

Efforts to Prevent HIV Infection That Target People Living with HIV/AIDS: What Works?

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Proven prevention strategies aimed at reducing the frequency of behaviors that increase the risk of human immunodeficiency virus (HIV) transmission and acquisition must be made available to greater numbers of persons with or at high risk for HIV infection. This article outlines programs that have effectively reduced rates of high-risk behavior and HIV transmission and suggests that it may be possible to improve the efficacy of such programs by concurrent implementation of multiple effective interventions

Efforts to prevent HIV infection have typically focused on individuals at high risk for HIV infection rather than on people living with HIV/AIDS. Prevention efforts shifted toward HIV-infected individuals once it became clear that such services were not only possible but necessary for this population [1]. Nevertheless, there remains a relative paucity of programs to help ensure that HIV-infected individuals do not transmit HIV through unsafe sexual activities and substance-abuse practices. This article argues that, to achieve the greatest efficacy of prevention interventions, multiple mechanisms to change behavior and improve access to more-comprehensive medical care are required.

RATIONALE FOR TARGETING PREVENTION EFFORTS AT HIV-INFECTED PERSONS

It has become commonplace in the literature on prevention strategies targeting HIV-infected persons to point out that it is more effective to aim preventive interventions at the estimated 1.2 million Americans who are HIV positive than to target the entire US pop-

ulation. Nonetheless, for a number of reasons the strategy of targeting prevention efforts at HIV-infected persons is very challenging to implement. Decreased HIV loads in infected persons during the HAART era have been accompanied by dramatic decreases in morbidity and mortality. As a result, prevention efforts targeting HIV-seropositive individuals must focus on how to achieve and maintain a high prevalence of low-risk behavior in a steadily increasing population of individuals who are living longer. Furthermore, many HIV-infected individuals are not receiving drug therapy or are unaware of their infection status, putting them at high risk for transmitting HIV to other people. Other HIV-seropositive persons manage the stigmatization associated with HIV infection by keeping their status confidential. For this latter group, aptly described as a "hidden" population, public health practices that require infected individuals to identify themselves are less efficacious.

It has been shown that many HIV-infected individuals will curtail high-risk behaviors once they are informed of their serostatus [2] and receive counseling [3]. Combining HIV counseling with testing is a major strategy for preventing HIV infection in the United States, because it allows individuals to receive psychological care, medical care, and training in preventive practices. For example, in a meta-analysis involving almost 20,000 subjects, Weinhardt et al. [4] found that, after HIV counseling and testing, HIV-seropositive couples and HIV-serodiscordant couples reduced the frequency of unprotected sex and increased the frequency of condom use, thus reducing the couples' risks of re-

Presented in part: Opportunities for Improving HIV Diagnosis, Prevention & Access to Care in the U.S., Washington, D.C., 29–30 November 2006.

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Clinical Infectious Diseases 2007;45:S308–12

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1058-4838/2007/4512S4-0018\$15.00

DOI: 10.1086/522555

infection or infecting others. These findings contrasted with those for HIV-seronegative couples and for untested couples: high-risk behavior was not significantly curtailed in either group. In addition, HIV counseling and testing can help reduce the risk of HIV transmission by facilitating access to HAART, which reduces an individual's infectivity by decreasing their HIV load. Implementing HIV counseling and testing on a wide scale, however, faces a number of challenges. It is believed that ~25% of the estimated 1.2 million HIV-infected persons in the United States do not know they are infected and that another ~25% of HIV-infected persons know they are infected but are not being treated [5–7]. Provision of care and behavioral interventions to HIV-infected persons will require substantial effort and incur significant cost. It will be particularly difficult to reach marginalized populations of HIV-infected persons, and prevention strategies will need to be exceptionally efficient for extended periods because of the increased life span achievable through HAART use.

