



Published in final edited form as:

Subst Use Misuse. 2006 ; 41(10-12): 1349–1378. doi:10.1080/10826080600838018.

Behavior Change and Health-Related Interventions for Heterosexual Risk Reduction Among Drug Users

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Abstract

Prevention of heterosexual transmission of HIV between and from drug users is important for controlling the local and global HIV heterosexual epidemic. Sex risk reduction interventions and health-related interventions are important for reducing the sex risk behaviors of drug users. Sex risk reduction interventions address individual-level, peer-level, and structural-level determinants of risk reduction. Health-related interventions include HIV counseling and testing, prevention and treatment of sexually transmitted diseases, and delivery of highly active antiretroviral therapy. It is important to adapt effective interventions implemented in resource-rich countries to the realities of the resource-constrained settings and to address relevant contextual factors.

RESUMEN—Il est important de prévenir la transmission hétérosexuelle du VIH à partir des usagers de drogue pour contrôler l'épidémie hétérosexuelle locale et mondiale de VIH. Des interventions ciblant à la fois la réduction de risque sexuel et la santé des usagers de drogue sont nécessaires. Les interventions de réduction de risque sexuel prennent en compte le niveau individuel, le niveau des pairs et celui des déterminants structurels de la réduction des risques. Les interventions visant l'amélioration de la santé comprennent le conseil et le dépistage du VIH, la prévention et le traitement des infections sexuellement transmissibles et la prescription d'antirétroviraux. Il est important d'adapter les interventions efficaces mises en place dans les pays riches aux réalités des contextes de pays à ressources limitées et de tenir compte des facteurs contextuels pertinents.

Keywords

global research; HIV; injection drug use; research interventions; sexual risk

HIV Infection and Injection Drug Users

Injection drug use continues to complicate the control of the global HIV epidemic (UNAIDS, 2004). In 2003, 136 countries reported injecting drug use and 93 countries reported HIV infection among injection drug users (IDUs) (World Health Organization, 2003). IDUs are at risk for infection with HIV through both multiperson use (“sharing”) of drug injection equipment and through unsafe sex behaviors (Aceijas et al., 2004). Although the scope and effectiveness of interventions aimed at reducing HIV infection through drug injection equipment has been well documented in the literature (Des Jarlais et al., 2005; Quan et al.,

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Note: The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

2002), there remains a need for understanding and controlling the sexual transmission of HIV infection of drug users, including IDUs (Strathdee and Sherman, 2003).

This review describes sex risk reduction interventions with drug users and their effectiveness in reducing sexual risk behaviors of IDUs and other drug users. We highlight the needs and opportunities for these interventions, discuss the generalizability of the results to resource-constrained settings, and outline the implications for global research efforts and public health practice. Although our literature review is not comprehensive, it highlights many areas that affect sexual transmission of HIV to and from drug users in both resource-rich and resource-constrained settings. Efforts to reduce substance abuse and HIV risk associated with injection behaviors and with use of drug equipment is covered elsewhere (Des Jarlais et al., 2005; Farrell et al., 2005; Needle et al., 2005; Stimson et al., 1998; Wodak and Cooney, 2005).

Parenteral Transmission of HIV in IDUs

Sharing injection equipment has led to extremely high HIV incidence rates in IDUs (Des Jarlais et al., 1989; Robertson et al., 1986; Stimson et al., 1998; UNAIDS, 2004) because this mechanism provides a highly efficient route for HIV transmission compared with unprotected sex (Centers for Disease Control and Prevention, 2003). Therefore most HIV prevention for IDUs has appropriately focused on reducing the sharing of injection equipment. There is evidence that, many IDUs have changed their injection drug practices to reduce their HIV risk (Quan et al., 2002). This evidence includes studies of drastically reduced HIV incidence among IDUs participating in interventions such as syringe exchange (Ksobiech, 2003), community outreach (Needle et al., 2005), and drug abuse treatment (Metzger and Navaline, 2003). There is also strong evidence that when HIV prevention interventions are implemented on a sufficiently large scale, it is possible to avert HIV epidemics among IDUs (Des Jarlais et al., 1995a). However, the heterosexual transmission of HIV to IDUs and from IDUs to sex partners who do not inject drugs remains a critical route for HIV transmission and is increasingly problematic for control efforts (Grassly et al., 2003).

Sexual Transmission of HIV in IDUs

There are several aspects of the heterosexual transmission of HIV between drug users that merit the attention of public health practitioners and health care providers. First, most IDUs as well as those who are HIV seropositive are sexually active, placing their long-term sex partners at considerable risk for HIV (Des Jarlais et al., 1984; Panda et al., 2000). In several countries, such as the United States, Spain, and Italy, sexual transmission of HIV from IDUs to sex partners who do not inject drugs was initially the dominant mode of heterosexual transmission (Des Jarlais et al., 1997). Second, if large numbers of IDUs become infected with HIV, there is the possibility that sexual transmission, particularly to sex workers and clients of IDU sex workers, may set off a generalized heterosexual epidemic (Saidel et al., 2003). This may be the case in a number of countries in Asia and Eastern Europe (UNAIDS, 2004). Third, after large-scale safe injection programs have been implemented, it appears that sexual transmission may become increasingly important as a source of infection among drug users. There is evidence for the increasing importance of sexual transmission in IDUs in Baltimore (Strathdee et al., 2001), San Francisco (Kral et al., 2001), and New York City (Des Jarlais et al., 2005).

The challenges of reducing sexual risk behaviors include intrapersonal, interpersonal, and peer and societal norms and conditions. Some of these factors include the private nature of sex behaviors, weak communication skills between partners about sex risk behaviors, the emotional overtones associated with sex behaviors and communication about sex behaviors, the power imbalance between partners, the role of drugs in sexual inhibition, and the negative attitudes associated with condom use. Given the changing HIV epidemiology of IDUs and the increasing proportion of women infected with HIV, even among drug users, it seems important to

understand the elements of a comprehensive prevention and control strategy to reduce the heterosexual transmission of HIV to and from drug users.

Evidence-Based Strategy for Reducing Sexual Transmission of HIV to and from IDUs

Behavior change risk reduction interventions and health-related interventions are the two primary anchors of evidence-based prevention strategy for reducing the sexual transmission of HIV between IDUs and their sex partners. Risk reduction interventions can be implemented with both HIV-seronegative and HIV-seropositive drug users and at various levels, including the individual level, the peer level, and the structural level. Health-related interventions include HIV counseling and testing, prevention and treatment of sexually transmitted diseases (STDs), and uptake of highly active antiretroviral therapy (HAART). These interventions have been implemented to varying degrees in resource-rich and resource-constrained settings. We review the profile and effectiveness of these interventions, highlighting strong accomplishments and effects, areas that can benefit from further development, and opportunities for adaptation and replication of these interventions with various populations and in settings that can benefit from them.

Sex Risk Reduction Interventions

During the past 20 years, most of the sex risk reduction interventions have been conducted with HIV-seronegative drug users. It is only recently that interventions to reduce the sexual transmission of HIV to drug users have been conducted with HIV-seropositive drug users. We review first the evidence for sex risk reduction interventions implemented with HIV-seronegative drug users and then summarize the emerging literature on risk reduction interventions with HIV-seropositive IDUs.

