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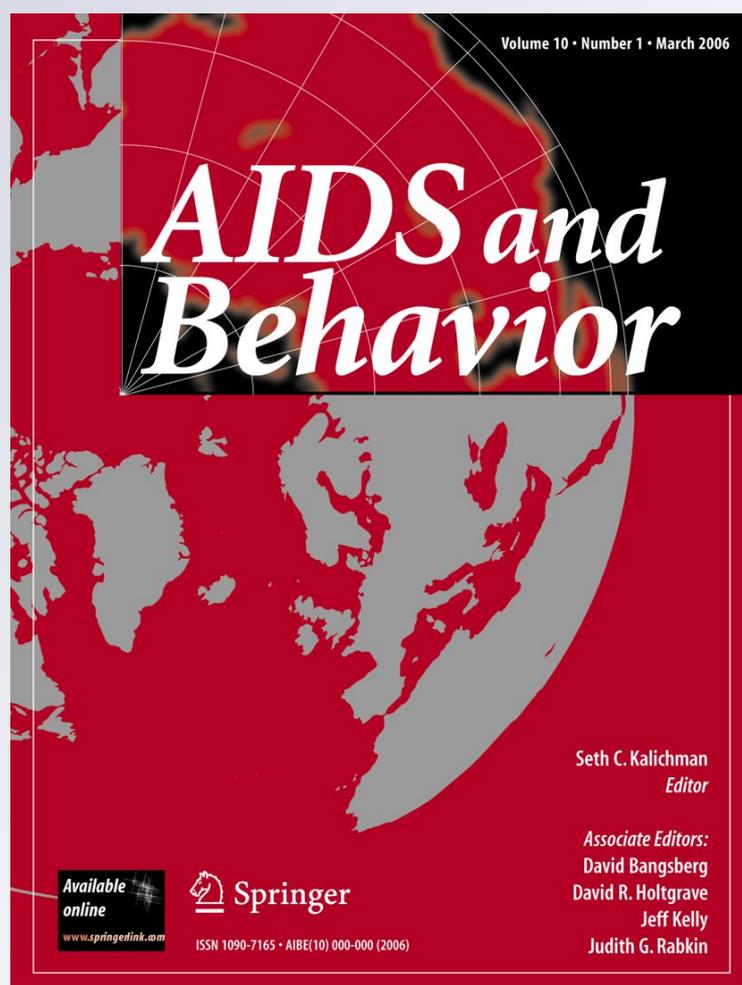
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**AIDS and Behavior**

ISSN 1090-7165

AIDS Behav

DOI 10.1007/s10461-012-0193-2



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# HIV Testing Behaviors of a Cohort of HIV-Positive Racial/Ethnic Minority YMSM

Gregory Phillips II · Lisa B. Hightow-Weidman ·  
Monisha Arya · Sheldon D. Fields · Bonnie Halpern-Felsher ·  
Angulique Y. Outlaw · Amy R. Wohl · Julia Hidalgo

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**Abstract** The HIV epidemic in the United States has disproportionately affected young racial/ethnic minority men who have sex with men (YMSM). However, HIV testing rates among young men of color remain low. Within this sample of racial/ethnic minority YMSM ( $n = 363$ ), the first HIV test was a median of 2 years after men who have sex with men sexual debut. Individuals with less than 1 year between their first negative and first positive HIV test were significantly more likely to identify the reason for their first negative test as being sick ( $OR = 2.99$ ; 95 % CI 1.23–7.27). This may suggest that these YMSM may have experienced

symptoms of acute HIV infection. Of major concern is that many YMSM in our study tested positive for HIV on their first HIV test. Given recommendations for at least annual HIV testing, our findings reveal that medical providers YMSM need to know the importance of regular testing.

