Miksad, R. A., & Fein, O. T. (2005). From treatment to prevention: The interplay between HIV/AIDS treatment availability, and HIV/AIDS prevention programming in Kyhayelitsha, South Africa. *Journal of Urban Health*, *82*(3), 498–509.

Medeiros, R. P., Munerato, P., & Diaz, R. S. (2004). HIV-1 viral load in blood and semen plasma of Brazilian patients under antiretroviral therapy. *Journal of Clinical Virology*, *30*(4), 346–347.

Mehendale, S. M., Ghate, M. V., Kishore, Kumar, B., Sahay, S., Gamble, T. R., Godbole, S. V., Thakar, M. R., Kulkarni, S. S., Gupta, A., Gangakhedkar, R. R., Divekar, A. D., Risbud, A. R., Paranjape, R. S., & Bollinger, R. C. (2006). Low HIV-1 incidence among married serodiscordant couples in Pune, India. *JAIDS*, *41*(3), 371–373.

Mencaglia, L., Falcone, P., Lentini, G. M., Consigli, S., Pisoni, M., Lofiego, V., Guidetti, R., Piomboni, P., & De Leo, V. (2005). ICSI for treatment of human immunodeficiency virus and hepatitis C virus-serodiscordant couples with infected male partner. *Human Reproduction*, *20*(8), 2242-6 g.

Moatti, J. P., Prudhomme, J., Traore, D. C., Juillet-Amari, A., Akribi, H. A., & Msellati, P. (2003). Access to antiretroviral treatment and sexual behaviours of HIV-infected patients aware of their serostatus in Cote d'Ivoire. *AIDS*, *17*(Suppl 3), S69–S77.

Moench, T. R., Chipato, T., & Padian, N. S. (2001). Preventing disease by protecting the cervix: The unexplored promise of internal vaginal barrier devices. *AIDS*, *15*(13), 1595–1602.

Morisky, D. E., Stein, J. A., Chiao, C., Sksobiech, K., & Malow, R. (2006). Impact of social influence interventions on condom use and sexual transmitted infections among establishment-based female bar workers in the Philippines: A multilevel analysis. *Health Psychology*, *25*(5), 595–603.

Myer, L., Morroni, C., & El-Sadr, W. M. (2005). Reproductive decisions in HIV-infected individuals. *Lancet*, *366*(9487), 698–700.

Nebie, Y., Meda, N., Leroy, V., Mandelbrot, L., Yaro, S., Sombie, I., Cartoux, M., Tiendrebeogo, S., Dao, B., Ouangre, A., Nacro, B., Fao, P., Ky-Zerbo, O., Van de Perre, P., & Dabis, F. (2001). Sexual and reproductive life of women informed of their HIV seropositivity: A prospective cohort study in Burkina Faso. *JAIDS*, *28*(4), 367–372.

Ngalande, R. C., Levy, J., Kapondo, C. P., & Bailey, R. C. (2006). Acceptability of male circumcision for prevention of HIV infection in Malawi. *AIDS and Behavior*, *10*(4), 377–385.

Oladapo, O. T., Daniel, O. J., Odusoga, O. L., & Ayoola-Sotubo, O. (2005). Fertility desires and intentions of HIV-positive patients at a suburban specialist center. *Journal of the National Medical Association*, *97*(12), 1672–1681.

Olley, B. O., Seedat, S., & Stein, D. J. (2004). Self-disclosure of HIV serostatus in recently diagnosed patients with HIV in South Africa. *African Journal of Reproductive Health, 8*, 71–76.

Olley, B. O., Zeier, M. D., Seedat, S., & Stein, D. J. (2005). Post-traumatic stress disorder among recently diagnosed patients with HIV/AIDS in South Africa. *AIDS Care*, *17*, 550–557.

Orroth, K. K., Korenromp, E. L., White, R. G., Gavyole, A., Gray, R. H., Muhangi, L., Sewankambo, N. K., Quigley, M., Wawer, M. J., Whitworth, J. A., Grosskurth, H., Habbema, J. D., & Hayes, R. J. (2003). Higher risk behaviour and rates of sexually transmitted diseases in Mwanza compared to Uganda may help explain HIV prevention trial outcomes. *AIDS, 17*(18), 2653–2660.

Panda, S. & Sharma, M. (2006). Needle syringe acquisition and HIV prevention among injecting drug users: A treatise on the "good" and "not so good" public health practices in South Asia. *Substance Use & Misuse*, *41*(6–7), 953–977.

Parker, R. & Aggleton, P. (2003). HIV and AIDS-related stigma and discrimination: A conceptual framework and implications for action. *Social Science and Medicine, 57*, 13–24.

Pettifor, A. E., Kleinschmidt, I., Levin, J., Rees, H. V., MacPhail, C., Madikizela-Hlongwa, L., Vermaak, K., Napier, G., Stevens,W., & Padian, N. S. (2005). A community-based study to examine the effect of a youth HIV prevention intervention on young people aged 15–24 in South Africa: Results of the baseline survey. *Tropical Medicine and International Health, 10*, 971–980.