Studies With HIV-Seronegative Drug Users—Qualitative reviews of U.S.-based intervention studies conducted mostly with seronegative IDUs first appeared in the literature in the early 1990s (Booth and Watters, 1994; Brown et al., 1993) and continued throughout the 1990s (Coyle et al., 1998; Gibson et al., 1998). Although these reviews showed that drug users, mainly heroin injectors, reduced their sex risk behaviors, they also noted the relatively large number of studies conducted in the 1990s in which there were no differences at follow-up between the rates of sexually risky behaviors of participants in the intervention groups and in the comparison groups. Later, a meta-analysis conducted in the late 1990s of 16 U.S.-based studies found a statistically significant moderate average effect size, indicating that participation in the experimental group was associated with greater sex risk reduction (Cross et al., 1998). This meta-analysis found that drug users increased their condom use after participating in the interventions. The overall weighted average effect, reported as a standardized mean difference, was 0.40 (95% confidence interval [CI], 0.33-0.46). This effect translates to an odds ratio of 0.49 (95% CI, 0.44-0.54). This moderate average effect, however, was somewhat surprising, given the results from the qualitative reviews, but that was explained by the fact that the meta-analysis included studies with relatively weak designs. Seven of 16 studies included in the meta-analysis used a one-group preintervention versus postintervention research design.

Results of a recent meta-analysis of 33 U.S. studies, published between 1988 and 1999, clarified the information on the extent of sex risk reduction by drug users, mostly heroin IDUs and crack cocaine smokers (Semaan et al., 2002). This study used well-established standard formulas to conduct the meta-analysis, provided details of the procedures used in the calculations, included studies with rigorous research designs, and used a sufficiently large number of studies to permit a stratified meta-analysis (Cooper and Hedges, 1994; Hedges et al., 2002; Hedges and Vevea, 1998; Johnson et al., 2002). The stratified meta-analysis showed that studies of comparison

groups that did not receive an intervention demonstrated a significantly stronger effect ($k = 3$; odds ratio 0.60; CI, 0.43-0.85) than did studies with comparison groups = 95% that received an HIV prevention intervention ($k = 30$; OR = 0.91; 95% CI, 0.81-1.03). The effects of the two groups of studies were statistically different. By measuring absolute intervention effects, the researchers' stratified meta-analysis results showed that the odds ratio for the three studies in which the comparison groups did not receive an intervention was moderate and statistically significant. Measuring relative intervention effects, the odds ratio for the 30 studies in which the comparison groups received an intervention was weak and not statistically significant. In those 30 studies, participants in the comparison groups received a standard or a minimal HIV-related intervention, whereas the participants in the intervention groups received a more extensive or an enhanced HIV-related intervention. When the odds ratio of 0.60 was extrapolated to a population with a 72% prevalence of risk behavior, the proportion of drug users who reduced their risk behavior was 12.6% greater in the intervention groups than in the comparison groups.

We note from these results the similarity between the statistically significant moderate effect size of the meta-analysis conducted by Cross and colleagues (1998) and of the stratified meta-analysis conducted by Semaan and colleagues (2002) for the interventions that did not offer an intervention to the comparison groups. The second part of the stratified meta-analysis of Semaan and colleagues showed that studies in which both the intervention and comparison groups received HIV-related interventions showed only a small insignificant average effect. Taken together, the qualitative reviews and the meta-analysis studies showed that drug users have reduced their sexual risk behaviors in response to the research interventions in which they participated. A stronger effect was obtained when the comparison group did not receive an intervention.

A few more qualitative reviews and meta-analytic studies have been published in the past few years (Elwy et al., 2002; Mize et al., 2002; van Empelen et al., 2003). These studies also indicated that drug users responded positively by adopting safer sex behaviors.

Studies With HIV-Seropositive Drug Users—More recently, a new initiative was devoted to helping HIV-infected individuals adopt and sustain HIV sex risk reduction behaviors, treatment adherence, and effective strategies for coping with HIV/AIDS (Gordon et al., 2005). As part of that initiative, a few behavioral interventions with HIV-seropositive IDUs were implemented. These interventions are important because it might be difficult for HIV-seropositive IDUs to maintain consistently safer sexual behaviors over long period of times, especially as they receive HAART and believe the quality of their lives has improved.

Interventions with HIV-seropositive IDUs are primarily designed to improve IDUs' utilization of HIV care, adherence to HIV medications, and reduction of sexual and injection risk behaviors. Results of behavioral interventions with HIV-seropositive IDUs recruited from a methadone program (Margolin et al., 2003) and from community settings (Purcell et al., 2004) showed that prevention and education messages can help HIV-seropositive drug users reduce their sex risk behaviors. These interventions are important because maintenance of behavior change for long periods of time, especially in the era of long survival periods after initial HIV infection, might be difficult without prevention messages and relapse prevention programs.

Components of Sex Risk Reduction Interventions—A review of intervention components delivered in U.S.-based risk reduction intervention studies (Elwy et al., 2002; Mize et al., 2002; Semaan et al., 2002; van Empelen et al., 2003) showed that different combinations of components were included in the interventions to reduce the sexually risky behavior of IDUs and crack cocaine smokers. Successful interventions used multiple theories and methods for

behavior change. The theoretical basis of the interventions was generally derived from the social-cognitive theory (Bandura, 1990, 1993), the theory of diffusion of innovations (Rogers, 1983), and the transtheoretical model of behavior change (Prochaska and Velicer, 1997).

In general, the interventions provided (1) information on how HIV is transmitted, including information on how to practice safer sex; (2) assessment of personal risk and responsibility; (3) risk reduction supplies, including condoms at reduced cost or for no cost to participants; (4) technical skills training in when and how to use condoms correctly; (5) individual or group counseling to address practical and emotional issues in practicing safer sex; (6) skills training in negotiating safer sex with partners; (7) voluntary HIV counseling and testing; (8) treatment of other STDs that may facilitate HIV transmission or referral for such treatment; (9) referral to drug treatment to reduce both injection behavior and sexually risky behavior; (10) education on enhancement of self-esteem and group pride; (11) education on enhancement of one's responsibility to adopt safer behaviors; (12) education on enlistment of social support of peers to reinforce positive changes; and (13) education on development of intrapersonal and interpersonal skills such as skills in communication with partners, disclosure of HIV status to partners, problem solving, and self-management.

Although many of the sex risk reduction interventions implemented in resource-rich settings were theoretically based, the question of how to adapt these interventions to other settings is still relevant (Needle et al., 2003). Taking into consideration the social, environmental, and normative context for HIV risk reduction, calls are still being made to adapt even the theoretical models of behavior change to the culture and context of local community norms and to the traditional practices of resource-constrained settings (Oduolu, 2005). Although these calls have been made in reference to heterosexual populations other than drug users, the same phenomenon, promotion of protective peer and social norms, applies to drug users (Gibson et al., 1998). This adaptation process is especially relevant to sexual behaviors because individual behaviors are shaped by social norms and because the process of behavior change goes beyond the individual decision making process.

Summary Remarks and Future Research Efforts—In summary, the research results show that sex risk reduction interventions, often implemented as part of education on reducing drug-related risk behaviors, can lead to a moderate reduction in sexual risk among drug users. Thus interventions can reduce chances of acquiring HIV and transmitting HIV among drug users. Most of the interventions were implemented by outreach workers and addressed individual-level or interpersonal-level variables. The interventions were either delivered on an individual basis or in groups.

