

Current HIV Epidemiology and Revised Recommendations for HIV Testing in Health-Care Settings

Bernard Branson*

Division of HIV/AIDS Prevention, CDC, Atlanta, Georgia

The Centers for Disease Control and Prevention (CDC) estimates that about one quarter of the 1–1.2 million persons living with HIV/AIDS in the United States are unaware they are infected. Persons who do not know they are HIV infected are unable to access effective treatment and, compared with those who know they are infected with HIV, are more likely to transmit HIV to others. Pregnant women need to know if they are HIV infected so they can take steps to avoid transmitting HIV to their infants and access medical care for themselves. Despite past CDC recommendations for routine, voluntary HIV testing of all persons in acute-care hospitals with high HIV prevalence and those with risks for HIV, many HIV-infected persons who encounter the health-care system are not tested. Promoting HIV testing as a routine part of medical care is a key strategy of the CDC's Advancing HIV Prevention initiative launched in 2003. The CDC has recently revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings to help increase the number of HIV-infected Americans who are aware they are infected so they can receive prevention, care, and treatment. The new recommendations advocate voluntary "opt-out" HIV screening in health-care settings, with appropriate follow-up care and treatment; eliminating requirements for separate, written consent for HIV testing; annual retesting for persons with known risk factors; and expanded rescreening in the third trimester for women who test negative for HIV early in pregnancy. The CDC issued the revised recommendations on September 22, 2006, and is now engaged with numerous professional organizations on practical strategies for implementation. **J. Med. Virol. 79:S6–S10, 2007.** © 2007 Wiley-Liss, Inc.†

KEY WORDS: HIV; epidemiology; health care

HIV EPIDEMIC

This article describes the present state of the HIV epidemic in the United States, current testing, previous

recommendations for HIV screening, the rationale for expanded HIV screening, and the new recommendations from the Centers for Disease Control and Prevention (CDC).

Throughout the 1980s, the number of new AIDS cases increased rapidly. With the advent of highly active antiretroviral therapy (HAART) in 1995, there was a steep decline in the number of new AIDS cases and deaths. Since 2000, however, the decline in the number of persons who progress to AIDS each year has leveled off [CDC, 2005a]. Because the estimated annual number of new cases of HIV infection has remained relatively steady over the past 10 years and there are now fewer deaths, overall prevalence—the number of people living with HIV—has continued to increase. Paradoxically, increasing HIV prevalence is good news, in that it reflects longer life expectancy. Nonetheless, the continued occurrence of new infections reinforces the need to reduce HIV transmission from those who are already infected.

The CDC estimates that 1–1.2 million persons in the U.S. are infected with HIV. Of these, approximately one quarter (252,000–312,000 persons) do not know they are infected [Glynn and Rhodes, 2005]. It is estimated that 40,000–55,000 new infections occur each year, and that sexual transmission accounts for approximately 32,000 of these new infections [Marks et al., 2006]. Twenty-five percent of persons who are unaware they are infected with HIV account for at least 54% and as much as 70% of new sexually transmitted infections [Marks et al., 2006]. The transmission rate for those unaware they are infected is 3.5 times higher than that for persons aware of their HIV infection. Thus, it is critically important that persons learn of their HIV infection as soon as possible. Appropriate testing

Associate Director for Laboratory Diagnostics.

*Correspondence to: Bernard Branson, MD, Division of HIV/AIDS Prevention, CDC, 1600 Clifton Road, Mailstop D-21, Atlanta, GA 30333. E-mail: BBranson@cdc.gov

Accepted 21 June 2007

DOI 10.1002/jmv.20972

Published online in Wiley InterScience
(www.interscience.wiley.com)

strategies that will detect undiagnosed HIV infection and facilitate both treatment and prevention are essential to controlling the epidemic.

Data on risk behaviors of persons newly diagnosed with HIV or AIDS in 2001–2004 are available from the 33 states with name-based HIV reporting [CDC, 2005c]. These represent persons who were newly diagnosed, not necessarily those who were recently infected. Approximately 29% of reported cases were among women. Injection drug use accounted for 21% of cases among both men and women. Male-to-male sexual contact was the route of infection for the majority (61%) of cases among males. The majority (76%) of women diagnosed with HIV or AIDS were exposed through heterosexual contact. In contrast to reported cases, which may reflect biases from testing and reporting practices, the best source of information on the distribution of HIV in the U.S. population comes from NHANES, the National Health and Nutrition Examination Survey [McQuillan et al., 2006]. This nationally representative household survey reveals that HIV is distributed disproportionately in persons of different ages, races, and ethnicities. Overall, HIV prevalence was 0.37% among persons aged 18–39, and 0.54% in persons aged 40–49. However, among African Americans, HIV prevalence was nearly 2% among males and 1% among females in the 18–39-year-old age group. Among persons aged 40–49, more than 4.5% of African American males, and nearly 3% of females, were infected with HIV.

