

Critical Issues and Trends: HIV/AIDS

Prevention of HIV Infection Through Changes in Sexual Behavior

Michael P. Carey

SYNOPSIS

Ample evidence exists that behavioral interventions reduce high risk sexual behaviors and promote safer practices. Downstream interventions in settings attracting high risk patients work well, especially with infected persons to avert new infections. Preparing health care workers for intensive, skills-based interventions grounded in behavioral science theory would enhance primary prevention. Midstream interventions have reliably reduced risk in primary care and community settings. Adoption of comprehensive skills-based programs in schools is controversial but likely to improve outcomes. Upstream community approaches have slowed human immunodeficiency virus (HIV) incidence among men having sex with men. Upstream policy interventions remain underutilized in the U.S. but have been successful internationally. Needed are a national HIV prevention strategy and research linking behavior change to reduced HIV seroprevalence.

OVERVIEW AND POPULATION TRENDS

Acquired immunodeficiency syndrome (AIDS) and HIV infection continue to be worldwide public health threats. By the end of 1997, an estimated 30.6 million adults and children were living with HIV/AIDS.¹ Through December 1998, approximately 688,200 Americans had been diagnosed with AIDS,² with two-thirds now deceased. About 372,500 Americans are known to be living with HIV or AIDS,² and several hundred thousand others are infected with HIV.³ HIV and AIDS rates escalated during the 1980s due to initial uncertainty regarding the cause and then to political reluctance to contribute resources to prevention.⁴

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During the 1990s, grass-roots activism coupled with behavioral research advances has helped contain HIV and AIDS in the U.S. Recent declines in new infections among gay men and in AIDS cases⁵ reflect years of prevention efforts⁶ as well as advances in biomedical treatment.⁷

Although popular, education alone is insufficient for sexual behavior change, at least in individuals with established repertoires of risky behavior. More sophisticated approaches offer supplementary (1) motivational components such as risk sensitization (e.g., epidemiological information tailored to the audience), and (2) self-management and sexual negotiation skills training to improve self-efficacy regarding safer sex.⁸ Multicomponent skills training is more powerful in a supportive context (e.g., small groups) where social reinforcement is available.⁹ Though rarely studied, long-term maintenance of healthy sexual practices is believed to be most likely when larger health care, cultural, and social influences are also supportive. Discussion of downstream, midstream, and upstream progress follows, with typical approaches listed in Table 1. Study designs and outcomes of select interventions are detailed in Table 2.

DOWNSTREAM INTERVENTIONS

Downstream prevention interventions are typically delivered in HIV counseling and testing (C&T) sites, sexually transmitted disease (STD) clinics, and drug treatment programs (Table 2). There, interventionists have access to individuals who have engaged in risky sexual behavior. Research-based programs can deliver strong outcomes, but "teachable moments" in practice remain largely untapped, as these settings typically lack resources for intensive skills-based interventions. Instead, interventions tend to be brief, atheoretical, and focused upon education and risk sensitization—limiting impact. Greater investment in professional and paraprofessional training and integration into settings less stigmatized and less isolated from routine medical care are needed to engage persons in primary not just secondary prevention.

Meta-analysis reveals that HIV C&T does not alter risky sexual behavior among those who test negative but does consistently associate with risk reduction among HIV-positive individuals and serodiscordant couples (i.e., couples in which just one partner is infected).¹⁰ C&T provides secondary prevention among HIV-positive individuals, there-

Table 1
Current and Prospective Interventions: Risky Sexual Behavior

Downstream	<p>Risk reduction strategies in settings attracting high risk patients:</p> <ul style="list-style-type: none"> • HIV counseling and testing sites • STD clinics • Drug treatment sites <p>Intensive skills-based risk reduction</p> <p>Relapse prevention</p>
Midstream	<p>School-based comprehensive skills-based programs</p> <p>Clinic-based risk reduction programs</p> <p>Brief primary care interventions and referral</p> <p>Social-cognitive and skills-based interventions for targeted populations (e.g., runaways, youth, men having sex with men, urban women)</p>
Upstream	<p>National system of STD prevention</p> <p>Comprehensive community-wide interventions</p>

by infecting fewer future partners and reducing personal risk for reinfection with HIV or other STDs.