Pettifor, A. E., MacPhail, C., Bertozzi, S., & Rees, H. V. (2007). Challenge of evaluating a national HIV prevention program: the case of loveLife, South Africa. *Sexually Transmitted Infections*, *83*, Suppl 1, i70–74.

Pronyk, P. M., Hargreaves, J. R., Kim, J. C., Morison, L. A., Phetla, G., Watts, C., Busza, J., & Porter, J. D. (2006). Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: A cluster randomised trial. *Lancet*, *368*(9551), 1973–1983.

Quinn, T., Wawer, M., Sewankambo, N., Serwadda, D., Li, C., Wabwire-Manngen, F., Meehan, M., Lutalo T., Gray, R. (2000). HIV load and heterosexual transmission of Human Immunodeficiency Virus Type-2. *New England Journal of Medicine, 342*, 921–929.

Rabori, E., Gupta, P., Pandey, R., Chattopadahya, D., Loi, S., & Baveja, U. K. (2005). Sexual risk behaviors in HIV positive individuals in north India. *Journal of Communication Disorders*, *37*, 249–253.

Richardson, J., Milam, J., McCutchan, A., Stoyanoff, S., Bolan, R., Weiss, J., et al. (2004). Effect of brief safer-sex counseling by medical providers to HIV-1 seropositive patients: A multi-clinic assessment. *AIDS*, *18*, 1179–1186.

Rogers, E. M. (1983). *Diffusion of Innovations*. New York: Free Press.

Rogers, A., Meundi, A., Amma, A., Rao, A., Shetty, P., Antony, J., Sebastian, D., Shetty, P., & Shetty, A. K. (2006). HIV-related knowledge, attitudes, perceived benefits, and risks of HIV testing among pregnant women in rural Southern India. *AIDS Patient Care & STDs*, 20(11), 803–811.

Rojanapithayakorn, W. (2006). The 100% condom use program in Asia. *Reproductive Health Matters*, *14*(28), 41–52.

Rojanapithayakorn, W. & Hanenberg, R. (1996). The 100% condom program in Thailand. *AIDS*, *10*(1), 1–7.

Sauer, M. V. (2005). Sperm washing techniques address the fertility needs of HIV-seropositive men: A clinical review. *Reproductive Biomedicine Online*, *10*(1), 135–140.

Saxena, S. (1997). Alcohol, Europe, and the developing countries. *Addiction*, *92*(1), 43–48.

Shisana, O., Rehle, T., Simbayi, L., Parker, W., Bhana, A., Zuma, K., Connolly, C., Jooste, S., Pillay, V., et al. (2005). *South African National HIV Prevalence, Incidence, Behaviour and Communication Survey*. Cape Town: Human Sciences Research Council Press.

Sikkema, K. J., Kelly, J., Winett, R., Solomon, L., Cargill, V., & Roffman, R. (2000). Outcomes of a randomized community-level HIV prevention intervention for women living in 19 low-income housing developments. *American Journal of Public Health*, *90*, 57–63.

Sikkema, K. J., Anderson, E. S., Kelly, J. A., Winett, R. A., Gore-Felton, C., Roffman, R. A., Heckman, T. G., Graves, K., Hoffmann, R. G., & Brondino, M. J. (2005).

Outcomes of a randomized, controlled community-level HIV prevention intervention for adolescents in low-income housing developments. *AIDS, 19*(14), 1509–1516.

Simbayi, L. (2002). Psychosocial and cultural determinants of HIV/AIDS in the SADC region. (Chapter 3). *HIV/AIDS in Southern Africa: A review paper.* Report prepared for the WK Kellogg Foundation. Cape Town: Human Sciences Research Council Press.

Simbayi, L. C., Kalichman, S. C., Skinner, D., Jooste, S., Cain, D., Cherry, C., Mathiti, V., J. Dlakulu, R., Unddermans, N., Bruinders, V., Jacobs, C., van Wyk, R., Arendse, C., Croome, J., & Bok, W. (2004). Theory-Based HIV Risk Reduction Counseling for Sexually Transmitted Infection Clinic Patients in Cape Town, South Africa. *Sexually Transmitted Diseases*, *31*, 727–733.

Simbayi, L. C., Kalichman, S., Strebel, A., Cloete, A., Henda, N., & Mqeketo, A. (2007). Internalized stigma, discrimination, and depression among men and women living with HIV/AIDS, Cape Town, South Africa. *Social Science & Medicine, 64*, 1823–1831.

Sivaram, S., Srikrishnan, A. K., Latkin, C. A., Johnson, S. C., Go, V. F., Bentley, M. E., Solomon, S., & Celentano, D. D. (2004). Development of an opinion leader-led HIV prevention intervention among alcohol users in Chennai, India. *AIDS Education & Prevention*, *16*(2), 137–149.