NEW STRATEGIES FOR A CHANGING EPIDEMIC

In 2003, the CDC announced a new initiative for HIV prevention that focused greater emphasis on HIV testing and on providing prevention and care services for persons infected with HIV [CDC, 2003a]. The initiative has four priority strategies that emphasize the use of proven public health approaches to reduce the spread of HIV disease: making voluntary HIV testing a routine part of medical care; implementing new models for diagnosing HIV infection outside medical settings; working with persons diagnosed with HIV and their partners to interrupt transmission; and further reducing perinatal HIV transmission. This article will focus on two of these strategies—making voluntary testing a routine part of medical care, and reducing further perinatal transmission.

According to the National Health Interview Survey, 38–44% of adults aged 18–64 report that they have been tested for HIV, and 16–22 million adults are tested annually [CDC, 2004]. These figures do not include the approximately 15 million tests conducted annually for blood donation. More than three quarters of HIV tests are performed in health-care settings, primarily hospitals and emergency departments, private physician offices, health maintenance organizations, and community clinics. Similarly, nearly two-thirds of HIV-positive persons interviewed as part of CDC's supplement to HIV–AIDS surveillance indicated they received

their HIV tests in a health-care setting such as a hospital or clinic [CDC, 2005, unpublished work].

Unfortunately, many people do not find out they are infected with HIV until late in the course of their disease. In 2004, among persons reported with HIV, AIDS was diagnosed in 40% within 1 year of their first HIV test [CDC, 2005a]. Given the average period of 10 years between initial infection and the development of AIDS, these persons were infected—and infectious—for many years before they were ever tested for HIV. These late testers may be less likely to think they are at risk, and with testing strategies targeted based on risk, they are less likely to be tested in time to receive maximal benefit from effective therapies. Compared with persons tested early (5 years or more before developing AIDS), persons tested late are more likely to be young, heterosexual, less educated, and African American or Hispanic [CDC, 2003b]. As shown in Figure 1, late testers more often report they were tested for HIV because they were ill. Even among early testers, only a small proportion reported they were tested as part of a routine medical checkup.

PREVIOUS GUIDELINES AND THEIR EFFECTS

CDC first recommended routine HIV testing for inpatients and outpatients in acute-care hospital settings in 1993 [CDC, 1993]. The 2001 guidelines for HIV counseling and testing reiterated this recommendation for routine testing in health-care settings with HIV prevalence $\geq 1\%$, and recommended targeted testing (based on risk assessment) in health-care settings with lower HIV prevalence, and routine HIV testing for all persons seeking treatment for sexually transmitted diseases (STDs) [CDC, 2001a].

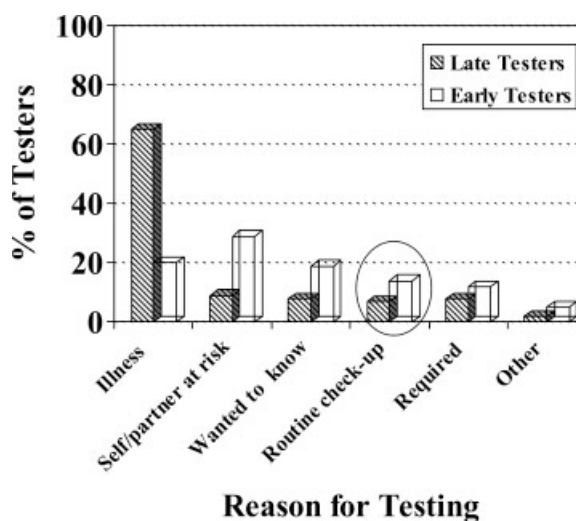


Fig. 1. Percentage of late and early testers, by reason for testing, United States, 2000–2003. Late Testers are persons who had their first positive HIV test <1 year of diagnosis of AIDS. Early Testers are persons who either had their first positive HIV test >5 years before the diagnosis of AIDS or had >5 years without a diagnosis of AIDS after their first positive HIV test.