Because sexual behavior is a multidimensional phenomenon and the sex reduction effect is moderate, future research should examine interventions for reducing sexually risky behavior with multiple partners and with different types of partners, including regular partners, casual partners, and commercial sex partners. Research is also needed for reducing the risk behaviors associated with the purchase or sale of sex for drugs. Additional research is needed to determine the effectiveness of different combinations of intervention components to develop more effective interventions. We need evaluation of strong contrasts between interventions delivered to the intervention and to the comparison groups. There is also a need to dismantle intervention effects by examining whether the theoretical methods on which an intervention is based are effective in changing the psychosocial or sociological factors that facilitate behavior change and the reasons or causal processes for such change. Because most of the sex risk reduction interventions were part of overall HIV risk reduction interventions and were implemented in resource-rich settings, it is important for new research to conduct interventions in different national and cultural settings.

Community-Based Outreach Interventions

Most of the sex risk reduction interventions used outreach workers to recruit IDUs and crack cocaine smokers into intervention studies. Recently, a comprehensive review of the global reach and overall effectiveness of community-based outreach interventions for preventing HIV among IDUs was published (Needle et al., 2005). The authors of the review concluded that community-based outreach interventions have appropriately evolved over the past 20 years of the HIV epidemic to respond to the needs of IDUs in different regions of the world. Community-based outreach interventions have successfully reached IDUs. Outreach workers have provided credible risk reduction information and the means for behavior change to enable drug-using populations to reduce drug use, to reduce reuse of syringes and other drug injection equipment, and to increase condom use. As part of these interventions, IDUs have received referrals to drug user treatment and to voluntary HIV counseling and testing services.

Despite evidence of the effectiveness of risk reduction interventions and of community based outreach and intervention research studies, a huge gap still exists in most countries between the number of IDUs who want or could benefit from such programs and the number of IDUs who actually receive them. There is a need to implement programs wherever they are needed, based on positive evidence from research intervention data and literature and on the local realities of the HIV epidemiology, drug use practices, and sex risk behaviors.

Levels of Risk Reduction Interventions

Risk reduction interventions can be implemented at many levels: at the individual level, at the dyad/partner level, at the peer level, at the group level, at the family level, and at the structural level. All these levels are important in reinforcing the message about the importance of safer sex behaviors because sex behaviors are influenced by determinants that operate individually and synergistically at multiple levels.

Interventions Influencing Individual-Level Variables of Risk Reduction—Most of the sex risk reduction interventions included in the reviews of the 1990s and in the two meta-analyses of those interventions (Cross et al., 1998; Semaan et al., 2002) included interpersonal determinants of sex risk reduction. The interventions were either delivered on a one-to-one basis or in groups. However, because sex risk reduction is influenced by partner-level determinants, by peer norms, and by social and contextual-level variables, there is a need for interventions that focus more fully on these particular determinants. Given the modest effect of reduction interventions that focus on individual-level determinants of risk reduction and the importance of peer and social norms and of societal barriers and facilitators in influencing safer sex behaviors, a new set of interventions has been developed or called for in the past several years.

Interventions Influencing Peer-Level Variables of Risk Reduction—Several studies have shown the importance of peer norms in influencing behavior change and have shown that peer processes are central to HIV risk reduction among IDUs in different national and cultural settings. For example, predictors of behavior change from four cities in resource rich and resource-constrained countries have shown that frequent talking with IDU peers was the strongest factor associated with behavior change in response to the threat of HIV (Des Jarlais et al., 1995). Accordingly, it seems that successful sexual risk reduction operates through discussions about HIV and AIDS by drug-using peer groups with their drug-using partners (Barabási, 2003; Des Jarlais et al., 1995, Des Jarlais et al., 1996). These discussions led to new peer norms that promote safer behaviors (Friedman et al., 2004). However, such discussions are unlikely in social environments in which drug users, including HIV-seropositive drug users, face discrimination and marginalization (Des Jarlais, 2000; Sumartojo, 2000). Alternatively, it is difficult to develop new social norms promoting safer injection and safer sex if people

cannot talk honestly about these matters. Additionally, severe stigmatization of HIV/AIDS and illicit drug use, which may stymie open dialogue and education because of feelings of guilt or shame or discrimination, may limit abilities of communities to make use of individual-level interventions, no matter how effective these interventions may be (Parker, 2002).

In the United States, peer-based interventions have gained momentum as a complementary strategy for influencing behavior change (Friedman et al., 2004; Knowlton et al., 2001; Latkin et al., 1996, Latkin et al., 2003a,b). Delivered by the peers of drug users, these interventions have aimed at harnessing the positive influence of peer norms to risk reduction. There is yet a need to implement interventions at the dyad level or partner level. Implementing interventions that address peer-level determinants of risk reduction on a larger scale and in resource-constrained settings can show promising results in developing positive peer norms for safer sexual behaviors.

Family-Based Interventions—In addition to peer-level interventions, there is renewed attention to involving families in HIV prevention and treatment efforts. Although the definition and structure of a family (e.g., nuclear, extended) varies between countries and across cultures, the power of a family can be harnessed in HIV prevention and control, assuming cultural concerns about privacy of persons and confidentiality of data are addressed appropriately. Several investigators have pointed to the importance of families in substance use addiction or called for interventions that build on the strengths of the families and mobilize them to contribute to the community's long-term health, survival, and security needs (Aronowitz et al., 2005; Fullilove et al., 2000; McArdle et al., 2002; Paruk et al., 2005; Rotheram-Borus et al., 2005).

Family-based interventions have the potential to be effective with young drug users who are still living with their families and who have not admitted openly to their drug use practices or with young drug users who are still in touch with their families. In certain resource-constrained settings, the strength of the families can be harnessed for the development of effective sex risk reduction interventions.

Structural-Level Interventions—Over the past several years, increased and renewed attention has been given to the social and environmental context of sex risk reduction of drug users. The social and ecological context includes the interactions of sex risk behaviors with factors relevant to society, the community, and the environment (Galea and Vlihaov, 2002; Latkin and Knowlton, 2005; Latkin et al., 2005; Rhodes et al., 2005). Calls for these types of interventions, once referred to as social prevention interventions, have been made in the 1990s (Fournier and Carmichael, 1998).

Structural-level interventions seem increasingly important because risk reduction interventions that address only individual-level determinants of risk reduction do not seem to be enough (Blankenship et al., 2000; Sumartojo et al., 2000). Although interventions that address peer processes of risk reduction affect positive norms and may have a stronger effect in influencing sex risk reduction than the interventions that address individual determinants of risk reduction, public health investigators have typically shied away from structural-level interventions. Such interventions require more resources, macro-level or societal-level changes, and a longer time to see changes. However, structural-level interventions that aim, for example, to increase women's economic, social, and political empowerment are key components of a comprehensive strategy to reduce sexual risk behaviors (Kim and Watts, 2005; Sherman et al., 2006). In such interventions, the target becomes the economic and social context in which sex occurs (Friedman et al., 2002; Smith Fawzi et al., 2003). Interventions that involve micro-financing of local projects or activities and that include training and empowerment of women and educational opportunities for girls are becoming a focal point for defining the next effort

of structurally designed sexual risk reduction in populations still confronting escalating rates of HIV and other health disparities.