**Resumen** La epidemia de VIH en los Estados Unidos ha afectado desproporcionadamente a hombres jóvenes de minorías raciales y étnicas que tienen sexo con hombres (JHSH). Sin embargo, las tasas de pruebas de VIH entre jóvenes de color siguen siendo bajas. Dentro de esta muestra de minorías raciales y étnicas JHSH ( $n = 363$ ), la primera prueba de VIH fue un promedio de 2 años después debut sexual de HSH. Individuos con menos de un año entre su primera negativa y primer VIH positivo fueron significativamente más probabilidades de identificar la razón para su primera prueba nunca como enfermos ( $OR = 2.99$ ; 95 % CI 1.23–7.27). Esto puede sugerir que estos JHSH puede han experimentado síntomas de infección de VIH. De las principales preocupaciones es que muchos JHSH en nuestro estudio prueba positiva del VIH en su primera prueba de VIH. Teniendo en cuenta las recomendaciones para la prueba de VIH al menos anual, nuestros hallazgos revelan que proveedores médicos JHSH necesitan saber la importancia de las pruebas regulares.

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G. Phillips II (✉) · J. Hidalgo  
Department of Epidemiology and Biostatistics, The George Washington University School of Public Health and Health Services, 2100-W Pennsylvania Avenue, NW, Suite 800, Washington, DC 20037, USA  
e-mail: glp2@gwu.edu

L. B. Hightow-Weidman  
University of North Carolina, Chapel Hill, NC, USA

M. Arya  
Baylor College of Medicine, Houston, TX, USA

S. D. Fields  
Florida International University—College of Nursing and Health Sciences, Miami, FL, USA

B. Halpern-Felsher  
University of San Francisco, San Francisco, CA, USA

A. Y. Outlaw  
Wayne State University, Horizons Project, Detroit, MI, USA

A. R. Wohl  
Los Angeles County Department of Public Health, Los Angeles, CA, USA

**Keywords** HIV · MSM · Acute infection · HIV testing

## Background

Studies of adolescents have found that very few have been tested for HIV despite being sexually active. This poses a problem for early detection of HIV infection and prevention of forward transmission among adolescents, who are

disproportionately affected by HIV. While estimated overall HIV incidence in the United States did not significantly change between 2006 and 2009, there was a 21 % increase in HIV incidence among people aged 13–29, which was driven by a 34 % increase in incidence among young men who have sex with men (YMSM) [1]. Therefore, it is vital to understand HIV testing patterns and motivators for testing among adolescents, particularly YMSM, in order to increase testing uptake and decrease HIV incidence.

Data from the 2009 Behavioral Risk Factor Surveillance System (BRFSS) study were used to investigate HIV testing behaviors of 6,628 male and female adolescents [2]. Only 31.8 % had ever been tested for HIV, and less than one-third of these (29 %) had been tested in the prior year. Another study of 17,528 males and females aged 13–24 who had an HIV diagnosis between 2006 and 2008 found that more than half of those aged 13–19 (54.0 %) had tested for HIV at least once before their diagnosis, and 68.4 % of those aged 20–24 had tested at least once before their diagnosis [3]. Men who have sex with men (MSM) aged 20–24 were significantly more likely to be repeat testers, compared with men exposed to HIV through heterosexual sex or other means [3].

The 2009 BRFSS study also found that African-American (odds ratio (OR) = 3.08; 95 % confidence interval (CI) 2.14–4.56) and multiracial individuals (OR = 3.23; 95 % CI 2.19–5.41) were more likely to test than whites, although Hispanics were less likely to test (OR = 0.66; 95 % CI 0.44–0.98) [2]. Contrary to the findings from the BRFSS study, the Reaching for Excellence in Adolescent Care and Health (REACH) Project, a multisite study of males and females aged 12–19, found that adolescent African-Americans had significantly lower odds of testing for HIV compared with whites (OR = 0.4; 95 % CI 0.2–0.8) [4]. With conflicting study results, it remains unclear if young African-Americans are less likely to have been tested for HIV.

A study in Maryland of sexually active male and female adolescents ( $n = 278$ ) aged 12–24 investigating barriers to HIV testing found that 70.5 % ( $n = 196$ ) had never been tested for HIV, and nearly two-thirds ( $n = 123$ ) reported that they had never been offered an HIV test [5]. Additionally, more than one-half of participants ( $n = 106$ ) were never tested because they believed they were not HIV-positive because they were not sick or were at low risk for HIV acquisition [5]. Similarly, the main reason the youth in the REACH Project reported for not testing was that they felt they were at low risk for acquiring HIV [4].