A promising set of studies has occurred in STD clinics.^{11,12} For example, the NIMH Multisite Trial (3700 clients from 37 STD clinics and health service sites) showed that participants in the HIV risk reduction program reported fewer unprotected sexual acts and higher and more consistent condom use over the 1-year follow-up. Among men recruited from STD clinics, gonorrhea incidence rates declined.¹²

Evidence of change in drug treatment settings has been equivocal. Some report reduced risky sexual behavior,¹³ whereas others describe reductions in needle sharing but not risky sex.¹⁴ Drug treatment tends to emphasize risks associated with substance use and needle sharing rather than sexual behaviors. Increased attention to self-management skills and sexual assertiveness is needed to facilitate safer sexual practices.

MIDSTREAM INTERVENTIONS

Midstream interventions provide promising evidence for how to change sexual behavior, especially in primary care and community settings. Interventions have been implemented in many high prevalence areas (i.e., "epicenters") with strong grass-roots organizations or in research studies. Wider adoption is constrained by limited training of health professionals in sexual behavior and behavioral science and by reluctance to address sexual health.

The most effective school-based sex education and HIV risk reduction programs lower rates of unprotected intercourse through multifaceted (not just information based) and comprehensive (not just abstinence oriented) programs.¹⁵ Typically, such programs are guided by social learning theories and focus on specific strategies to reduce risk behavior. They use active learning instructional methods, address social and media pressures, reinforce values against unprotected sex, and develop communication or negotiation skills. Opposition to such comprehensive programs has limited dissemination and is unfortunate because schools afford the opportunity to reach a

large number of children and adolescents before they have established risky habits.¹⁶ Where comprehensive teacher-delivered curricula have been used, outcomes demonstrate the feasibility of implementation and reveal improvements in HIV-related knowledge, self-efficacy, and safer behaviors (Table 2).¹⁷

Risk assessment and counseling are emerging in provider training¹⁸ and clinical practice¹⁹⁻²¹ but are not yet routine in primary care. Patients report that physicians inquired about safer sex behaviors less often (19%) than exercise (73%), diet (70%), stress (61%), smoking (53%), and alcohol use (36%).²² Given increased vulnerability among women,²³ risk screening coupled with onsite brief interventions or referral to more intensive programs needs to become standard practice. Such interventions with women recruited from medical clinics improved condom use rates (Table 2).^{24,25} Similarly, men and women recruited from mental health clinics evidenced successful outcomes.^{26,27}

Community interventions have reliably reduced risky sexual practices in targeted populations, including runaway youth,²⁸ adolescents,²⁹ men who have sex with men,³⁰ and urban women (Table 2).³¹⁻³³ Participants are recruited through aggressive outreach to social service, recreational, and business settings—for example, using well-liked men from gay bars to serve as peer interventionists^{30,34} or small groups at a community-based organization for sexually active, single women.^{31,35} Meta-analysis suggests that such interventions consistently reduce short-term risk behavior³⁶; however, few studies evaluate maintenance of change. Community-based organizations have begun to adopt evidence-based protocols,³⁷ but more often, "technology transfer" (i.e., dissemination of effective methods from researchers to practitioners) has been indirect, through word-of-mouth dissemination rather than formal training.³⁸

UPSTREAM INTERVENTIONS

Upstream comprehensive community-wide and public policy interventions have potential to make the largest

Table 2
Exemplary Studies Illustrating Downstream, Midstream, and Upstream Approaches for Managing Risky Sexual Behavior