Structural-level interventions, and in particular needle exchange programs, have reduced the parenteral risk of HIV transmission (Des Jarlais, 2000). Such interventions can have direct and indirect effects on reducing sexual risk behaviors of drug users (O'Leary and Martins, 2000; Sumartojo et al., 2000). However in developing structural-level interventions, it is important to pay attention to the local context and local barriers (Power et al., 2005) and to the local practices of drug users (McCurdy et al., 2005). Therefore it seems important to combine resources and expertise to design structural interventions in partnership with drug users to enhance the adoption of safer sex behaviors. For example, the power of such partnerships has been harnessed in the participatory research with commercial sex workers and establishment owners in the Philippines (Chiao et al., this issue).

Tailored Interventions for Subgroups of Drug Users

Drug users are not a homogenous group, because different reasons make drug users gravitate to different drugs. Additionally, drug users struggle with multiple health and social problems, including severe and persistent mental illness, relationship abuse, poverty, and transient housing. Drug users who live in rural settings may have different needs from users who live in inner cities. Because of multiple personal and contextual variations, drug users differ in terms of their sex risk for acquiring and transmitting HIV. Some drug users may need more intensive prevention interventions, including case management, to influence their sex risk reduction behaviors (Malow et al., 2006; Malta et al., 2003).

Most individual-level and peer-level risk reduction interventions in the United States have been implemented with heroin or cocaine IDUs or with crack cocaine smokers. Because of the differing and changing patterns in drug use in resource-rich and resource-constrained settings, tailored interventions are important for certain subgroups of drug users. Tailored interventions could serve as an important strategy to reach crack cocaine smokers, alcohol users, methamphetamine users, those who trade sex for money or for drugs, and those with childhood or adulthood history of witnessing abuse or violence, in both resource-rich and resource-constrained settings.

Tailored interventions have been developed over the past years with crack cocaine smokers, most of whom were women (Feist-Price et al., 2003; Logan and Leukefeld, 1998, 2005; Marx et al., 1991; Sterk et al., 2003). These interventions addressed most often individual-level determinants of risk reduction, and they were delivered to individuals or groups. The interventions used various theoretical models of behavior change and were associated with modest changes in sex risk reduction. The interventions included similar components as those used in interventions with IDUs, but they also addressed issues relevant to women, such as the meaning of behaviors and social interactions, gender dynamics, economic stressors, gender-specific norms and values, and power and control.

The role of alcohol in influencing sexual risk behaviors, infection with STDs, and infection with HIV has been well documented in the literature (Campbell et al., 2005; Cook and Clark, 2005; Markos, 2005; Palepu et al., 2005; Thompson et al., 2005). Relevant preventive and treatment activities need to be implemented with those who abuse¹ alcohol either alone or in conjunction with other drugs. Such interventions are also relevant to drug users in Africa and to controlling the HIV epidemic in Africa.

¹The journal's style utilizes the category *substance abuse* as a diagnostic category. Substances are used or misused; living organisms are and can be *abused*. Editor's note.

Methamphetamine use in the United States (Farabee et al., 2002; Kral et al., 2000; Mansergh et al., 2006; Molitor et al., 1999; Semple et al., 2004a,b,c, Semple et al., 2005; Wohl et al., 2002) and particularly in East Asia (Beyrer et al., 2004) is associated with sex risk behaviors. Although interventions with methamphetamine users who engage in heterosexual behaviors have not been widely evaluated or implemented, calls for such interventions have been made. Such interventions can address all levels of variables that influence risk taking, and they can also include drug treatment.

The proportion of commercial sex workers who use injection drugs and the proportion of female IDUs who trade in sex vary by city and country and can reach 50% in some settings (Kuyper et al., 2005; Ryan et al., 2003; Tran et al., 2005). Sex worker peer-based interventions, coupled with condom availability, enhancement of communication skills, and promotion and availability of prevention and care services for STDs, have been effective in several countries, including Thailand, Cambodia, and the Netherlands. These interventions were developed and implemented with the cooperation of the sex workers and the owners of the establishments. Relevant interventions are needed for male sex workers. Relevant interventions are also needed for drug users who engage in same-sex sex risk behaviors (Friedman et al., 2003b; Maslow et al., 2002; Young et al., 2000, 2006).

Several studies showed the role of childhood sexual abuse as well as adult violence and abuse in the earlier initiation of injection drug use (Ompad et al., 2005) and in having unprotected sex (Hamburger et al., 2004). These studies emphasize the importance of integrating substance use prevention with postvictimization services for young drug users and show the need for tailored interventions for those with a history of childhood or adult abuse. Health care providers can also assess abuse history and supplement HIV prevention counseling with mental health counseling.

Health-Related Interventions

Health-related interventions form another set of important interventions to reduce the sexual transmission of HIV among drug users. We focus in this section on the role of HIV testing and counseling, prevention, and treatment of STDs and the role of HIV treatment (HAART) in sex risk reduction. Although HIV counseling and testing and prevention and treatment of STDs have been implemented in several resource-rich and resource-constrained countries and have been associated with various levels of success, only a small proportion of IDUs in resource-rich and resource-constrained countries have received HAART for HIV. Issues related to cost and availability of a well-developed infrastructure affect this limited access (Dawson-Rose et al., 2005; Ksobiech and Malow, 2005; Masson et al., 2004; Sterk et al., 2002).

HIV Counseling and Testing—The World Health Organization (WHO) has sponsored two studies of HIV and injecting drug use. Together, these studies provide partial answers to the question of whether the results of sexual risk reduction studies in resource-rich settings can be generalized to resource-constrained settings. The partial answers would be probably yes and it depends.

The first WHO study was one of the first studies that utilized standard methods for collecting data in both resource-rich and resource-constrained settings (Des Jarlais et al., 1995b, Des Jarlais et al., 1996). For this study, IDUs were recruited through community outreach and from drug user treatment programs in 12 different cities (Athens, Greece; Bangkok, Thailand; Berlin, Germany; Glasgow, Scotland; London, United Kingdom; Madrid, Spain; New York, USA; Rio de Janeiro, Brazil; Rome, Italy; Santos, Brazil; Sydney, Australia; and Toronto, Canada). Informed consent was obtained, a structured interview was administered, and a blood or saliva sample was collected for HIV testing. The interview asked about demographics, drug use, and

HIV risk behavior. At the time of data collection (approximately 1990) some HIV prevention efforts for IDUs existed in all of the cities, although the extent of the programs varied greatly.

The great majority of the IDUs who participated in the first WHO study reported that they had changed their behavior to avoid getting HIV. The specific behavior changes were primarily reductions in the sharing of drug injection equipment, increases in the use of male condoms, and reductions in the numbers of sex partners (Stimson et al., 1998). The percentages of participants in the two Brazilian cities (Rio de Janeiro and Santos) who changed their behavior were relatively low, 58% and 50%, respectively. This result was consistent with the relative lack of HIV prevention programs in Brazil at the time of data collection. In contrast, Bangkok had one of the highest percentages of participants (92%) who reported HIV-related behavior change. Bangkok had an extensive HIV education and prevention program for IDUs, which was implemented through its methadone treatment programs. Participants in Bangkok who reported behavior change were half as likely to become infected with HIV as participants who reported that they had not changed their behavior (Vanichseni et al., 1993). This first WHO study suggests that IDUs in both resource-rich and resource-constrained settings will change their behavior to reduce their chances of contracting HIV and that these changes can lead to important reductions in risk.