EFFICACY OF BEHAVIORAL INTERVENTIONS

Risk-reduction interventions for HIV-infected persons have been implemented in a variety of situations, but the factors that contribute to their success or failure have not been clearly identified. Johnson et al. [8] conducted a meta-analysis of randomized, controlled risk-reduction intervention trials involving HIV-infected persons to determine whether the interventions helped reduce the number of sex partners and/or increase the frequency of condom use (the most common markers of risk behavior) and to identify the most-efficacious interventions in different subgroups of study subjects. Overall, the interventions were associated with a statistically significant reduction in risk of sexual transmission of HIV, as measured by an increased frequency of condom use during anal, oral, and vaginal sex; however, the frequency of condom use improved only when interventions included both motivational and behavioral skill enhancements. The interventions were more effective among younger participants but had no significant impact in cohorts composed of men who have sex with men (MSM). Notably, there was no decay in the interventions' efficacy over time. Although the meta-analysis demonstrated the efficacy of motivational and behavioral interventions in reducing risk behavior, it also highlighted the need for prevention programs among MSM that focus on skills training, in addition to motivational programs.

Similar findings were noted in a meta-analysis of trials on interventions to prevent HIV transmission by HIV-infected persons, which included an evaluation of the factors that contributed to the success of interventions designed to reduce the frequency of risky sexual behavior [3]. Crepaz et al. [3] included studies with follow-up durations ranging from 3 months to 1 year and found that interventions were associated with a sig-

nificant reduction in the odds of unprotected sex (OR, 0.57; 95% CI, 0.4–0.7) at the longest follow-up, as well as a significant reduction in the odds of acquiring a sexually transmitted disease (STD) (OR, 0.20; 95% CI, 0.05–0.73). There was an apparent reduction in the frequency of needle sharing among injection drug users in the intervention groups, but this was not statistically significant. Similar to the findings of the meta-analysis by Johnson et al. [8], the characteristics of effective interventions, summarized in table 1, were pivotal to their success. It should be noted that the effect sizes for interventions delivered to groups or by peers were only marginally statistically significant, indicating that interventions may be most effective when delivered one-on-one by health care professionals or professional counselors in settings where HIV-infected persons can receive medical care for and address a range of coping issues associated with their infection. If these criteria are necessary to ensure the efficacy of prevention interventions for HIV-infected persons, it will be a significant challenge to find adequate financial and human resources to meet these needs.

DETERMINING RELEVANT ISSUES IN PREVENTION PRACTICES

Risk-reduction interventions are now recognized as an integral part of comprehensive treatment programs for HIV-infected persons. Nevertheless, unanswered questions remain about the sexual, substance-abuse, and infection-disclosure practices of HIV-infected individuals that affect the risk of transmitting infection to uninfected partners [1]. Despite evidence that HIV-infected persons significantly curtail risk behavior once HIV infection is diagnosed, there are few studies on interventions designed for HIV-seropositive MSM. To obtain better information on risk behaviors among MSM, the Centers for Disease Control and Prevention (CDC) launched a research initiative known as the Seropositive Urban Men's Study (SUMS) in 1996.

Table 1. Characteristics of interventions effective at reducing behavior associated with a high risk of HIV transmission.

Guided by behavioral theory
Specific emphasis on HIV transmission behaviors
Skill building programs, by subject
Use of condoms
Coping with HIV positivity
Role-playing with partners
Delivered during one-on-one sessions
Delivered by health care professionals or professional counselors
Delivered in settings where HIV-infected people receive care
Substantial delivery time (>20 h) over a long duration (>3 months)
Addressed multiple issues regarding coping with HIV positivity
Adhering to medications
Reducing high-risk behaviors for HIV transmission

NOTE. Adapted from [3].

SUMS sought to determine the viability of recruiting HIV-infected MSM from different communities, describe serostatus disclosure and sexual practices, determine the factors that affect disclosure and risk behavior, and obtain input on possible intervention protocols. Two years later, the CDC supplemented SUMS with the Seropositive Urban Men's Intervention Trial (SUMIT) [1]. In addition to gathering more information on the items investigated by SUMS, SUMIT evaluated the efficacy of a behavioral intervention to reduce the risk of HIV transmission to uninfected partners. In one of the study arms, participants received current information about HIV infection and STD transmission and safer sex practices from experts during a single, 1.5–2-h session; in the other arm, participants attended 6 weekly 3-h sessions focusing on sexual relationships, HIV and STD transmission, drug and alcohol abuse, assumptions about the HIV serostatus of their sex partners, and disclosure of their HIV serostatus. Information about the risks of unprotected sex for the participants and their HIV-infected or HIV-uninfected partners was provided to both study arms, with an emphasis on the participants' responsibility to prevent transmission of HIV to their partners. New information from SUMIT raised questions about a number of unaddressed issues regarding risk-associated assumptions and behaviors of HIV-infected MSM.

