

# Frequent HIV testing among participants of a routine HIV testing program

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Massachusetts developed a routine HIV testing program in four sites from January–September 2002. Of the 2,502 patients tested, 453 (18.1%) reported  $\geq 2$  HIV tests within the prior three years. In multivariate analyses, frequent HIV testing was associated with younger age (18–30 years, OR = 1.42), a history of injection drug use (OR = 6.35), and men who had sex with men (OR = 3.49). Participants who reported multiple sexual partners (OR = 2.17) and high risk sexual behavior (OR = 2.02) were significantly more likely to have had a prior HIV test. Patients whose HIV risk was unknown had the highest association with frequent testing (OR = 13.18). Because characteristics of frequent HIV testers may inform behavioral interventions, there is a need to understand the motivation for repeatedly accessing HIV testing services.

## Introduction

Recent Centers for Disease Control and Prevention guidelines in the US advocate that HIV testing be integrated into routine medical care.<sup>1</sup> The guidelines also recommend that everyone should be tested at least once, and persons at especially high risk for HIV infection should be tested annually. High-risk individuals include injection drug users, men who have sex with men, persons who exchange sex for money or drugs, those with frequent heterosexual partners, and the sexual partners of persons in all categories noted above. This strategy, if universally implemented, affords everyone who comes into contact with a health care provider the opportunity to determine their HIV serostatus and benefit from early linkage to care and treatment services. HIV testing laws vary in each state and differ in how closely they align with these federal recommendations. In Massachusetts, written informed consent must be obtained before an HIV test may be administered.<sup>2</sup>

The promotion of voluntary HIV counseling and testing services, as both a prevention tool as well as an entry point to care and treatment, has had an impact on the number of persons accessing these services. A new pattern of HIV testing has emerged over time, with an increasing proportion of tests being performed on persons who previously tested negative.<sup>3</sup> It remains unclear who are frequent utilizers of HIV testing services; they may be those with continued and ongoing high-risk behaviors or simply the “worried well.”

From a public health perspective, behavior change specifically as it relates to HIV risk reduction is the desired goal. However, studies that have examined the dynamics of HIV testing reveal

the complexity of psychosocial factors that motivate and sustain behavior change efforts.<sup>4-6</sup> As new HIV infections continue to occur, prevention continues to pose a major challenge to providers and policy makers and makes a clear case for frequent testing and enhanced behavioral interventions for persons with persistent risks.<sup>7</sup>

Given the substantial resources going towards re-testing of individuals, as well as efforts to optimize HIV prevention and care, it is important to understand the characteristics of those who frequently present for HIV testing services. We examined the correlates of prior HIV testing in a study of participants in a routine HIV testing program.

## Results

Among those invited to speak to the health educator about HIV testing, 548 were excluded because they were <18 years old and 801 reported no prior testing data. A total of 2,502 patients met the inclusion criteria for the study (Table 1); an additional four patients were tested but excluded due to indeterminate results. Over half (56.6%) were male. Nearly half (44.6%) were between the ages of 18 and 30 years, and a quarter were over age forty. More than a third of the sample was African American (35.1%) with smaller percentages comprising Hispanic (26.2%), white (22.0%) and other races (16.8%). Two thirds of patients (66.9%) reported having at least a high school education. Among subjects, 56.7% reported no prior tests and 25.2% reported 1 prior test, (a total of 81.9% reported 0–1 prior HIV tests) while 453 (18.1%) reported  $\geq 2$  prior HIV tests.

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**Table 1.** Descriptive characteristics of the sample population in a cohort of routine HIV testing in Massachusetts

Variable	No. (%) N = 2,502
<b>Gender</b>	
Male	1,415 (56.6)
Female	1,082 (43.2)
Unknown	5 (0.2)
<b>Age (years)</b>	
18–30	1,115 (44.6)
31–40	738 (29.5)
>40	649 (25.9)
<b>Race</b>	
Black	877 (35.1)
Hispanic	655 (26.2)
White	550 (22.0)
Other	420 (16.8)
<b>Highest level of education</b>	
<High School	733 (29.3)
High School	840 (33.6)
>High School	834 (33.3)
Unknown	95 (3.8)
<b>Annual Income (\$/year)</b>	
<\$20,000	920 (36.8)
\$20,000–\$50,000	156 (6.2)
>\$50,000	64 (2.6)
Declined	1,362 (54.4)
<b>Risk behaviors in past 3 years*</b>	
IDU or sex with IDU	182 (7.3)
High risk sexual behavior <sup>†</sup>	846 (33.8)
Men who had sex with men	28 (1.1)
Multiple sexual partners	398 (15.9)
Other <sup>‡</sup>	45 (1.8)
HIV risk unknown	517 (20.7)
No acknowledged risk	486 (19.4)
<b>Number of prior HIV tests</b>	
0–1	2,049 (81.9)
≥2	453 (18.1)

IDU, Injection drug user; \*The risk groups were constructed in a mutually exclusive fashion, assigning highest risk to injection drug use, followed by MSM, followed by multiple sexual partners; <sup>†</sup>Includes patients who engage in sexual behaviour with non-injection drug users; <sup>‡</sup>Indicates risk associated with occupation, blood transfusions, assault, and vertical transmission.