The second WHO study was conducted in 2000-2003 in 12 cities. All cities were in developing or transitional countries: Beijing, China; Bogota, Columbia; Gran Rosario, Argentina; Hanoi, Vietnam; Kharkiv, Ukraine; Lagos, Nigeria; Minsk, Belarus; Nairobi, Kenya; Penang, Malaysia; Rio de Janeiro, Brazil; St. Petersburg, Russia; and Santos, Brazil (Des Jarlais et al., 2004). The methods for this second WHO study were almost identical to the methods of the first WHO study. Because the two WHO studies used very similar methods, this similarity facilitated the comparisons across the different cities and between the two studies. The major difference between the two WHO studies was that the second study included a rapid assessment and response component to provide qualitative data on each city and to develop interventions for HIV prevention with IDUs in each city.

With this greater number of cities in resource-constrained settings included in the second WHO study, there was a much greater variation in indices of risk and in risk reduction between the cities. First, there was great variety in the drugs that were most frequently injected, with heroin being the dominant drug in the African and Asian cities and with cocaine being the dominant drug in the South American cities. Heroin and various “homemade” drugs, such as poppy-straw extract and ephedrine-based stimulants, were the most commonly injected drugs in the Eastern European cities. Second, generally, fewer female IDUs were recruited into the second WHO study.

In the first WHO study, the percentages of female IDUs recruited in the cities from the industrialized countries ranged from 19% in Madrid to 44% in Berlin. In the second WHO study, the percentages of female IDUs recruited in the different cities ranged from 0% in Penang and 6% in Rio de Janeiro to 26% in Kharkiv and in St. Petersburg. Although greater stigmatization of female IDUs in many developing countries may have made it more difficult to recruit females in the second WHO study, it does appear that the male-to-female ratio of IDUs is probably much higher in most developing and transitional countries than in most industrialized countries. Therefore the problem of sexual transmission of HIV from IDUs to sex partners who do not inject drugs is likely to exist on a greater scale in developing and transitional countries. This phenomenon would include male IDUs utilizing the services of sex workers and potentially serving as a source transmitting HIV to commercial sex workers. Third, the IDUs in the second WHO study were generally less likely to have reported having changed their behavior to reduce the risk of HIV infection. In the industrialized cities in the first study, the percentage of IDUs who reported risk reduction ranged from 72% in Madrid to 88% in

Athens. In the second WHO study, data from cities in the developing and transitional countries show that the percentages reporting risk reduction ranged from 32% in Kharkiv to 78% in Lagos. The data from the second WHO study do indicate that large numbers of IDUs in developing and transitional countries will adopt risk reduction but that even after the 10-year period between the two studies, IDUs in developing and transitional countries were still behind the level of risk reduction reported by the IDUs in industrialized countries.

Finally, there was very great variation in the percentages of IDUs reporting unsafe sexual behavior (unprotected vaginal intercourse with an opposite sex partner in the 6 months before the interview) in the second WHO study. The percentages of IDUs reporting unsafe sex with a primary partner ranged from 25% in Penang to 82% in Kharkiv. The percentages of subjects reporting unsafe sex with casual partners ranged from 5% in Hanoi to 50% in Rio de Janeiro. The reasons for these variations have not yet been systematically studied but are likely to include the different drugs being used (and their effects on sexual behavior), the male-to-female ratios of the IDU populations, and the extent to which HIV prevention programs have been implemented of the different cities.

The results of these two WHO studies indicate that the vast majority of IDUs adopt behavior changes to reduce their risk of becoming infected with HIV, including both injection and sexual risks. IDUs in developing and transitional countries, however, appear to be behind those in industrialized countries in terms of their adoption of risk reduction behaviors. There is also very substantial variation in the factors likely to be associated with the sexual risk behaviors of IDUs in developing and transitional countries, and site-specific adaptation of HIV prevention programs is needed.

Other studies have shown that IDUs who learn that they are HIV seropositive greatly increase their use of condoms to reduce the risk of transmitting HIV to their sex partners. As part of the first WHO study, investigators examined the relationship between knowing one's HIV status and using condoms with regular sex partners (Vanichseni et al., 1993). In Bangkok and New York City, IDUs who knew that they were HIV positive were much more likely to consistently use condoms with their regular sex partners. A similar result was obtained in a European Union study of HIV risk behavior of IDUs in different European cities (Desenclos et al., 1993). Both the WHO study and the European Union study suggest that altruism—protecting a sex partner from becoming infected with HIV—can be an important factor in reducing the sexually risky behavior of IDUs. Equally important is an environment that is supportive of adoption of safer sex behaviors.

A meta-analysis of 22 published studies (Weinhardt et al., 1999) showed similar results to those reported in individual studies. The meta-analysis included data from IDUs from four studies in the United States and from six studies from resource-constrained settings. The meta-analysis showed that after voluntary HIV counseling and testing, HIV seropositive persons were more likely to report reductions of sexually risky behavior than either HIV-seronegative persons or persons who had not been tested and counseled. The overall weighted average effect measured as a standardized mean difference for the variable that measured unprotected sexual intercourse was 0.47 (95% CI, 0.32-0.61) and as an odds ratio was 0.43 (95% CI, 0.33-0.56). The overall weighted average effect measured as a standardized mean difference for the variable that measured increased condom use was 0.65 (95% CI, 0.42-0.87) and as an odds ratio was 0.31 (95% CI, 0.21 -0.47).

Recent publication of data collected from IDUs in Baltimore during the mid to late 1990s showed that exposure to repeated HIV testing and counseling was not associated with increased condom use by IDUs who have been injecting during the 10 years before data collection and who did not initiate antiretroviral therapy. The study showed that condom use remained low,

indicating the need for interventions to reduce sexual risk behaviors and sexual HIV transmission between IDUs (Rusch et al., 2005). A recent meta-analysis examined the prevalence of high-risk sexual behaviors of HIV-positive persons aware of their serostatus and of HIV-positive persons unaware of their status in the United States (Marks et al., 2005). The study showed that the prevalence of high-risk sexual behaviors was reduced substantially after people became aware that they were HIV positive. The 11 studies included in this meta-analysis did not include drug users, and risk reduction was assessed for unprotected anal or vaginal intercourse combined.

Results of HIV testing and counseling studies show that HIV counseling and testing can reduce exposure to HIV from persons unaware they are infected. Accordingly, in the United States, the Centers for Disease Control and Prevention initiated a new strategy in 2001. This strategy emphasizes testing, counseling, and disclosure and access to such services as well as the intervention support needed to support the difficulties of disclosure to sex partners. This strategy has been referred to as the serostatus approach to fighting the HIV epidemic and has been advanced as an important strategy in both resource-rich and resource-constrained settings (De Cock et al., 2002; Janssen et al., 2001). Discrimination and stigma against HIV testing, learning about one's HIV status, and receiving antiviral treatment for HIV infection still pose barriers to HIV counseling and testing interventions.