In 2008, the National HIV Behavioral Surveillance System (NHBS-MSM-2) recruited 8,153 YMSM from 21 cities across the US; among MSM aged 18–24, HIV prevalence was highest among African-American (16.6 %) and Latino (6.9 %) YMSM compared to white YMSM

(5.7 %) [6]. Data from NHBS-MSM-2 also showed that while 83.3 % of sexually active YMSM aged 18–24 had ever been tested for HIV, only 67.5 % had been tested in the prior 12 months [7]. Additionally, a multisite study of YMSM of color found that more than one-third of participants (34.1 %) had never been tested for HIV before, despite being sexually active [8].

The Centers for Disease Control and Prevention (CDC) currently recommend that sexually active MSM test for HIV infection at least annually [9, 10]. Based on surveillance data and results from NHBS-MSM-2, which found that 55 % of MSM were unaware of their HIV infection [6], the CDC amended their recommendations to suggest that all MSM who have multiple or anonymous sex partners should test for HIV more frequently than annually [11].

The purpose of this analysis is to characterize the HIV testing experiences of a geographically diverse sample of HIV-positive racial/ethnic minority YMSM who were newly diagnosed or recently reengaged in HIV care. Specifically, we investigated the patterns and correlates of HIV testing prior to diagnosis.

## Methods

### Participants

A total of 363 participants were enrolled at one of eight demonstration sites (Bronx, NY; Chapel Hill, NC; Chicago, IL; Detroit, MI; Houston, TX; Los Angeles, CA; Oakland, CA; and Rochester, NY) funded by the Health Resources and Services Administration (HRSA) HIV/AIDS Bureau's (HAB) Special Projects of National Significance (SPNS) Initiative. The focus of the initiative was to provide outreach to HIV-positive racial/ethnic minority YMSM, and link them to and retain them in HIV-related care. Each site implemented its own innovative outreach, linkage, and retention strategies, yet all sites used similar enrollment criteria and had participants complete the same baseline and follow-up surveys. Methods for this study have been described elsewhere [12]. In order to be eligible to enroll in the present study, participants had to be born male; be HIV-positive and not currently in care; have sex with men or the intent to have sex with men; self-identify as non-White; be between the ages of 13 and 24 years at the time of the first interview; and be willing and able to provide full written informed consent/assent and a release of information to obtain medical records.

### Procedures

Eligible participants were administered a standardized questionnaire by trained interviewers at each site at

baseline and every 3 months thereafter for up to 2 years or until study closure, whichever occurred first. Data were collected between June 1, 2006 and August 31, 2009. Only baseline data were used for these analyses. All data were entered into a secure web-based data portal maintained by an evaluation center at The George Washington University (GWU). All instruments and protocols were approved by institutional review boards (IRBs) at each site and by the GWU IRB.

### Measures

Participants reported demographic characteristics such as age, race/ethnicity, sexual orientation, and education on a survey form that was standardized across all eight of the SPNS sites.

At baseline, participants were asked about their experiences with HIV testing, with a focus on their experiences with their first HIV test and their first positive HIV test. They were asked the open-ended question “Why was it that you got tested?” Additionally, they were asked “Where did you get that test?” and were provided with a list of possible responses to choose, including “other location”.

Depressive symptomatology was measured using the Center for Epidemiologic Studies Depression Scale (CES-D), a self-report scale consisting of 20 items, each of which was rated based on a four-point scale [13]. CES-D scores range from 0 to 60, with a score of 16 or greater considered indicative of significant depression.

A participant was considered to have been recently infected with HIV if he had received a negative test result within the year prior to his first positive test result. These two tests were calculated using the questions “Think back to your first ever HIV test (whether the results were negative, positive, or you did not return for results). When was it?” and “When was your first HIV test that was positive?”