Study	Objective of Evaluation	Research Design	Participants and Controls	Evaluation Period	Interventions	Outcome Measures	Key Findings
Downstream							
Boyer et al. ¹¹ (1997)	Evaluate the effectiveness of cognitive-behavioral (CB) skills-building intervention vs. brief counseling to prevent STDs	Randomized controlled trial	399 adults in a sexually transmitted disease clinic (San Francisco, CA); 67% male at 18–35 y old	Baseline and follow-up at 3 and 5 mo	(1) Experimental intervention based on AIDS risk reduction model designed to increase knowledge, reduce high risk psychosocial factors, and build decision making and communications skills; delivered during four 60-min individual sessions (2) A brief standardized counseling session (standard care control)	Condom use, acquisition of new STDs	<ul style="list-style-type: none"> • Condom use increased more among men who received the CB skills intervention (57% vs. 42%) • Number of sexual partners without condom use was lower in the intervention group than in the control • No group differences on acquisition of new STDs
McCusker et al. ¹³ (1996)	Test the effectiveness of a relapse prevention (RP) program vs. a therapeutic community (TC) program in reducing HIV risk-taking behavior	Randomized controlled trial	495 adults in a residential drug abuse treatment program (Westborough, MA, and Providence, RI); 77% male with 80% less than 35 y	Baseline and follow-up between 2 and 6 mo after discharge	(1) Relapse program (RP) to build individual skills to cope with lapses and prevent relapse; to improve HIV prevention skills (e.g., syringe cleaning, condom use); 21–42 group sessions (2) Therapeutic community (TC) was a strict hierarchical community in which residents earned status and responsibility incrementally. Also included AIDS educational program	Drug injection, sexual partners, and condom use	<ul style="list-style-type: none"> • Clients in the RP programs reduced drug injection and condoms use risk • Female clients in the TC program reduced their condom use risk • No difference on risk behavior change between RP and TC

Table 2, continued

Study	Objective of Evaluation	Research Design	Participants and Controls	Evaluation Period	Interventions	Outcome Measures	Key Findings
Baker et al. ¹⁴ (1993)	Examine the effectiveness of relapse prevention (RP) vs. a brief intervention in reducing HIV risk-taking behavior	Randomized controlled trial	95 adults in a methadone maintenance program (Australia); 54% female (<i>M</i> = 31 y old)	Baseline and follow-up at 6 mo	(1) Relapse prevention (RP) model to build individual skills to cope with lapses and prevent relapse; improved HIV prevention skills; delivered during six 60–90-min individual sessions (2) The brief intervention involved one 60-min motivational interview to raise motivation to change needle use and unsafe behavior	Drug use, HIV risk behavior, and HIV serostatus	<ul style="list-style-type: none"> • RP participants had lower rates of needle risk behavior • Neither RP nor brief intervention reduced sexual risk behavior
Midstream							
Walter and Vaughan ¹⁷ (1993)	Assess the effectiveness of a teacher-delivered curriculum in modifying HIV-related knowledge, beliefs, and risk-taking behavior	Matched controlled trial	1316 adolescents in high school (New York City); 59% female (<i>M</i> age = 16 y old)	Baseline and follow-up at 3 mo	(1) AIDS-preventive curriculum based on social-cognitive theory to target knowledge, beliefs, self-efficacy, and behavioral skills. Delivered in six 1-h group sessions by classroom teachers (2) No treatment control	AIDS-related knowledge, beliefs, self-efficacy, and sexual behaviors	Students who received the curriculum demonstrated increased HIV knowledge, beliefs, self-efficacy, and reduced risk behavior