To enhance the effect of HIV counseling and testing on reducing sexual transmission of HIV, health care providers and public health practitioners are encouraged to offer HIV counseling and testing in different venues and through different means. For example, some of these options include expanding testing services to nonclinical settings, using the social networks of individuals who have recently tested positive for the first time, offering rapid testing as part of partner counseling and referral services, offering HIV counseling and testing services in corrections facilities, offering HIV testing in all venues frequented by drug users; and adding HIV testing and counseling capacity to all prevention and treatment venues.

Gaining the cooperation of current HIV-positive drug users to reach and recruit members of their sexual and social networks for HIV testing, counseling, and treatment is an important mechanism to increase HIV testing in drug users (Emerson et al., 2005). Other strategies include the use of oral HIV fluid testing that has been feasible and useful in acute substance user treatment settings (Pugatch et al., 2001) so that drug users can learn their test results while still in treatment. Continual prevention services are needed for persons who know they are HIV positive so they can continue to engage in safe sex behaviors. For those who are HIV seropositive, health care providers need to reach them with continued prevention and intervention messages. Integrating prevention with routine medical care is an important mechanism to ensure adoption and maintenance of safer sex behaviors.

One of the important strengths of the voluntary HIV counseling and testing studies is that they have been conducted in a large number of different settings, including resource-constrained settings. Therefore it would appear that the desire to avoid infecting sex partners is common among IDUs in different cultural settings and countries. Another important strength of the knowledge of one's positive serostatus is that the increase in condom use takes place with regular (primary) sex partners, an important result in the efforts to control the spread of HIV infection. However, HIV-seropositive IDUs do not use condoms 100% of the time nor do all HIV-seropositive IDUs use condoms, and there appears to be little or no effect of HIV counseling and testing on sexually risky behavior of HIV-seronegative drug users.

It is important, however, to keep in mind several points as we consider the implementation of voluntary HIV counseling and testing in resource-constrained settings. First, discrimination against and stigmatization of people with HIV may restrict the willingness of IDUs to

participate in voluntary counseling and testing activities (Parker and Aggleton, 2003). Second, the reduction in sexually risky behavior may depend on social and cultural factors other than the drug user's learning that he or she is infected with HIV. For example, discrimination and stigmatization in certain settings may restrict the willingness of IDUs to use condoms to reduce transmission of HIV. It may be important that HIV and drug use not be so heavily stigmatized in the local setting that the drug user can admit to being HIV seropositive. Third, it is important that the HIV-seropositive drug users receive some form of psychological support or medical care after learning that they are infected with HIV. Accordingly, voluntary HIV counseling and testing activities should include appropriate medical follow-up and treatment for HIV-seropositive IDUs.

STDs Among Drug Users

Research demonstrates that several STDs, especially syphilis and genital herpes, facilitate sexual transmission of HIV (Freeman et al., 2006; Gray et al., 1999; Grosskurth et al., 1995; Hitchcock and Fransen, 1999; White et al., 2004). This evidence comes from studies conducted with populations other than drug users and mostly from resource-constrained settings. It remains important, though, to examine this synergy in drug-using populations.

The rates of STDs among drug users are higher for herpes as compared with syphilis, gonorrhea, and chlamydia. Certain subgroups of drug users who engage in higher sex and drug risk behaviors have higher rates of STDs. Higher rates for bacterial STDs are reported in drug users who are younger, of a racial or ethnic background other than White, and in females (Semaan et al., 2006). The same pattern is seen for genital herpes, with the exception of age, where higher rates are seen in older drug users. The sociodemographic variation of STD rates is influenced by medical factors, such as the relative rates of STD transmission from one sex to the other and the increased likelihood of asymptomatic infections among women. Social factors also influence the sociodemographic distribution of STD rates, including contrasting patterns of sexual activity between men and women, the age of sex partners, and the different drug use patterns and behaviors associated with drug use. An example is the increased likelihood of crack use and the exchange of sex for money and drugs among women.

For example, in the United States, several studies assessed seropositivity rates of syphilis in drug users. The research data showed high rates of syphilis among drug users, ranging from 1% to 6%, and higher rates in certain groups of drug users, including those who reported having had a previous infection with syphilis, those who reported having had a history of STDs, those who had multiple partners, and those who started use of injection drugs (Bachmann et al., 2000; Friedman et al., 2003; Gourevitch et al., 1996; Hwang et al., 2000; Lopez-Zetina et al., 2000; Plitt et al., 2005; Ross et al., 2002). A recent study reported incidence rates in IDUs of 26 in 1,000 person-years (Lopez-Zetina et al., 2000).

Rates ranging from 38% to 61% were reported in the few studies that assessed for genital herpes (HSV-2) in drug users (Hwang et al., 2000; Plitt et al., 1999, 2005; Ross et al., 2002). These studies showed that the pattern in the variation of the prevalence rates of genital herpes by sociodemographic factors mirrored the pattern seen in other populations, with lower rates reported in younger, White, and male drug users. Higher prevalence rates were found in subgroups of drug users, especially in male drug users who have sex with men, those who trade in sex, those with multiple partners, those with a history of incarceration, and in those who were HIV positive.

Several studies tested for both gonorrhea and chlamydia in drug users (Bachmann et al., 2000; Friedman et al., 2003; Gunn et al., 2005; Hwang et al., 2000; Lally et al., 2002; Latka et al., 2001; Liebschutz et al., 2003; Plitt et al., 2005; Ross et al., 2002). For gonorrhea, a prevalence rate ranging from 1% to 3% was reported in those studies. For chlamydia, the studies

reported a prevalence rate ranging from 1% to 5%. One study reported incidence rates for chlamydia, with 2% reported in male IDUs and 4% reported in female IDUs at the 6-month follow-up period (Latka et al., 2001). The same study reported on incidence rates for gonorrhea, with 0% and 1% reported in male and female IDUs, respectively, at the 6-month follow-up period. The studies also showed higher rates of gonorrhea in male crack users, female IDUs, those who trade in sex, those with multiple partners, and female IDUs infected with HIV. The studies showed higher rates for chlamydia in female crack users, female IDUs, those who trade in sex, those with multiple partners, and those who had reported having had other STDs or a previous infection with chlamydia.

High rates of STDs are also reported in drug users from countries other than the United States, especially resource-constrained settings (Parish et al., 2003; Shakarishvili et al., 2005). The studies also point to the contextual factors that are associated with high STD rates. For example, in Estonia higher rates of unemployment were associated with higher rates of syphilis, showing that syphilis is still exacerbated by social factors (Uuskula et al., 2004). Good news, for example, comes from Australia where control policies for STDs were successful in reducing STD rates (Lee et al., 2005). Improved STI treatment services have been shown to reduce HIV incidence in an environment characterized by an emerging HIV epidemic (low and slowly rising prevalence HIV rates) and high prevalence rates for STIs (Sangani et al., 2004).

The importance of and opportunities for collecting STD-related data have been noted in a few studies (Maclachlan et al., 2002). Few interventions were specifically developed with drug users to reduce their risk of infection with STDs (Wendell et al., 2003).