HIV-positive men often attempt to reduce the frequency of risky behavior on the basis of what they consider to be the epidemiological risks for HIV transmission. However, these "folk" beliefs can stretch the limits of current epidemiological knowledge about HIV transmission, as illustrated by the following questions that many HIV-positive MSM considered in their efforts to reduce the risk of HIV transmission [9]. Does the risk for HIV infection increase during oral sex between serodiscordant persons if either partner has a STD? Is the risk for HIV infection enhanced if an HIV-seropositive partner has a high HIV load? Can a man with an undetectable HIV load transmit HIV to a sex partner? And if an HIV-positive man has receptive anal sex with an HIV-negative partner, is the risk of HIV transmission lower than the risk if the HIV-positive man is the penetrator? These questions point to the need for rigorous epidemiological studies that can better define risk-reduction strategies for HIV-positive MSM.

For the estimated 250,000 HIV-seropositive individuals in the United States who do not know their status [6], risk-prevention interventions that encourage HIV-infected individuals to inform sex partners about their positive serostatus have no value. It is therefore essential to develop programs to identify these individuals and provide them with counseling, testing, and referral (CRT) for treatment. In 2003, the CDC initiated a pilot project involving community-based organizations in 7 US cities to evaluate the efficacy of using social networks to identify individuals with undiagnosed HIV infection [10]. The program enlisted HIV-positive individuals and HIV-negative

individuals at high risk for infection to recruit people in their social network (i.e., "network associates") and introduce them to CTR. More than 800 network associates were recruited, and HIV infection was newly diagnosed in 6%. This prevalence uncovered by the social-network model was 5 times the average prevalence reported by conventional CTR sites. These results parallel those of a partner notification intervention initiated in 1998 by Jordan et al. [11]. Enlistment of HIV-positive individuals may prove to be the most effective means of identifying persons with undiagnosed HIV infection.

As SUMIT showed, HIV-infected MSM face an array of adverse psychosocial conditions, including substance abuse, stigmatization associated with homosexuality and HIV infection, depression, poverty, homelessness, and violence [9]. All of these conditions are associated with an increased frequency of high-risk sexual behavior and work against the efficacy of interventions designed to reduce transmission risk. The combined effects of these psychosocial stressors may prevent individuals from changing their behaviors, which means that prevention strategies that include treatment for psychosocial comorbid conditions—and thereby help disentangle individuals from these constraints—may help reduce the risks of HIV infection and transmission.

Of note, the SUMIT trial found that personal responsibility and altruism were important predictors of reducing the frequency of high-risk behavior [9]. All MSM, not just those who are infected with HIV and aware of their status, must take responsibility for practicing safe sex. This responsibility to each other and to the community at large should be shared by HIV-positive and HIV-negative MSM alike.

Current interventions focus on initiating changes in behavior but do not address the need for maintaining such changes over the long term nor do they attempt to inculcate a sense of altruism. A reexamination of behavioral theory may be required to address how to maintain risk-reduction behaviors that have been initiated through existing interventions.

A MULTIFACETED APPROACH TO REDUCING RISK

All of these unaddressed issues strongly suggest that prevention programs need to address a broader range of health-related problems and risk factors than are included in current risk-reduction interventions. The understanding of viral replication led to the development of drugs that attack multiple mechanisms of viral replication (i.e., HAART). We should learn the lessons of this multilevel approach to treatment by applying multiple mechanisms of behavioral interventions to address the social conditions that foster viral transmission among HIV-infected individuals.