### Statistical Analysis

Univariate analyses were conducted on baseline HIV testing characteristics. Significant differences between participants who tested positive at their first HIV test and participants who tested negative at least once before their first positive were assessed using bivariate analyses to generate  $\chi^2$  statistics and associated probabilities. Variables associated with testing positive at the first HIV test with  $p$  value  $<0.20$  were included in a multivariable logistic regression model. In the full model, correlates with  $p$  values  $>0.10$  were eliminated using a manual stepwise technique, starting with the variable with the largest  $p$  value. Additionally, the association of length of time from first MSM sexual experience to first HIV test with several correlates was assessed using bivariate general linear

models. SAS v.9.2 (SAS Institute, Cary, NC) was used for all analyses.

### Results

Two-thirds of the 363 racial/ethnic minority YMSM in this sample identified as African-American (66.7 %). The remainder identified as either Latino (21.5 %) or multiracial (11.9 %). The mean age of participants was 20.4 years (standard deviation (sd) = 1.9). Nearly one-half (43.3 %) had at least some college education, and 63.6 % identified as gay or homosexual. Most had engaged in oral or anal sex with a man in the prior 3 months (79.0 %) and had used a condom at last insertive or receptive anal sex (67.8 %). The mean reported age of first MSM sexual encounter was 14.5 years (sd = 3.2) [14]. Of the 200 YMSM (55.1 %) who reported having had sex with a woman, nearly one-half (49.0 %) reported their age of first sexual encounter with a woman at or before their MSM sexual debut.

### HIV Testing Behaviors

More than one-fifth of YMSM (21.1 %) had only tested for HIV once in their life. YMSM in this sample reported an average of 4.5 tests (sd = 6.0) over their lifetime (range 1–80). The mean age at first HIV test was 18 years (sd = 2.3). Mean age at the first positive HIV test was 2 years older, at 20 years (sd = 2.0), with a mean time from first HIV test to first positive HIV test of 1.8 years (sd = 2.1).

On average, YMSM reported having their first HIV test 2 years (interquartile range 0–3 years) after they first had sex with another man. Over half of the sample (52.4 %) had their first HIV test more than 1 year after their first reported sexual encounter with a man. Thirty-one YMSM (12.0 %) reported testing for HIV at least 1 year before their first sexual encounter with a man. Of these 31 YMSM, 35.5 % had engaged in sex with a woman prior to testing.

Among YMSM who selected a testing location from the choices presented in the questionnaire, most received their first ever HIV test at a clinic or doctor's office (32.4 %) or hospital (12.5 %) (Table 1). Nearly 5 % received their first HIV test as part of their participation in the SPNS Initiative. Of the 28.9 % of YMSM who reported testing for HIV the first time at a location other than those listed, 24.2 % were tested at their local health department and 4.0 % were tested through the military.

The most frequently cited reasons for testing for HIV this first time were feeling sick (16.0 %), being told to get an HIV test by someone (15.8 %), and not using a condom during sex (13.5 %). Approximately half of YMSM

**Table 1** HIV testing behaviors of a cohort of HIV-positive racial/ethnic minority YMSM, United States, 2006–2009 (n = 363)

	First HIV test n (%)	First HIV-positive test n (%)
<b>Location of HIV test</b>		
This SPNS <sup>a</sup> program	16 (4.7)	44 (13.1)
A clinic or doctor's office	111 (32.4)	87 (25.8)
A hospital	43 (12.5)	51 (15.1)
An anonymous testing site	5 (1.5)	4 (1.2)
A blood donation center	3 (0.9)	1 (0.3)
Employer/employer clinic	2 (0.6)	1 (0.3)
A jail, prison, or juvenile detention center	7 (2.0)	5 (1.5)
A bar or club	2 (0.6)	2 (0.6)
A testing program on street	14 (4.1)	2 (0.6)
A screening program at school	14 (4.1)	10 (3.0)
A testing program with other care	27 (7.9)	27 (8.0)
Other	99 (28.9)	103 (30.6)
<b>Reason for test<sup>b</sup></b>		
I was sick	58 (16.0)	102 (28.2)
Condom broke	14 (3.9)	11 (3.0)
Didn't use condom during sex	49 (13.5)	43 (11.9)
Used needles to inject drugs	2 (0.6)	0 (0.0)
Someone told me to get tested	57 (15.8)	40 (11.1)
I didn't know I was being tested	2 (0.6)	1 (0.3)
I thought I might be HIV-positive	25 (6.9)	38 (10.5)
Routine medical appointment	28 (7.7)	33 (9.1)
Employee physical	1 (0.3)	0 (0.0)
Gave blood	5 (1.4)	8 (2.2)
Joined the military	4 (1.1)	3 (0.8)
In jail, prison, or juvenile detention center	8 (2.2)	2 (0.6)
Saw testing at a bar or club	3 (0.8)	2 (0.6)
Saw testing program on the street	5 (1.4)	3 (0.8)
Saw testing program at pride	7 (1.9)	0 (0.0)
Testing program in school	14 (3.9)	3 (0.8)
Was offered testing with other care	20 (5.5)	26 (7.2)
Other	169 (46.7)	138 (38.1)