In univariate analysis, variables associated with the number of prior HIV tests included age, race, income, history of injection drug use, high risk sexual behavior, being an MSM, having multiple sexual partners, and HIV risk unknown. After adjusting for potential confounders, the analysis did not change substantially (Table 2). In the final model, younger patients (18–30 years versus >40 years, OR 1.42, 95% CI 1.06–1.91), patients with a

history of injection drug use, high risk sexual behavior, being an MSM, and having multiple sexual partners were all more likely to have been frequent testers compared to those with no acknowledged risk behavior. Those whose HIV risk was unknown were the most likely to be frequent testers (OR=13.18, 95% CI 8.42–20.64). There was a trend toward frequent HIV testing among blacks, Hispanics, and those with an annual income <\$20,000/year (Table 2).

## Discussion

We studied the factors that influence frequent HIV testing among a wide cross section of persons attending urgent care clinics across Massachusetts. We found that younger patients (18–30 years), injection drug users and MSM were more likely to report a history of frequent HIV testing. Patients who reported multiple sexual partners or whose HIV risk was unknown were also more likely to report prior HIV testing.

In the US, younger patients (18–30 years) account for less than 34% of new HIV infections, whereas older patients (31–49 years) account for 56% of new cases.<sup>8</sup> In the current study, younger patients (18–30 years) were almost twice as likely as those older than 40 years to have had a prior HIV test. This is consistent with national surveys that have found that persons >45 years report ever being tested for HIV less frequently than younger persons.<sup>9</sup> This also supports existing data that suggests that younger persons may be more likely to perceive their HIV risk to be high, and consequently seek opportunities for HIV testing.<sup>10</sup>

Consistent with the published literature, there was a trend toward finding that persons who accessed health care services and were non-white were more likely to have been previously HIV tested.<sup>9,11</sup> This may reflect provider willingness to recommend HIV testing for these individuals.<sup>12</sup> This does, however, contradict suggestions that differential access and utilization of health care services among ethnic minorities makes them unlikely candidates for HIV testing compared to whites.<sup>13</sup>

The number of patients who reported injection drug use was small; however it was significantly associated with a history of prior HIV testing, as seen in other studies.<sup>14</sup> These results suggest that in clinical practice, there is appropriate targeting of the high risk behavior for testing.<sup>15</sup>

In this study, as in others, men who had sex with men were almost three times more likely to report prior HIV testing.<sup>16–19</sup> This may indicate that behavior change is more contingent on the test result, rather than the test itself. One possible interpretation of these results is that a negative test may erroneously result in a false sense of security and failure to recognize the need for the adoption of safer sexual practices. Some authors suggest that it may promote greater risk taking among individuals.<sup>20–23</sup>

Those whose HIV risk was unknown, but who accepted an HIV test, comprised a large proportion of participants (20.7%), and they had an increased frequency of repeat HIV testing. This finding suggests the need to move away from risk-based HIV testing and towards the encouragement of routine screening for HIV as a part of medical care.<sup>24–27</sup>

There were several limitations of note to this study. These urgent care sites were selected in areas of high HIV prevalence and therefore extrapolation of the results is cautioned in lower prevalence and primary care settings. Moreover, persons who agreed to be tested and participated in the study may have been different than those who refused testing. The study is based on self-reported sexual and HIV testing history and is subject to recall bias, although the design attempted to minimize bias by asking patients to recall relatively recent events (within 3 years). Given the sensitive nature of questions about sexual history, it is also possible that risk behaviors were underreported because of pressure to give socially desirable responses, potentially leading to an underestimation of the association between risk behavior and frequent testing.<sup>28</sup>

We found that providers need to strengthen practices to identify persons who have had multiple HIV tests and provide enhanced behavioral interventions for those with persistent risks. This might mean referral to other prevention and support services in order to effect sustainable risk reduction. The results also suggest that some risk behaviors (i.e. injection drug use, MSM and multiple sexual partners) are appropriately recognized as markers for more frequent HIV testing. Individuals with these persistent risks should be actively sought with behavioral interventions added to their medical and HIV testing encounters. Further efforts should be made to enhance education about high risk behaviors in those with negative frequent HIV test results.