Efforts to control STDs aim to interrupt and reduce transmission of infection and to prevent the development of disease, complications, and sequelae. Primary prevention includes behavioral interventions that focus on information, education, and communication; use of barrier methods; vaccination; screening; testing; and case finding. Treatment strategies include promoting appropriate health-seeking behaviors, syndromic management, partner notification and management, and a supportive health care sector. Targeted interventions include working with those who trade sex for money or drugs, have high numbers of sexual partnerships, or are HIV infected. These subgroups of drug users may be more likely to acquire and transmit HIV or STIs, forming a bridge with the general population. Inclusion of STD prevention in venues that deliver care to drug users, including HIV-positive drug users, is important in the prevention and control efforts of STDs in drug users. Establishing STD testing and treatment options in drug treatment facilities and corrections facilities and training staff members in STD clinics or hospital emergency rooms in how to work with drug users can be effective in controlling and preventing STDs among drug users.

HAART and Sexual Transmission of HIV Among IDUs

Treatment with anti-HIV drugs of HIV-seropositive individuals has the potential to reduce the sexual transmission of HIV by lowering the amount of HIV in the blood and semen to undetectable levels. Assuming that HIV infectiousness is related to the amount of virus in the blood and in the semen (Chakraborty et al., 2001, 2003), HIV-seropositive IDUs using HAART may be less likely to transmit HIV to their injection and sex partners. Alternatively, HAART may be associated with the disinhibition phenomenon, where HIV-seropositive individuals treated with HAART may mistakenly believe they are not at risk for infecting others with HIV and consequently paying less attention to the adoption and maintenance of safer sex behaviors.

Studies that examined the effect of HAART on sexual risk behaviors of HIV-seropositive IDUs in France showed that prescription of HAART was associated with reductions in unprotected sexual intercourse (Bouhnik et al., 2002). In another study with seropositive IDUs receiving HAART in Baltimore, the results showed that the level of their risk behaviors remained stable

or showed some increase (Vlahov et al., 2001). Taken together, these results are generally promising, but they still point to the fact that the use of HAART should be accompanied with counseling HIV-seropositive IDUs on HAART so that they refrain from high-risk sexual behaviors. Prevention of relapse to unsafe sex behaviors should be an important component of care of HIV-seropositive IDUs receiving HAART. These two studies with IDUs were included in a meta-analysis of HIV-positive individuals receiving HAART (Crepaz et al., 2004). The meta-analysis found that HIV-positive patients receiving HAART did not exhibit increased sexual risk behavior, even when the therapy achieved an undetectable viral load. However, the meta-analysis showed that people's beliefs about HAART and about HIV viral load may promote unprotected sex. Those who believed in the positive effects of HAART, those who believed in the positive effects of an undetectable viral load, and those who had reduced concerns about engaging in unsafe sex, given the availability of HAART, were more likely to engage in unprotected vaginal or anal sex. These beliefs are amenable to change through prevention messages, and they should be included with prevention and treatment messages shared with HIV-seropositive IDUs receiving HAART.

Although it is important to assess and prevent drug users' disinhibition behaviors associated with HAART, it is also important to ensure that drug users receive HAART. IDUs are less likely to receive HAART than other HIV-seropositive individuals (Andersen et al., 2000; Celentano et al., 1998; Strathdee et al., 1998). Because HAART is an expensive therapy, very few drug users in resource-constrained settings and even in resource-rich settings receive HAART (Celentano et al., 1998). Additionally, the factors associated with the readiness of HIV-seropositive individuals, including HIV-seropositive drug users in resource-constrained settings to receive HAART are not fully explored (Gebrekristos et al., 2005). However, recent evidence indicates that drug users are no less likely than other risk groups to adhere to HAART therapy (Amico et al., 2006; Ware et al., 2005).

Recent interventions, including the use of peers as health advocates for providing peer support and counseling, have been developed in the United States to increase adherence of drug users to HAART (Broadhead et al., 2002). Negative attitudes of health care providers may also influence IDUs' receipt of HAART (Bogart et al., 2000). Data from a recent study on utilization of care by HIV-positive drug users showed that some HIV-positive IDUs left care because of unfair and discriminatory treatment from providers (Dawson-Rose et al., 2005). Alternatively, a good provider-patient relationship and attendance of drug users at primary care appointments were reported to be associated with adherence to antiretroviral treatment (Jeanty et al., 2003). Increased understanding of providers working with different populations of HIV-seropositive drug users may positively influence clinical practice and may improve the quality of health care for HIV-positive IDUs and their adoption of safer sex behaviors.

Recommendations for Global Research Efforts

Resource-rich and resource-constrained countries have differed in their adoption and implementation of behavioral and health-related interventions to reduce the sexual risk behaviors of drug users. The variation in the mix of the adopted interventions was often influenced by the existing infrastructure, available resources and expertise, the local epidemiology of HIV infection and drug use, and by the prevailing societal philosophy and climate for risk reduction. Despite the variations in the public health activities taken and in the health outcomes observed, implementing and evaluating a comprehensive approach for reducing the sexual risk transmission of HIV appears to be crucial in controlling the heterosexual transmission of HIV to and from drug users.

It seems appropriate that countries document the extent of the sexual transmission of HIV to and from drug users and the relevant contribution of the different behavior change and health-

related interventions in the control and reduction of the sexual transmission of HIV. Such a depository of baseline data would be helpful in evaluating components and combinations of sexual risk reduction and health-related interventions among drug users.

In terms of personal-level changes, we know that the problem of unsafe sex with primary partners at risk for infection with HIV still persists. This finding is not unique to drug users but is also true for non-drug-using heterosexual persons (Neumann et al., 2002) and for men who engage in sex with men (Johnson et al., 2002). Accordingly, it seems important to implement and evaluate a comprehensive strategy for reducing the sex risk behaviors of drug users, including structural-level interventions.

Because behavior change interventions are relatively short in duration, it is often the case that such interventions did not include biologic outcome measures for infection with HIV or other STDs (Semaan et al., 2002). However, it seems important that future intervention studies complement patient-reported behavioral measures of their adoption of safer sex behaviors with more objective outcomes in the evaluation of intervention effectiveness. Additionally, collection of data on the rate of partner change, sexual networks, and on serosorting is especially important in interventions with HIV-seropositive drug users. Research on health-related interventions include evaluating the extent to which HIV counseling and testing, prevention, and control of STDs, and access and adherence to HAART reduce the sexual transmission of HIV among drug users.

Collaboration between partners is important. This collaboration includes partnership between investigators and drug users (Friedman et al., 2004); between investigators from resource-rich and resource-constrained settings (Greenberg et al., 2005); and between researchers, health care providers, and organizations serving drug-using populations (Brown et al., 2005).

Diffusion, translation, and operational research studies should be a high priority to bridge research and practice (Solomon et al., 2006). Because HIV prevention is based on a translation of our knowledge of the mechanisms of biological and behavioral transmission, adapting behavioral and health-related strategies to local conditions offer promising results in reducing sexual risk behaviors of drug users.

It is also important to assess where studies are being conducted and where the gaps are. In addition to synthesis reviews, meta-analytic studies, and registration of clinical trials and intervention studies, geomapping can serve as important tool to track existing and future trials or studies (Siegfried et al., 2005). Such an analysis is important to ensure coverage of all relevant geographic areas and subgroups of drug users.