Table contains column percentages

<sup>a</sup> Health Resources and Services Administration (HRSA) HIV/AIDS Bureau's (HAB) Special Projects of National Significance

<sup>b</sup> Could choose more than one option

(46.7 %) reported another reason for their first HIV test, which included having an HIV-positive sex partner and being curious about their HIV status.

#### Characteristics of First Positive HIV Test

Similar to the first HIV test, most of the participants received their HIV-positive test at a clinic or doctor's office (25.8 %) or a hospital (15.1 %). However, compared to the first ever HIV test, a larger proportion (13.1 %) received this positive HIV test result as part of their participation in the SPNS Initiative.

The main reason participants reported testing at their first positive HIV test was feeling sick (28.2 %) (Table 1). Specifically, participants reported "diarrhea," "leg pain," "cold sweats," "pain in penis and discharge," and "losing

a lot of weight." Other major reasons for testing included not using condoms during sex (11.9 %); being told to get tested by someone (sex partner, friend, relative, clinician, etc.) (11.1 %); and thinking that they might be HIV-positive (10.5 %). Four men (1.1 %) reported being raped or sexually assaulted as motivation for testing the first time they received an HIV-positive diagnosis.

#### Frequency of Testing Prior to HIV Diagnosis

More than one-third of participants (n = 130; 35.8 %) tested positive on their first HIV test. There were no significant differences between YMSM who tested positive on their first HIV test and those participants who were tested multiple times before seroconverting regarding race/ethnicity, level of education, possession of health insurance,

having run out of money for basic needs in the last 3 months, sexual orientation, depressive symptoms, or sexual behaviors (Table 2). Participants who tested multiple times were significantly younger at their first HIV test compared to those who tested positive on their first HIV test (19.5 vs. 17.4 years;  $t = 8.11$ ;  $p < 0.0001$ ). However, there was no significant difference for age at HIV diagnosis. There was a significant difference in the proportion of YMSM who tested positive on their first HIV test based on SPNS program site. The SPNS program located in Los Angeles had the largest proportion of YMSM who tested positive on their first HIV test, whereas the SPNS program

in Chicago had the smallest proportion (52.3 vs. 18.2 %;  $\chi^2 = 16.26$ ;  $p = 0.023$ ).

In multivariable analysis, testing positive on the first HIV test was significantly more likely among YMSM who enrolled in Los Angeles (vs. Chapel Hill; adjusted (aOR) = 6.93; 95 % CI 2.29–21.0) and YMSM who identified as bisexual (vs. gay/homosexual; aOR = 2.87; 95 % CI 1.27–6.52). YMSM who identified significant depressive symptoms were significantly less likely to have tested positive on their first HIV test (aOR = 0.52; 95 % CI 0.27–0.99). Although reporting condom use at last anal sex was somewhat associated with testing positive on the

**Table 2** Correlates of having previously tested HIV-negative versus testing positive on first HIV test among a cohort of HIV-positive racial/ethnic minority YMSM, United States, 2006–2009 (n = 363)