Data from the 2000–2002 National Hospital Ambulatory Medical Care Surveys suggest these recommendations are not having their intended effect [McCaig and Burt, 2004]. Visits to emergency departments represent 10% of all ambulatory care visits in the U.S. Persons in the age group most likely to be sexually active (aged 15–64) accounted for nearly 70 million of the more than 100 million annual visits to emergency departments each year. However, only about 200,000 HIV tests were performed annually in emergency departments, representing less than 0.5% of these acute care visits. In a survey of 95 academic emergency departments, 93% of responding providers reported they routinely screen patients with suspected STDs for gonorrhea, 88% screened for chlamydia, 58% screened for syphilis, but only 3% screened for HIV [Wilson et al., 1999].

In a separate survey, 154 emergency department providers reported they saw an average of 13 patients with suspected STDs per week, but only 10% said they always recommended an HIV test for these patients [Fincher-Mergi et al., 2002]. Numerous reasons were given for not performing an HIV test: 51% of providers said they were concerned about follow-up; 45% reported they were not certified to provide HIV counseling; 19% said that the informed consent and pretest counseling process was too time consuming; and 27% said that HIV testing was not available in their institutions. A study offering routine screening with rapid HIV tests in the emergency department of Stroger (Cook County) Hospital in Chicago found that nearly two-thirds of patients accepted testing [Lyss et al., 2007]. More than half of those patients who tested positive had never been tested for HIV before, and 51% reported none of the traditional risk factors for HIV. Thus, testing based on assessment of risk factors would have missed half of the patients with unrecognized HIV infection.

HIV TESTING AMONG MEN WHO HAVE SEX WITH MEN

Since 2002, CDC has recommended annual HIV testing for men who have sex with men [CDC, 2002, 2005b]. As part of CDC's National HIV Behavioral Surveillance, 1,800 men who have sex with men in five cities were surveyed and underwent HIV testing during 2004. Overall, 25% of these men were infected with HIV; 48% did not know they were infected. Among black men who have sex with men, 46% were infected with HIV, of whom 67% were unaware of their infection, and among young men aged 18–24, 14% were infected with HIV, of whom 79% did not know it. These data suggest that even men at very high risk for HIV are not being tested for HIV.

CDC has recommended routine voluntary counseling and testing as early as possible during prenatal care since 1995, shortly after it was first demonstrated that zidovudine prophylaxis substantially reduced the risk of transmission from HIV-infected pregnant women to their infants [CDC, 1995]. The widespread implementation of this recommendation marks a notable success

in HIV prevention: the number of infants reported with AIDS attributed to perinatal HIV transmission peaked at 945 in 1992 and declined 95% to 45 in 2004 [CDC, 2005a].

THE RATIONALE FOR REVISING RECOMMENDATIONS FOR HIV SCREENING

Screening is a proven public health tool that has been effective for the prevention and control of numerous diseases. HIV infection meets all of the generally accepted criteria that justify routine screening [Wilson and Jungner, 1968]. It is a serious health disorder for which effective treatment is available; treatment is more effective when begun before symptoms develop; a reliable, inexpensive, and acceptable screening test exists, and the costs of screening are reasonable in relation to the anticipated benefits.

Demonstration projects and studies in various health-care settings have shown that HIV screening can identify a substantial number of persons with undiagnosed HIV infection. Among patients visiting the emergency department for a variety of complaints, HIV screening identified unrecognized HIV infection in 2.3% of patients in Chicago, 2.7% in Atlanta, 3.2% in Baltimore, and 1.3% in Los Angeles [Kelen et al., 1999; CDC, 2001b; Lyss et al., 2007]. When screening was offered to inpatients at Boston Medical Center, 3.8% of patients admitted for complaints unrelated to HIV were found to be infected with HIV [Walensky et al., 2002].

The most important justification for expanding HIV screening is the effectiveness of antiretroviral therapy. HIV-infected persons can lead longer, healthier lives when infection is detected early and timely therapy is initiated before advanced immune dysfunction [Palella et al., 2003, 2006]. Screening also has significant potential implications for prevention. A meta-analysis of 11 studies found that persons who were aware that they were infected with HIV were 68% less likely to engage in unprotected anal or vaginal intercourse with uninfected partners compared with persons unaware of their HIV infection [Marks et al., 2005]. This finding was consistent in both persons with long-term HIV-infection and those who were recently diagnosed. For persons who test negative, the benefit of prevention counseling in conjunction with HIV testing is less clear. A meta-analysis found that the effect of HIV counseling in conjunction with HIV testing for HIV-positive patients substantially reduced unprotected intercourse and increased condom use. HIV-negative participants, however, did not modify their behavior more than untested participants [Weinhardt et al., 1999].