Slutkin, G., Okware, S., Naamara, W., Sutherland, D., Flanagan, D., Carael, M., Blas, E., Delay, P., & Tarantola, D. (2006). How Uganda reversed its HIV epidemic. *AIDS and Behavior*, *10*(4), 351–360.

Sullivan, L. E. & Fiellin, D. A. (2005). Buprenorphine: Its role in preventing HIV transmission and improving the care of HIV-infected patients with opioid dependence. *Clinical Infectious Diseases*, *41*(6), 891–896.

Sullivan, L. E., Metzger, D. S., Fudala, P. J., & Fiellin, D. A. (2005). Decreasing international HIV transmission: The role of expanding access to opioid agonist therapies for injection drug users. *Addiction*, *100*(2), 150–158.

Sweat, M. D., Gregorich, S., Sangiwa, G., Furlonge, C., Balmer, D., Kamega, C., Grinstead, O., Coates, T. (2000). Cost-effectiveness of Voluntary HIV-1 Counseling and Testing in reducing sexual transmission of HIV-1 in Kenya and Tanzania. *Lancet*, *356*(9224), 113–121.

Tilson, H., Aramrattana, A., Bozzette, S. A., Celentano, D. D., Falco, M., Hammett, T. M., Kozlov, A. P., Lai, S., Mahal, A., Schottenfeld, R., & Solomon, S. (2006). *Preventing HIV Infection among Injecting Drug Users in High Risk Countries: An Assessment of the Evidence* (Institute of Medicine Report). Washington, DC: The National Academies Press.

UNAIDS (Joint United Nations Programme on HIV/AIDS). (2006a). *UNAIDS/WHO AIDS Epidemic Update: December 2006.* Geneva: UNAIDS.

UNAIDS (Joint United Nations Programme on HIV/AIDS). (2006b). *2006 Report on the Global AIDS Epidemic*. Geneva: UNAIDS.

Van Griensven, F. & Kalichman, S. C. (2007). NIMH Collaborative HIV/STD Prevention Trial. *AIDS*, *Supplement 2*, *Volume 21*, S1–2.

Van de Perre P., Clumeck, N., Carael, M., Nzabihimana, E., Robert-Guroff, M., De Mol P., Freyens, P., Butzler, J. P., Gallo, R. C., & Kanyamupira, J. B. (1985). Female prostitutes: A risk group for infection with human T-cell lymphotropic virus type III. *Lancet*, *2*(8454), 524–527.

Vernazza, P., Troiani, L., Flepp, M., Cone, R. W., Schock, J., Roth, F., Boggian, K., Cohen, M. S., Fiscus, S. A., & Eron, J. J. (2000). Potent antiretroviral treatment of HIV-infection results in suppression of the seminal shedding of HIV. *AIDS*, *14*(2), 117–121.

Voluntary HIV-1 Counseling and Testing Efficacy Study Group (2000). Efficacy of voluntary HIV-1 counseling and testing in individuals and couples in Kenya, Tanzania, and Trinidad: A randomized trial. *The Lancet*, *356*, 103–112.

Wawer, M. J., Sewankambo, N. K., Serwadda, D., Quinn, T. C., Paxton, L. A., Kiwanuka, N., Wabwire-Mangen, F., Li, C., Lutalo, T., Nalugoda, F., Gaydos, C. A., Moulton, L. H., Meehan, M. O., Ahmed, S., & Gray, R. H. (1999). Control of sexually transmitted diseases for AIDS prevention in Uganda: A randomised community trial. Rakai Project Study Group. *Lancet*, *353*(9152), 525–535.

Weiss, H. A., Quigley, M. A., & Hayes, R. J. (2000). Male circumcision and risk of HIV infection in sub-Saharan Africa: A systematic review and meta-analysis. *AIDS*, *14*(15), 2361–2370.

Westercamp, N. & Bailey, R. C. (2007). Acceptability of Male Circumcision for Prevention of HIV/AIDS in Sub-Saharan Africa: A Review. *AIDS & Behavior*, *11*, 341–55.

WHO (2007). *WHO and UNAIDS announce recommendations from expert consultation on male circumcision for HIV prevention.* Retrieved on April 24, 2007, from http://www.who.int/mediacentre/news/releases/2007/pr10/en/index.html.

Wight, R. G. (2000). Precursive depression among HIV infected AIDS caregivers over time. *Social Science and Medicine*, *51*, 759–770.

Yoshioka, M. R. & Schustack, A. (2001). Disclosure of HIV status: Cultural issues of Asian patients. *AIDS Patient Care STDs*, *15*, 77–82.

Zaric, G. S., & Brandeau, M. L. (2007). A little planning goes a long way: multilevel allocation of HIV prevention resources. *Medical Decision Making*, *27*, 71–81.