	Previously tested HIV-negative (n = 233)	Tested HIV-positive on first test (n = 130)	Total (n = 363)	$\chi^2$ Test statistic	p Value
<b>Site</b>					
Oakland, CA	19 (65.5)	10 (34.5)	29 (8.0)	16.26	0.02
Bronx, NY	38 (65.5)	20 (34.5)	58 (16.0)		
Harris County, TX	30 (60.0)	20 (40.0)	50 (13.8)		
Los Angeles, CA	31 (47.7)	34 (52.3)	65 (17.9)		
Rochester, NY	6 (75.0)	2 (25.0)	8 (2.2)		
Chapel Hill, NC	61 (75.3)	20 (24.7)	81 (22.3)		
Detroit, MI	30 (60.0)	20 (40.0)	50 (13.8)		
Chicago, IL	18 (81.8)	4 (18.2)	22 (6.1)		
<b>Education</b>					
Less than high school degree	68 (64.8)	37 (35.2)	105 (28.9)	5.25	0.07
High school degree or equivalent	56 (55.5)	45 (44.6)	101 (27.8)		
At least some college	109 (69.4)	48 (30.6)	157 (43.3)		
<b>Race/ethnicity</b>					
African-American	156 (64.5)	86 (35.5)	242 (66.7)	2.10	0.35
Latino	46 (59.0)	32 (41.0)	78 (21.5)		
Multiracial	31 (72.1)	12 (27.9)	43 (11.9)		
Health insurance	150 (64.4)	79 (60.8)	229 (63.1)	0.47	0.49
Ran out of money for basic needs, last 3 months	169 (75.8)	101 (83.5)	270 (78.5)	2.74	0.10
Age at first HIV test (mean, sd)	17.4 (2.2)	19.5 (2.0)	18.0 (2.3)	8.11 <sup>a</sup>	<0.01
Age at HIV diagnosis (mean, sd)	20.2 (2.0)	19.8 (2.0)	20.0 (2.0)	1.65 <sup>a</sup>	0.10
<b>Sexual orientation</b>					
Gay/homosexual	150 (64.9)	81 (35.1)	231 (63.6)	3.85	0.15
Bisexual	40 (55.6)	32 (44.4)	72 (19.8)		
Other	43 (71.7)	17 (28.3)	60 (16.5)		
<b>CES-D score</b>					
<16	104 (65.0)	56 (35.0)	160 (47.6)	0.16	0.70
≥16	118 (67.1)	58 (33.0)	176 (52.4)		
Exchange sex, last 3 months	33 (14.2)	15 (11.6)	48 (13.3)	0.48	0.49
Sex with a man, last 3 months	186 (80.2)	99 (76.7)	285 (79.0)	0.59	0.44
Unprotected anal intercourse, last sex	52 (34.9)	23 (27.4)	75 (32.2)	1.39	0.24

Table contains row percentages

CES-D Center for Epidemiologic Studies Depression Scale

<sup>a</sup>  $t$  Test statistic

first HIV test, this association was not significant ( $\chi^2 = 2.79$ ;  $p = 0.095$ ).

### Recent HIV Infection

Of the 233 participants who previously had a negative HIV test result, 22.8 % received this result less than 1 year before their first positive test, and approximately half of these participants ( $n = 23$ ) had less than 6 months between their first negative and first positive test. There were no significant differences between participants with less than 1 year between their first negative and first positive HIV test and those with more than 1 year between these tests based on age, race/ethnicity, education level, sexual orientation, or site. Individuals with less than 1 year between their first negative and first positive HIV test were significantly more likely to identify the reason for testing at their first negative test as “I was sick” (OR = 2.99; 95 % CI 1.23–7.27) compared to individuals whose first negative HIV test was longer than 1 year prior. This association was more pronounced for individuals with less than 6 months between tests (OR = 4.16; 95 % CI 1.53–11.3). Nearly three-quarters of individuals (72.4 %) who identified being sick as the reason for their first HIV test were tested at a clinic, hospital, or urgent care unit. There were no significant differences between participants with less than 1 year between tests and those with more than 1 year between tests regarding the behaviors that might have placed them at elevated risk for HIV acquisition, such as “condom broke,” “didn’t use condoms when having sex,” and “used needles to inject drugs.” There were no differences between the two groups with respect to reasons for testing at their first positive HIV test. However, individuals who had less than 1 year between their first negative and first positive HIV test were significantly more likely to have received their first positive result at a clinic or doctor’s office compared to other locations (OR = 1.96; 95 % CI 1.00–3.87).