Several studies have concluded that HIV screening in health-care settings is cost effective [Paltiel et al., 2005; Sanders et al., 2005; Walensky et al., 2005]. Considering only the benefits for individual patients, one analysis demonstrated that HIV screening once every 3–5 years was justified in all but the lowest risk populations, and one-time screening in the general U.S. population might be warranted [Paltiel et al., 2005]. A second study found

that HIV screening was cost effective in health-care settings with HIV prevalence as low as 0.05% when the effects on reducing subsequent transmission were taken into account [Sanders et al., 2005].

REVISED RECOMMENDATIONS FOR HIV TESTING IN HEALTH-CARE SETTINGS

Key elements of CDC's recently revised recommendations for HIV testing encourage both expanded screening in health-care settings and changes in counseling and consent procedures to make widespread screening more feasible [CDC, 2006]. Voluntary HIV screening is recommended in health-care settings for all persons aged 13–64 regardless of risk. Screening should be repeated at least annually for persons known to be at risk for HIV, and persons should be screened for HIV each time they seek treatment for STD-related symptoms. CDC recommends opt-out HIV screening with the opportunity to ask questions and the option to decline. Separate signed informed consent for HIV testing is not recommended.

Prevention counseling in conjunction with HIV screening in health-care settings should not be required, although counseling persons who test positive and linking them to care are essential. Clinicians are encouraged to communicate test results in the same manner as is done for other diagnostic or screening tests, and to either provide clinical HIV care for persons found to be infected, or establish a reliable referral to qualified providers.

In settings where HIV prevalence is thought to be low, screening should still be initiated. If screening yields fewer than one new HIV diagnosis per 1,000 persons tested, then continued screening is not warranted. In cases where state or local regulations for consent or counseling conflict with these recommendations, providers are encouraged to initiate screening within current parameters while steps are considered to harmonize regulations with CDC's recommendations.

For pregnant women, universal opt-out HIV screening is recommended as early as possible during each pregnancy. This means that unless a woman declines, HIV screening should be included in the routine panel of prenatal screening tests. Consent for prenatal care should include HIV testing, without the need for a separate written consent form. Data suggest that some infants have become infected from mothers who acquired HIV infection after a negative test early in pregnancy. Therefore, a second test in the third trimester is recommended for pregnant women who are known to be at high risk for HIV (e.g., injection drug users), in jurisdictions with elevated HIV incidence among women of childbearing age, and in health-care facilities in which prenatal screening identifies at least one HIV-infected pregnant woman per 1,000 women screened.

If the mother's status is unknown at delivery, rapid testing of the newborn is recommended, with initiation of antiretroviral prophylaxis in newborns, when indi-

cated, as soon as possible after birth based on the rapid test result.

SUMMARY

There is an urgent need to increase the number of infected persons who are aware of their HIV infection. Expanded routine, voluntary, opt-out screening in health-care settings is an important strategy to accomplish this goal, and has been shown to be cost effective. CDC's revised recommendations in this regard were issued in September 2006, and several jurisdictions have already begun to implement the recommended screening.