## Methods

In 2002, a state funded program called “Think HIV” offered routine voluntary HIV counseling, testing and referral in four hospital-associated urgent care centers in Massachusetts.<sup>29</sup> Two sites were located in Greater Boston and one each in Springfield and Worcester. Sites were selected based on high HIV prevalence, significant patient volumes and support from HIV primary care services.

All patients who presented to these urgent care centers for any reason were invited to speak to a “health educator;” those who consented and were not already known to be HIV-infected were offered confidential HIV counseling and testing. The HIV test used was the ELISA Orasure HIV-1 antibody detection system (Orasure Technologies, Bethlehem, PA)—an oral cheek swab that provided test results within two weeks. Patients were asked to return in 14 days for test results and post-test counseling. During the pre-test counseling session, information was collected by patient self-report on a standardized Massachusetts Department of Public Health HIV Counseling and Testing Form (available on request).<sup>30</sup> Data included patient demographics, HIV risk behavior, as well as self-reported HIV testing in the prior three years (i.e., the number of tests, date and result of most recent test).<sup>29</sup>

The goal of this study was to determine the characteristics of those more likely to undergo frequent testing. We restricted the sample to subjects  $\geq 18$  years old and with complete data on risk factor and prior HIV testing history. Those who reported

**Table 2.** Independent predictors of frequent HIV testing in the multivariate logistic model

Variable	Unadjusted odds ratio (OR) (95% CI)	Adjusted odds ratio (OR) (95% CI)
<b>Gender</b>		
Female	1.20 (0.98–1.49)	-
Male	Reference	
<b>Age (years)</b>		
18–30	1.58 (1.21–2.06)	1.42 (1.06–1.91)
31–40	1.28 (0.96–1.72)	1.20 (0.87–1.65)
>40	Reference	
<b>Race</b>		
Black	1.05 (0.80–1.39)	1.24 (0.89–1.74)
Hispanic	1.35 (1.01–1.80)	1.25 (0.90–1.75)
Other	0.50 (0.34–0.74)	0.63 (0.40–0.97)
White	Reference	
<b>Education</b>		
<High School	1.25 (0.97–1.62)	-
High School	1.00 (0.78–1.30)	
>High School	Reference	
<b>Annual Income (\$/year)</b>		
<\$20,000	0.51 (0.33–0.79)	1.56 (0.98–2.48)
Unknown/Declined	0.69 (0.56–0.86)	0.80 (0.50–1.29)
$\geq$ \$20,000	Reference	
<b>Risk behaviors in past 3 years</b>		
IDU or sex with IDU	7.49 (4.54–12.37)	6.35 (3.82–10.56)
High risk sexual behavior	2.26 (1.46–3.52)	2.02 (1.30–3.12)
Men who had sex with men	3.85 (1.35–11.01)	3.49 (1.21–10.07)
Multiple sexual partners	2.30 (1.40–3.77)	2.17 (1.33–3.54)
Other	0.39 (0.05–2.91)	0.40 (0.05–2.99)
HIV risk unknown	10.89 (7.08–16.74)	13.18 (8.42–20.64)
No acknowledged risk	Reference	

IDU, Injection drug user; CI, Confidence Interval.

an indeterminate or unknown test result were excluded from the analysis because their serostatus could not be conclusively determined.

Because behaviors and risk may differ according to the number of prior HIV tests, we divided patients into two groups: those who had 0 or 1 prior tests and those who had  $\geq 2$  prior tests (defined as “frequent testers”).<sup>31</sup> Fisher’s exact tests were used in univariate analysis to examine the association between number of tests and sociodemographic and HIV risk behaviors. All tests were two-tailed with a type 1 error rate of 5% used to determine statistical significance.

Guided by the CDC recommendations, we defined high HIV-risk as: (1) history of injection drug use; (2) high-risk sexual behavior; (3) men who had sex with men (MSM); (4) multiple sexual partners (defined as >1 partner); (5) other

(risks associated with occupation, assault, etc.); (6) HIV risk unknown, and; (7) no acknowledged risk. HIV risk behaviors were classified independently of each other; hence each risk behavior was counted separately, even if individual subjects had multiple risks.

Logistic regression models were used to determine factors associated with a history of frequent HIV testing. Demographic and behavioral variables that were significantly associated with a history of a prior HIV test with univariate  $p < 0.20$  were considered for inclusion in the multiple logistic regression model. The final model included only those variables significant at the  $p < 0.05$

level. All analyses were conducted using SAS v 9.1 (SAS Institute, Cary, NC USA).

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