### Entry into Care

The majority of YMSM (85.2 %) were referred to medical care by the person who gave them their HIV-positive test result. YMSM who had their first HIV-positive test at one of the SPNS program sites were more likely to be referred to medical care than YMSM whose test was at another location (95.5 vs. 83.5 %;  $\chi^2 = 4.29$ ;  $p = 0.04$ ). More than half of participants who were referred reported that the person who gave them their test results called and made an appointment for them (53.7 %) and/or told them where to go for the appointment (52.3 %). About one-fifth of the people who gave the participants their test results either helped them with transportation (19.9 %) or took them directly to the appointment (20.9 %). Only 4.5 % ( $n = 13$ )

of YMSM who received referrals did not keep their HIV medical appointment.

Participants took an average of 2 months (sd = 4.70; range 0–36.5 months) from the date of their positive test to enter into HIV medical care, defined as a visit with a medical provider. YMSM who reported testing positive at the SPNS program site had a significantly shorter time between testing and entering into care than did those who tested elsewhere (16.3 vs. 67.3 days;  $t = 5.08$ ;  $p < 0.0001$ ). Although YMSM identified as having a recent HIV infection entered care an average of 1 month earlier (40.1 vs. 70.5 days;  $t = 1.23$ ), this association was not significant.

### Discussion

Despite CDC testing recommendations, we found that more than one-half of racial/ethnic minority YMSM in this study did not begin regular HIV testing upon becoming sexually active. There was an average of 2 years between when YMSM in this study began engaging in sex with other men and when they underwent their first HIV test. Notably, over one-third of YMSM tested positive for HIV on their first HIV test. These findings support the need for initiatives to encourage racial/minority YMSM to begin testing for HIV upon becoming sexually active, rather than delaying testing for several years after their sexual debut and being unaware of their status while sexually active.

The most frequently cited reasons for the first HIV test was feeling sick, engaging in unprotected sex (intentionally), or due to condom breakage. Very few YMSM in this sample tested because they became sexually active or because they knew they should test on a regular basis. Given that many YMSM in our study tested positive for HIV on their first HIV test, it is important to encourage YMSM to test at least as frequently as recommended by the CDC. Medical providers who are caring for these youth should discuss the CDC testing guidelines with their patients and routinely ask them about their sexual behaviors to ensure they are testing with appropriate frequency.

Although we cannot truly assess acute HIV infections (AHIs) through data collected in this study, the fact that significantly more YMSM who had less than 1 year between their first negative HIV test and their first positive test reported “*feeling sick*” as the main reason for testing compared to YMSM with more than a year between these tests suggests that many of the YMSM in this study may have been recently infected and may have experienced symptoms of acute retroviral syndrome. Since these symptoms were present at the first negative test, this indicates that these infections might have been missed by initial screening tests. AHI is characterized by high viral loads, which is highly correlated with increased risk of HIV

transmission [15, 16]. During AHI, the risk of transmitting the disease is 8–22 times greater per sexual act than during the chronic phase of HIV [17, 18]. Since the symptoms of AHI can mirror those of other illnesses such as influenza and mononucleosis, medical providers in emergency rooms and urgent care units need to be aware of and test for the possibility of HIV infection among their patients. Many of these young men are likely to present at these clinical settings, school health clinics, or community health centers due to illness [19]. The majority of YMSM in this study who felt sick presented to a clinic, hospital, or urgent care unit for their first HIV test, but received an HIV-negative diagnosis. Medical providers caring for YMSM need to be aware of the clinical presentation of AHI and order the appropriate laboratory tests to avoid missing this diagnosis and thus delaying entry into care [20–22].