Table 2, continued

Study	Objective of Evaluation	Research Design	Participants and Controls	Evaluation Period	Interventions	Outcome Measures	Key Findings
Kelly et al. ²⁴ (1994)	Evaluate the effectiveness of a small-group, cognitive-behavioral, skills-training intervention in reducing HIV risk-taking behavior	Randomized controlled trial	197 women in a comprehensive community primary care clinic (Milwaukee, WI); (<i>M</i> age = 29 y old)	Baseline and follow-up at 3 mo	(1) Social-cognitive intervention focusing on risk education, skills training in condom use, sexual assertiveness, problem solving, and risk trigger identification; peer support (2) General health promotion condition Both interventions delivered during five 90-min group sessions	HIV knowledge, sexual negotiation and communication skills, unprotected intercourse, condom use	<ul style="list-style-type: none"> • Women in the skills groups increased sexual communication and negotiation skills • Condom use increased from 26% to 56%
Carey et al. ³¹ (1997)	Evaluate the effectiveness of a small-group, motivational enhancement and skills training intervention in reducing HIV risk-taking behavior	Randomized controlled trial	102 women in a community-based organization (Syracuse, NY); 76% African-American (<i>M</i> age = 32 y old)	Baseline and follow-up at 3 mo	(1) Social-cognitive intervention focusing on risk education, motivational enhancement using personalized feedback; skills training in condom use and sexual assertiveness; and peer support. Delivered during four 90-min group sessions (2) Wait list control	HIV-related knowledge, risk perceptions, behavioral intentions, sexual communication, and risk behavior	<p>Women in the intervention:</p> <ul style="list-style-type: none"> • increased knowledge, risk awareness, and behavioral intentions; • communicated their intentions with partners; • reduced substance use proximal to sexual activities; and • engaged in fewer acts of unprotected intercourse

Table 2, continued

Study	Objective of Evaluation	Research Design	Participants and Controls	Evaluation Period	Interventions	Outcome Measures	Key Findings
Upstream							
Kegeles et al. ³⁹ (1996)	Test the effectiveness of a peer-led community-level prevention program in reducing HIV risk-taking behavior	Matched controlled trial	191 adults in two matched communities (Eugene, OR, and Santa Barbara, CA); 100% men who have sex with men (<i>M</i> age = 23 y old)	Baseline and follow-up at 12 mo	(1) Peer-led intervention involving educational and recreational outreach, small groups (to provide accurate information, eroticize safer sex, promote condom use, and promote other safer sex), and a publicity campaign (2) Wait list control	Sexual behavior	Unprotected anal intercourse decreased from 41% to 30%
Dubois-Arber et al. ⁴⁶ (1997)	Assess the effectiveness of a national HIV prevention policy on condom use	Cohort study	Stratified general population sample of 2800 adults ages 17 to 45 y (Switzerland)	Baseline and follow-ups at 6, 12, 18, 24, and 30 mo	Comprehensive national campaign including informational brochures distributed to all households and development of specialized organizations (e.g., peer groups) and professional services (e.g., counseling) targeted toward "at-risk" groups (e.g., adolescents, MSM, IDUs)	Sexual behavior, condom use	<ul style="list-style-type: none"> • Condom use with a new steady partner increased from 40% to 64% among young adults and from 57% to 72% among middle-aged adults • Condom use with casual partners increased from 8% to 56% among young adults and from 22% to 42% among middle-aged adults • Condom use was higher among those with multiple partners
Nelson et al. ⁴⁷ (1996)	Examine the effectiveness of a national campaign to promote safer sexual practices on condom use and HIV incidence	Cohort study	4311 healthy young men conscripted into the army in Thailand (<i>M</i> age = 21 y old)	Baseline and follow-up at 9, 21, 33, 45, 57, 69, and 93 mo	Distribution of condoms to brothels and other sex establishments, a media campaign to promote condom use, and an enforcement program to ensure compliance	HIV status, use of condoms, STD history	<ul style="list-style-type: none"> • Condom use increased from 61% to 92% • HIV prevalence decreased from 12% to 7% • STD prevalence decreased from 42% to 15%

public health impact. Governmental policies and programs have been slow and muted, relative to the magnitude of the epidemic and the prevention opportunities. Early grass-roots programs in epicenters like San Francisco and New York reduced the incidence of HIV infection among men having sex with men. Formal evidence of the power of community interventions is difficult to obtain, but findings have been modestly encouraging (Table 2).^{39,40} As with other health behaviors,⁴¹⁻⁴⁴ this probably reflects traditional funding patterns as well as methodological limitations (e.g., sampling, outcome measures) rather than inadequate interventions.⁴⁵