REFERENCES

- CDC. 1993. Recommendations for HIV testing services for inpatients and outpatients in acute-care hospital settings. *MMWR Morb Mortal Wkly Rep* 42:1–10.
- CDC. 1995. U.S. Public Health Service recommendations for human immunodeficiency virus counseling and voluntary testing for pregnant women. *MMWR Morb Mortal Wkly Rep* 44:1–12.
- CDC. 2001a. Revised guidelines for HIV counseling, testing, and referral. *MMWR Morb Mortal Wkly Rep* 50:1–62.
- CDC. 2001b. Routinely recommended HIV testing at an urban urgent-care clinic—Atlanta, Georgia, 2000. *MMWR Morb Mortal Wkly Rep* 50:538–541.
- CDC. 2002. Sexually transmitted diseases treatment guidelines 2002. *MMWR Recomm Rep* 51:1–78.
- CDC. 2003a. Advancing HIV prevention: New strategies for a changing epidemic—United States, 2003. *MMWR Morb Mortal Wkly Rep* 52:329–332.
- CDC. 2003b. Late versus early testing of HIV—16 Sites, United States, 2000–2003. *MMWR Morb Mortal Wkly Rep* 52:581–586.
- CDC. 2004. Number of persons tested for HIV—United States, 2002. *MMWR Morb Mortal Wkly Rep* 53:1110–1113.
- CDC. 2005a. Cases of HIV infection and AIDS in the United States, 2004. *HIV AIDS Surveill Rep* 16:16–45. (Available at <http://www.cdc.gov/hiv/stats/hasrlink.htm>)
- CDC. 2005b. HIV prevalence, unrecognized infection, and HIV testing among men who have sex with men—five U.S. cities, June 2004–April 2005. *MMWR Morb Mortal Wkly Rep* 54:597–601.
- CDC. 2005c. Trends in HIV/AIDS diagnoses—33 states, 2001–2004. *MMWR Morb Mortal Wkly Rep* 54:1149–1153.
- CDC. 2006. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Recomm Rep* 55:1–17.
- Fincher-Mergi M, Cartone KJ, Mischler J, Pasioka P, Lerner EB, Billittier AJ IV. 2002. Assessment of emergency department healthcare professionals' behaviors regarding HIV testing and referral for patients with STDs. *AIDS Patient Care STDs* 16:549–553.
- Glynn M, Rhodes P. Estimated HIV prevalence in the United States at the end of 2003 [Abstract]. Presented at the National HIV Prevention Conference, Atlanta, Georgia; June 12–15, 2005.
- Kelen GD, Shahan JB, Quinn TC. 1999. Emergency department-based HIV screening and counseling: Experience with rapid and standard serologic testing. *Ann Emerg Med* 33:147–155.
- Lyss SB, Branson BM, Kroc KA, Couture EF, Newman DR, Weinstein RA. 2007. Detecting unsuspected HIV infection with a rapid whole-blood HIV test in an urban emergency department. *J Acquir Immune Defic Syndr* 44:435–442.
- Marks G, Crepez N, Senterfitt JW, Janssen RS. 2005. Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: Implications for HIV prevention programs. *J Acquir Immune Defic Syndr* 39:446–453.
- Marks G, Crepez N, Janssen RS. 2006. Estimating sexual transmission of HIV from persons aware and unaware that they are infected with the virus in the USA. *AIDS* 20:1447–1450.

- McCaig LF, Burt CW. 2004. National Hospital Ambulatory Medical Care Survey: 2002 emergency department summary. *Adv Data* 340:1–34.
- McQuillan GM, Kruszon-Moran D, Kottiri BJ, Kamimoto LA, Lam L, Cowart MF, Hubbard M, Spira TJ. 2006. Prevalence of HIV in the US household population: The National Health and Nutrition Examination Surveys, 1988 to 2002. *J Acquir Immune Defic Syndr* 41:651–656.
- Palella FJ Jr, Deloria-Knoll M, Chmiel JS, Moorman AC, Wood KC, Greenberg AE, Holmberg SD, HIV Outpatient Study (HOPS) Investigators. 2003. Survival benefit of initiating antiretroviral therapy in HIV-infected persons in different CD4+ cell strata. *Ann Intern Med* 138:620–626.
- Palella FJ Jr, Baker RK, Moorman AC, Chmiel JS, Wood KC, Brooks JT, Holmberg SD, HIV Outpatient Study Investigators. 2006. Mortality in the highly active antiretroviral therapy era: Changing causes of death and disease in the HIV outpatient study. *J Acquir Immune Defic Syndr* 43:27–34.
- Paltiel AD, Weinstein MC, Kimmel AD, Seage GR, Losina E, Zhang H, Freedberg KA, Walensky RP. 2005. Expanded screening for HIV in the United States—an analysis of cost-effectiveness. *N Engl J Med* 352:586–595.
- Sanders GD, Bayoumi AM, Sundaram V, Bilir SP, Neukermans CP, Rydzak CE, Douglass LR, Lazzeroni LC, Holodniy M, Owens DK. 2005. Cost-effectiveness of screening for HIV in the era of highly active antiretroviral therapy. *N Engl J Med* 352:570–585.
- Walensky RP, Losina E, Steger-Craven KA, Freedberg KA. 2002. Identifying undiagnosed human immunodeficiency virus: The yield of routine, voluntary inpatient testing. *Arch Intern Med* 162:887–892.
- Walensky RP, Weinstein MC, Kimmel AD, Seage GR, Losina E, Sax PE, Zhang H, Smith HE, Freedberg KA, Paltiel AD. 2005. Routine human immunodeficiency virus testing: An economic evaluation of current guidelines. *Am J Med* 118:292–300.
- Weinhardt LS, Carey MP, Johnson BT, Bickham NL. 1999. Effects of HIV counseling and testing on sexual risk behavior: A meta-analytic review of published research, 1985–1997. *Am J Public Health* 89:1397–1405.
- Wilson JM, Jungner G. 1968. Principles and practice of screening for disease. Geneva, Switzerland: World Health Organization. Public Health Pap 34.
- Wilson SR, Mitchell C, Bradbury DR, Chavez J. 1999. Testing for HIV: Current practices in the academic ED. *Am J Emerg Med* 17:354–356.