Recognizing the need for new strategies, the CDC launched an initiative in 2003 that uses multiple mechanisms to address

a number of issues associated with HIV risk reduction and prevention [12]. The initiative addresses the problem of unidentified positives by supporting the incorporation of HIV testing into routine medical care for persons in settings where the prevalence of HIV infection is high, including correctional facilities, and for persons at high risk in low-prevalence clinical settings. In addition, the initiative emphasizes the creation of partner notification programs mediated by health departments and community-based organizations and supports new models that include offering rapid HIV testing to partners and enlisting peers to counsel partners about preventing HIV infection and accessing appropriate medical care. To address the maintenance of modifications in risk behaviors, the initiative recommends incorporating prevention strategies into the overall treatment program for HIV-infected individuals and promotes efforts to reach persons with diagnosed HIV infection who are not receiving ongoing medical or preventive care.

One critical social problem faced by a substantial proportion of HIV-infected individuals—which is amenable to multiple approaches for risk reduction—is homelessness [13]. Homelessness is associated with a range of psychosocial problems that enhance the potential for viral transmission, including increased vulnerability for high-risk survival sex, lower adherence to treatment regimens and prevention practices, increased abuse of drugs, decreased access to medical care, poverty, and violence. Because conventional cognitive behavioral programs may not be viable for homeless individuals, one potentially effective solution to this challenge would be to ensure that clients can obtain and retain housing is to minimize the prevalence of homelessness among HIV-positive persons while addressing attendant social issues.

The first challenge to addressing homelessness among HIV-infected persons is obviously to provide housing, which removes these individuals from high-risk environments. The HIV/AIDS Bureau has issued guidelines to confront HIV infection among individuals marginalized by homelessness [14]. These guidelines strongly suggest that the effective use of antiretroviral drugs demands an effective housing policy and that housing is unquestionably an important part of the health care system. Once housing is in place, multiple interventions can be implemented to reduce the risk of HIV infection and transmission. The availability of housing enhances access and adherence to cognitive behavioral programs that foster prevention practices. It facilitates the implementation of ongoing case management for coexisting conditions, such as drug abuse, depression, and STDs. Most important, it improves access to HIV treatment and adherence to HAART, which may have a significant impact on reducing the risk of HIV transmission. Thus, the use of housing as vector to link HIV-positive homeless Americans to health care is one example of a prevention strategy

that uses multiple mechanisms to support behavioral risk reductions.

CONCLUSIONS

The challenges to creating and implementing initiatives for HIV-infected persons are unprecedented. Although cognitive behavioral interventions have been shown to be highly successful, long-term data are lacking, especially in view of the extended life expectancy of people living with HIV/AIDS through access to HAART. Moreover, single interventions have not yet evolved to address the multiple needs faced by HIV-infected populations. For this reason, it is likely that multiple mechanisms for risk reduction will be needed to ensure long-term adherence to safe-sex behaviors. These include cognitive behavioral interventions tailored to an individual's needs, better access to HAART, treatment of comorbidities that foster high-risk behavior, rescue from high-risk environments, and, finally, a supportive policy environment.

Acknowledgments

I thank Joel LeGunn for his assistance in preparing this manuscript.

The "Opportunities for Improving HIV Diagnosis, Prevention & Access to Care in the U.S." conference was sponsored by the American Academy of HIV Medicine, amfAR, the Centers for Disease Control and Prevention, the Forum for Collaborative HIV Research, the HIV Medicine Association of the Infectious Diseases Society of America, and the National Institute of Allergy and Infectious Diseases. Funding for the conference was supplied through an unrestricted educational grant from Gilead Sciences, amfAR, GlaxoSmithKline, Pfizer, Abbott Virology, OraSure Technologies, Roche Diagnostics, and Trinity Biotech.

Supplement sponsorship. This article was published as part of a supplement entitled "Opportunities for Improving the Diagnosis of, Prevention of, and Access to Treatment for HIV Infection in the United States," sponsored by the American Academy of HIV Medicine, amfAR, the Centers for Disease Control and Prevention, the Forum for Collaborative HIV Research, the HIV Medicine Association of the Infectious Diseases Society of America, and the National Institute of Allergy and Infectious Diseases.

Potential conflicts of interest. R.H.: no conflicts.

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