Public policy interventions directed at entire populations have been rare in the U.S. When implemented (e.g., the Surgeon General's 1987 AIDS brochure mailed to U.S. households), such programs have not been evaluated. However, the Swiss national AIDS prevention program, utilizing a population approach, showed about a 20% increase in condom use among young adults (Table 2).⁴⁶ Similarly, national policy mandating condom use in brothels in Thailand increased use to over 90% and almost halved HIV prevalence among military conscripts (Table 2).⁴⁷

Experts have called for a national system for STD prevention without success.⁴⁸ The Institute of Medicine recommends public and private sector strategies to (1) overcome barriers (e.g., inadequate training of professionals) to adoption of healthy sexual behaviors; (2) develop a prevention infrastructure and surveillance system; (3) implement services in innovative ways for adolescents and underserved populations (e.g., use of nontraditional venues); and (4) ensure access to and quality of clinical services. Adoption and ongoing evaluation of these macro-level recommendations, supplemented with individual-level interventions informed by behavioral science, would decrease the incidence of HIV and other STDs.⁴⁸

FUTURE DIRECTIONS

Overall, ample evidence indicates that, contrary to conventional wisdom, people will modify sexual behavior in response to theoretically grounded and culturally appropriate risk reduction programs.⁶ The strongest evidence is available for men who have sex with men and for adult heterosexual women. Additional research focusing on adolescents, heterosexual men, and injection drug users is needed.

In grading our progress on preventing HIV infection, the downstream glass is half full.⁴⁹ While comprehensive multicomponent interventions are effective in producing sexual behavior change, downstream interventions tend to be clustered in high risk settings and therefore have limited reach—a concern given the changing face of the epidemic. The midstream glass is also half full. Effective means exist for changing behavior in primary care and community settings among a variety of populations, but the stigma attached to HIV limits their reach. Program adoption and provider awareness are greater in epicenters. Comprehensive school-based programs are effective, but inclusion of more productive components often meets

resistance. The upstream glass is just one-quarter full. Wider population-based approaches have been successful internationally but remain underutilized here. HIV-related research has benefited enormously from extensive community involvement (e.g., STOP AIDS San Francisco) as well as from ethnographic and qualitative research efforts. These influences have allowed interventionists to create programs that are culturally and developmentally appropriate and tailored with respect to gender and sexual orientation of program participants—a model for other health behavior research.

Comprehensive informational, motivational, and skills-based interventions provide a cost-effective avenue for prevention.⁵⁰ When lifetime medical costs of treating a person with HIV are considered,⁵¹ economic benefits of HIV prevention programs are significant⁵² and increase when efforts are targeted to high risk populations.⁵³

Critics of behavioral approaches to HIV risk reduction caution that self-reported condom use does not guarantee public health benefit. Therefore, future efforts should demonstrate an empirical link between self-reported behavior change and reduced incidence of STDs and HIV. For example, a clinical trial with STD clients comparing standard care to that supplemented with a state-of-the-science HIV risk reduction program could provide persuasive material for subsequent media campaigns. Longitudinal evaluation would include self-report of sexual behavior and biochemical markers of reinfection with STDs and new HIV infections.

Interventions need to be informed by proven theoretical models and should be delivered by trained providers with sufficient fidelity and intensity. Community groups and health professionals should continue their mutually rewarding relationship to disseminate validated interventions. Public forums like the NIH Consensus Conference on Interventions to Prevent HIV Risk Behaviors⁶ benefit researchers, practitioners, community organizers, service recipients, and the public by reviewing scientific data and providing an impetus for upstream interventions.

The NIH Conference Summary,⁶ like the Institute of Medicine report on STDs,⁴⁸ provides a national blueprint to combat HIV infection. Much could be accomplished if policy makers implemented these recommendations. Because HIV has disproportionately affected subpopulations who are disenfranchised, increased attention to developing, implementing, and evaluating programs for the urban poor, ethnic minorities, and adolescents is urgently needed.

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