We identified significant differences across SPNS program sites for HIV testing behaviors, specifically for YMSM testing positive on the first HIV test. This finding could either be due to differences in demographics based on site (age, race/ethnicity, etc.), or a function of the different outreach methods and techniques employed by the sites. While some sites conducted outreach and HIV testing at emergency rooms and sexually transmitted infection clinics, others conducted HIV testing events or used a mobile unit to access these YMSM [12, 23]. This wide array of outreach and testing strategies could have led to recruitment of YMSM with different healthcare-seeking and testing behaviors, and thus might explain the variation among program sites. However, all sites were successful at engaging and recruiting racial/ethnic minority YMSM throughout the course of the study, and should serve as models for future efforts.

Routine testing, defined by the CDC as at least annual testing for sexually active MSM [11], needs to be encouraged among racial/ethnic minority YMSM, especially in light of recent findings that the largest increase of incident HIV cases in the US between 2006 and 2009 (48 %) occurred among African-American YMSM [1]. NHBS researchers found that compared to white MSM, African-American MSM were significantly more likely to have sex with partners of unknown HIV status [24]. Other studies have shown that large proportions of African-American MSM are unaware of their HIV infection [6, 24–26], and that they are more likely to select other African-American MSM as sex partners [27–29]. These factors place African-American MSM at a heightened risk for HIV acquisition at each unprotected sex act, which is why it is important for these men to know their status, the status of their partners, and to practice risk reduction.

HIV counseling and testing has previously been shown to be effective at reducing high-risk sexual behaviors among HIV-positive individuals [30]. Our research has corroborated these findings by demonstrating that engagement in this

study and exposure to risk reduction counseling was associated with reductions in high-risk sexual behaviors [31], demonstrating the benefit of secondary prevention in order to prevent forward transmission and reinfection.

Although only a small portion of the participants received their first HIV test at a SPNS program site, these participants, on average, were linked to HIV medical care within 2 weeks, compared with 2 months for other testing sites. This is indicative of the effectiveness of the methods for linkage to care employed by each SPNS site [32], despite differences in implementation of outreach and linkage [12, 23]. Staff at each of the sites assisted participants in scheduling medical visits, ensuring that participants had transportation to these visits, reminded the participant of the appointment, and conducted follow-up case finding for any participants who missed an appointment [23]. The use of these methods should be encouraged to increase the probability that racial/ethnic minority YMSM are linked to care immediately upon receiving an HIV-positive diagnosis.

### Limitations

This study has some limitations. Data on HIV testing behaviors were collected via interview and thus could be subject to recall bias and social desirability bias (i.e., over-reporting of HIV testing frequency or underreporting of risk factors as a reason to test). We did not collect data on barriers to HIV testing for racial/ethnic minority YMSM which limits the interpretation of the results. Encouraging annual or more frequent testing among this population will not be effective if testing barriers are not identified and addressed. We were unable to accurately assess the number of confirmed acute infections missed within this cohort given that we only collected data on the first ever HIV test and the first positive HIV test. Thus, it is possible that a larger proportion of men in this study could have received a negative test less than 12 months prior to their first positive test, although only one-half reported more than two HIV tests in their lifetime (56.5 %). Additionally, we did not have the medical records of participants during the time of their reported illnesses, but instead only have the self-report of symptoms and a negative HIV test within 12 months of a first positive test to suggest a missed case of AHI. Despite these limitations, this was the first study to focus specifically on the HIV testing behaviors of a sample of HIV-positive racial/ethnic minority YMSM and to discuss possible missed diagnoses of acute cases in this group.

### Conclusion

Prevention programs and medical providers for racial/ethnic minority YMSM need to emphasize initiating HIV

testing upon becoming sexually active and ongoing testing based on continued engagement in risk. We found that a significant portion of this sample received a negative HIV antibody test potentially during the acute phase of their HIV infection; this represents a missed opportunity to decrease onward transmission. Therefore, clinicians should be aware of the likelihood of YMSM presenting with AHI and should be prepared to administer the appropriate tests if they suspect a possible AHI case. Additionally, this study found that HIV-positive racial/ethnic minority YMSM could be effectively linked to medical care. By scheduling HIV medical care visits, arranging transportation, and reminding participants of their appointments, study staff were able to ensure that these YMSM were quickly and efficiently linked into care following a positive HIV test result diagnosis.

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