Recommendations for Global Public Health Practice

Given that different interventions can reduce sexually risky behavior of IDUs, the transfer of research into practice becomes important. The potential for rapid spread of HIV in IDUs, followed by transmission to their sex partners who do not inject drugs, and then to a generalized heterosexual epidemic make it vital to transfer research results into public health practice, even when information despite is incomplete. Therefore, the current gaps in available scientific data on reducing the sexually risky behavior of IDUs should not be used as a rationale for failing to implement any programs to reduce sexually risky behavior (Doll and Holtgrave, 2002; Scofield and Smith, 2002). Foremost, we recommend that all interventions to reduce injection risk behavior of IDUs also address sexual risk behavior and that programs be comprehensive and include all IDUs.

Our specific strategies are as follows. First, we recommend implementation of educational or informative programs that support public discussion of reduction of HIV transmission.

Programs that provide accurate information on how HIV is transmitted sexually and on how different safer sex techniques, including condoms use, can reduce the risk of transmission are extremely important. Providing accurate information about sexual transmission of HIV and about safer sex practices would seem to be a necessary component of these interventions, because it would be very unlikely that sexually risky behavior would change in the absence of information. Although information alone may not be sufficient to reduce sexually risky behavior, accurate information is necessary for any effective risk reduction. Public discussion of sex risk may also help develop peer norms supporting safer sex behavior and may generate social support for reducing sexually risky behavior. It may be particularly helpful if peer leaders or other persons who are respected by IDUs serve as role models for reducing sexually risky behavior. Therefore social support, new social norms, and role modeling can serve to initiate and reinforce the sexual risk reduction of IDUs.

Second, making condoms readily available, either free or at low cost to IDUs, is important to control the HIV epidemic. Publicly available condoms, such as having open jars of condoms that can be taken by IDUs, may also facilitate discussions of sex and may help develop peer norms supporting safer sex. Although abstinence prevents the transmission of HIV infection, condoms are currently the most effective means of blocking sexual transmission of HIV in sexually active IDUs who are at risk of acquiring or transmitting HIV infection.

Third, voluntary HIV counseling and testing activities are important for increasing knowledge of serostatus and for producing safer behavior change. Voluntary HIV counseling and testing is particularly appropriate in areas with moderate to high HIV seroprevalence in IDUs. However, the effectiveness of voluntary counseling and testing activities may depend on a social climate that does not excessively stigmatize HIV and in which there is support and treatment for persons who are HIV seropositive. Fourth, program monitoring and evaluation remain valuable activities for enhancing reach, research, and effectiveness (Bellg et al., 2004; Leventhal et al., 2004; Semaan et al., 2002; Sogolow et al., 2000; Stimson et al., 2005).

Currently available research indicates that interventions to prevent sexual transmission of HIV between IDUs are effective. Although limited research on generalizing research results between resource-rich settings and resource-constrained settings has been conducted, it would be unethical from a public health perspective to deliberately withhold knowledge, support, or means for behavior change from IDUs at risk for HIV infection. The cost of adding intervention components to address sexual transmission to programs designed to prevent injection-related transmission is likely to be very low. Additionally, risk reduction interventions with drug users have proved to be cost effective (Pinkerton et al., 2000; Tuli et al., 2005). Addressing sexual transmission of HIV should be made a standard part of programs aimed at reducing injection-related transmission.

Conclusion

The data on HIV risk reduction, on sexual activity, and on the sexual risk behavior of IDUs and of other drug users that has been generated from resource-rich and resource-constrained settings indicate broad similarities between different settings in the responses of IDUs to the threat of HIV. The results of studies conducted in resource-rich and resource-constrained settings show that interventions to reduce both injection and sexual risk behavior could be effective for IDUs throughout the world. The data show that similar behavior change processes are likely to operate for IDUs throughout the world.

IDUs are likely to modify their behavior, and the reduction in risk behaviors is likely to be effective in reducing HIV prevalence and incidence rates. Despite the willingness and readiness of drug users to adopt safer sex behaviors, social and contextual variables influence maintenance of safer sex behaviors. Maintenance of behavior change for long periods of time

is also important in the new antiretroviral era and is not only important for HIV-seropositive drug users, but it is also important for HIV-seronegative drug users. Attention to barriers and facilitators and developing relevant interventions are important in reinforcing the behavioral changes adopted by drug users. Barriers to health-related interventions, including access to HIV counseling and testing, prevention and control of STDs, and access to HARRT, all might influence the prevention and control of sexual transmission of HIV to and from drug users. Developing relationships between the different organizations that come into contact with drug users and training staff members in how to work with drug users will be important in establishing successful prevention strategies.

Behavioral prevention along with health-related interventions remain critical in controlling the HIV epidemic, because unprotected sex and needle sharing carry risk for HIV transmission. These interventions remain the most ethical, practical, and cost-effective approaches to controlling the sexual transmission of HIV to and from drug users.

What We Know Now

- IDUs can and will change their risk behavior; interventions can be effective. Addiction or drug dependence does not preclude successful HIV risk reduction.
- Most interventions to date have focused on injection risk behavior, and many have shown strong effects.
- Moderate success has been observed for interventions targeting sexual risk behaviors.
- Understanding the comparison group services relative to the intervention is key to interpreting behavioral change in and between studies and should be a part of reviews and meta-analyses.
- Successful sexual risk reduction interventions have been theory based.
- The most potent sexual risk interventions with IDUs have been pragmatic, utilizing multiple theories and multiple components.

Possible Future Research

- Target test interventions to separate subgroups of IDUs rather than IDUs as a homogenous group.
- Create an intercountry depository of baseline data on IDU-related HIV sexual transmission rates and sexual risk reduction outcomes per program and trial.
- Improve data collection points to include biological outcome measures, partner-related variables, and sexual network information.
- Increase research on surrogate prevention strategies, evaluating the relationship between sexual risk reduction and HAART access and adherence, STD control, and HIV testing and counseling.
- Emphasize translational research, adapting proven designs to new settings and subgroups.
- Provide free condom outlets and develop research to evaluate individual-level and structural effects.
- Increase health services research to routinize HIV testing and counseling for IDUs.

Glossary

Evidence-Based Interventions

Evidence-based reviews that systematically assemble, critically evaluate, and synthesize all relevant interventions on a specific topic using scientific and statistical strategies that limit bias and random errors. The reviews address the health information overload and provide an assessment of the best available research evidence to guide future research, program, and policy activities. As an example, please see Hedges et al. (2002).

Micro-Financing

Primarily about enabling poor people to raise income through productive activities and viable projects. It often involves providing unsecured small amount of money for the operation of small and local projects. The operations and success of micro-financing depends on the support it gets from the government, social organizations, and financial institutions.

Resource-Constrained Countries

A general term that usually refers to developing countries, although still applicable to “richer” countries with large budget deficits or in economic crisis. The term is often used as “low- and middle-income countries.” The World Bank has specific economic criteria and updates on classification of countries <http://www.worldbank.org/data/countryclass/countryclass.html>. We used the terms resource-rich and resource-constrained settings because there can be resource-constrained settings in rich countries and vice versa.

Structural Interventions

Based on the premise that public health problems are related to factors in the social, economic, and political environments that influence health behaviors. Structural interventions aim to influence social, political, or economic factors to help people change their risk behaviors. A special supplement discusses the role of structural interventions in HIV prevention (AIDS, 14 (Suppl 1):S1-S72).

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