

The Future of HIV Prevention in the United States

Jonathan Mermin, MD, MPH

Kevin A. Fenton, MD, PhD

IN THE UNITED STATES, 1.1 MILLION PEOPLE LIVE WITH human immunodeficiency virus (HIV), a 60% increase from 15 years ago. The increasing number of people who can potentially transmit HIV makes prevention more difficult. Yet federal domestic HIV prevention funding, after adjustment for inflation, has not increased since 1991, necessitating a different approach to HIV prevention.

The CDC's new strategy, "High Impact Prevention," involves prioritizing and implementing the optimal combination of cost-effective, scalable interventions based on current science.¹ This strategy focuses on the goal of the National HIV/AIDS Strategy (NHAS) of reducing the current annual HIV incidence of about 50 000 infections by 25% in 5 years. If the NHAS goals are realized, it is possible that an estimated 163 000 infections could be prevented along with a corresponding potential projected savings of \$48 billion in health expenditures by 2020.²

Key Discoveries in HIV Prevention

Recent randomized trials have demonstrated up to a 73% reduction in HIV acquisition through pre-exposure prophylaxis with antiretroviral therapy (ART), a 96% reduction in HIV transmission from HIV-infected patients taking ART,³ and a 39% reduction in HIV acquisition among women using a vaginal microbicide. These results add to trials showing a 50% to 60% reduction in HIV acquisition in voluntarily circumcised adult heterosexual men; more than 70 randomized studies associating behaviorally focused interventions with reductions in risk behavior or sexually transmitted disease acquisition; and studies demonstrating reduced HIV acquisition with condoms, syringe programs, and HIV testing.

Translating Research Into Public Health Prevention Efforts

The availability of multiple effective prevention options presents practitioners and the public with a difficult question: "How should I choose among these interventions?" Public health commonly uses "combination prevention"—the inclusion of biomedical, behavioral, and environmental interventions. However, giving equal weight to all effective interventions is inherently flawed. Relative reductions in HIV

acquisition vary from 31% for an investigational vaccine to 96% for ART for infected partners in an HIV-discordant relationship.³ High Impact Prevention requires understanding the efficacy of interventions in preventing HIV acquisition or transmission, assessing the effectiveness of interventions in nontrial settings, establishing the cost per infection averted, determining the feasibility of full-scale implementation in target populations, developing epidemic models to project effectiveness, prioritizing among interventions, and implementing and evaluating programs designed to maximize reductions in incidence.

Optimizing utility requires thinking beyond efficacy and considering economics and the extent to which goals are achieved under uncontrolled circumstances. For example, the "best-case" efficacy of condom use is estimated at 94%, but its user effectiveness rate is about 80%.⁴ Oral pre-exposure prophylaxis was associated with a 95% reduction in acquisition among participants with detectable drug levels, but only 44% in the study overall⁵ and could have a lower or higher effectiveness in nonresearch settings. For many interventions, few economic data are available. For instance, only 1 cost-effectiveness study has focused on linkage to care, and there are no studies of patient retention or ART adherence. Yet maximizing prevention requires achieving the lowest cost per infection averted or quality-adjusted life-year (QALY) saved. Available studies highlight differences. Estimates of pre-exposure prophylaxis among gay and bisexual men ranged from \$32 000 to \$570 000⁶ per QALY saved, while a large-scale condom distribution program for African American women increased condom use by 30% and was cost-saving to the health care system. In the United States, a standard threshold for cost-effectiveness is \$100 000 per QALY saved.² Differences occur mostly because expensive interventions require substantial effectiveness and a very high-risk population to make economic sense, but inexpensive interventions with moderate effect can be cost-effective even in populations at relatively low risk.

Policy makers and programs should decide about cost-effectiveness thresholds and how feasibility of implementation should be defined. To be successful, interventions need

Author Affiliations: Division of HIV/AIDS Prevention (Dr Mermin), National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (Drs Mermin and Fenton), Centers for Disease Control and Prevention, Atlanta, Georgia.

Corresponding Author: Jonathan Mermin, MD, MPH, Centers for Disease Control and Prevention, Mailstop E-21, 1600 Clifton Rd, Atlanta, GA 30333 (jhm7@cdc.gov).

to be at a scale sufficient to have an effect on the epidemic. For example, a trial of five 2-hour behavioral counseling sessions among African American women increased condom use; however, the target population is several million individuals and HIV incidence is less than 1%, making large-scale implementation difficult and unlikely to be cost-effective. HIV testing restricted to individuals with risk factors for HIV is cost-effective but alone would miss a substantial proportion of individuals with HIV, because targeted testing in health care settings diagnosed 73% fewer infections than routine opt-out testing.⁷

Prevention programs should reduce the incidence of disease and increase health equity because HIV demonstrates extreme disparities. For example, 44% of new HIV infections occur in African American individuals and 20% in Hispanic/Latino individuals; 50% of people with HIV are living in 5 states; gay and bisexual men are more than 40 times as likely to have HIV as other men; and HIV prevalence is associated with poverty, less education, and drug use.⁸ Expansion of health care coverage presents opportunities through existing systems; eg, ART is often supported by health insurance, and intensive behavioral interventions for reducing HIV and STD risk may be covered with no copayment by most health insurance plans by 2014.

Implementing High Impact Prevention

High Impact Prevention requires that potential interventions are modeled, implemented, and evaluated together. For example, guidelines recommend that health care practitioners offer routine opt-out HIV testing for patients in health care settings with a prevalence of undiagnosed HIV of greater than 0.1%. Testing according to these guidelines might potentially prevent 7% of an estimated 1.2 million new infections over the next 20 years and, combined with expanded ART, could potentially prevent 17% of infections at \$21 000 per QALY gained.⁹ But testing and ART are insufficient to end the HIV epidemic without reductions in risk behavior.⁹ The Expanded Testing Initiative was implemented in 25 areas where 90% of the country's AIDS epidemic occurs. From 2007-2009, 2.8 million tests were conducted, 18 400 people were newly diagnosed with HIV, and 75% were linked to care.¹⁰ The program was cost-saving to the health care system, reducing medical costs by \$1.95 for every dollar spent.

The CDC's new health department cooperative agreements distribute more than \$350 million annually based on HIV prevalence. The agreements require that 75% of resources be focused on 4 strategies (HIV testing; prevention with positives, which includes linkage to health care, patient retention, ART, adherence counseling, and behavioral change interventions; policy change that facilitates prevention; and condom distribution to high-risk populations) with flexibility for additional activities based on local epidemiology and cost-effectiveness modeling.

Many HIV services can or should be reimbursed by third-party payers; eg, HIV testing in clinical settings should be similar to cholesterol screening—provided per guidelines and reimbursed through health insurance. The CDC recently made awards worth \$55 million over 5 years to 34 community-based organizations providing services for young gay and bisexual men and transgender persons of color.¹ This program requires grantees to provide on-site HIV testing with at least 4% of tests newly diagnosing people with HIV infection, or program improvement measures are initiated. If this target is reached, an estimated 3500 new HIV diagnoses will be made. It also includes prevention interventions to help clients with negative test results stay HIV negative.

Conclusions

How HIV prevention programs are implemented has substantial economic and humanitarian implications. The United States has an opportunity to shift from supporting hundreds of different HIV prevention approaches to objectively assessing current HIV strategies, focusing on more cost-effective activities, and conducting research that will establish the groundwork for the future. This shift should help improve the effectiveness of HIV prevention efforts, reduce HIV incidence, and ultimately increase the possibility of achieving an AIDS-free America.

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