Differences and Similarities in HIV Testing Among Men Who have Sex with Men and Women (MSMW) and Men Who Have Sex with Men Only (MSMO)

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Abstract: The study examined differences in HIV testing between men who have sex with men only (MSMO) (*n*=300) and men who have sex with men and women (MSMW) (*n*=105) and assessed associations with HIV testing among MSMW. A venue-based cross-sectional HIV surveillance study in 2008 (BESURE-MSM2) was examined. Prevalence of HIV testing was similar for MSMO and MSMW. One-on-one counseling (excluding counseling that is part of HIV testing) and having seen a health care provider in the past twelve months were associated with HIV testing in the past six months among MSMW in multivariate analyses. One-on-one counseling interventions may increase rates of HIV testing among MSMW.

BACKGROUND

In 2006, the Centers for Disease Control (CDC) recommended that sexually active men who have sex with men (MSM) be tested for HIV at least annually [1]. However, recent CDC analyses suggest that MSM should test more frequently. CDC surveillance found that among MSM who had been tested in the past year and who did not report a previous HIV positive test result, 7% were newly diagnosed seropositive. This high prevalence of new HIV infections among MSM who had been tested during the past year suggests that sexually active MSM might benefit from testing every three to six months [2].

HIV testing is a key component of HIV prevention efforts because knowledge of HIV positivity leads to decreases in HIV transmission [3-4]. HIV testing is also associated with early diagnoses of HIV and, when coupled with appropriate interventions, early diagnosis of HIV has been found to improve health outcomes, including slower clinical progression and reduced mortality [5].

Research suggests that compared to men who have sex with men only (MSMO), men who have sex with men and women (MSMW) are less likely to be tested for HIV [6-8], less likely to be exposed to HIV prevention [8] and more likely to be undiagnosed seropositive [9, 10]. Despite these findings, very little is known about the HIV testing behaviors of MSMW. Most research on HIV testing among MSM has combined samples of MSMO and MSMW [7, 11-13] or has

assessed differences by sexual identity rather than by sexual behavior [14-18]. These studies indicate that HIV testing is associated with factors such as perception of risk, fear of testing positive, structural barriers [13], health status [18], availability of rapid testing, intensive peer counseling [19], socioeconomic factors, race/ethnicity and urban residence [7].

We found no studies that assessed multivariate associations with HIV testing among MSMW. Understanding the factors associated with HIV testing among MSMW provides important information on who is being reached by current HIV testing interventions and how to strengthen current HIV testing initiatives. To address these gaps, this paper 1) describes HIV testing behaviors and use of HIV-related services among MSMW 2) compares HIV testing behaviors and use of HIV-related services of MSMW to MSMO and 3) assesses bivariate and multivariate associations between HIV risk behaviors, use of health services, and HIV testing in the past six months among MSMW.

METHODS

The National HIV Behavioral Surveillance System (NHBS) is an on-going surveillance system implemented by the CDC that allows for ongoing collection, analysis, and interpretation of HIV risk and prevention behaviors. The Baltimore portion of NHBS is referred to as BESURE and is implemented annually by the Johns Hopkins Bloomberg School of Public Health in collaboration with Maryland Department of Health and Mental Hygiene. BESURE targets three populations at increased risk for HIV: MSM, injection drug users, and heterosexuals. From July to October 2008, the second wave of BESURE-MSM, called BESURE-MSM2, was conducted using venue-based time-space sampling.

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The first step in venue-based sampling is developing a sampling frame. This was done by conducting a series of focus groups with MSM and key stakeholders to identify recruitment venues and corresponding time periods. Venues included bars, restaurants, street locations, festivals, and parks. These venues and times were then randomly selected from the sampling frame to create a sampling events calendar. At these venue and time-specific sampling events, the attendance of all potentially eligible participants was enumerated by counting all individuals who crossed a designated sampling line or area, such as the entrance to a bar. Study recruiters intercepted men who crossed into the sampling area to assess eligibility. Eligibility criteria for men participating in BESURE-MSM2 included (1) being 18 years of age or older, (2) living in Baltimore MSA (metropolitan statistical area), and (3) speaking English or Spanish. MSM behavior was not an eligibility requirement for BESURE-MSM2 so as to not bias the study against men who were not comfortable disclosing same sex behaviors at enrollment [20].

Study staff read through the consent form with each participant and addressed any questions. Because the study was anonymous, informed consent was given verbally by the participant and then documented on the consent form by the signature of the study staff member who participated in the consent process. Participants gave informed consent to an interviewer-administered survey and optional HIV test. After consent, eligible participants were given a forty-five minute behavioral risk surveillance survey by trained interviewers and an optional HIV test that included pre-and post-test counseling. Both the survey and the HIV testing took place in a private and secure mobile van. Blood specimens were tested for HIV-1 antibodies with ELISA and a confirmatory Western Blot. After the blood draw, participants scheduled appointments to get their test results and were also given information about BESURE drop-in hours [20].

From July to October 2008, BESURE-MSM2 approached 1,326 men to participate in the study. Sixty-five percent (860) of these men agreed to be screened for eligibility, of these 76% (654) were eligible, and, of these, 99% (648) were enrolled. Ninety-three percent of the enrolled participants completed survey and serologic information. Four hundred and forty-eight of enrolled participants reported sex with a man in the past twelve months [20]. Of these 448 men, 43 were known seropositive and were excluded from the analysis, resulting in a final sample of 405 MSM.

Measures

Men were classified as MSMW if they reported oral, vaginal, or anal sex with a woman in the past twelve months in addition to oral or anal sex with a man in the past twelve months. Men who only reported oral or anal sex with men in the past twelve months were coded as MSMO.

Our outcome of interest, HIV testing within the past six months, was calculated by subtracting the date of the respondent's most recent HIV test from the date of the interview. Date of a respondent's most recent HIV test was obtained by asking "When did you have your most recent HIV test?" Individuals who had never been tested for HIV (*n*=43) were coded as not having been tested for HIV in the past six months.

Our independent variables of interest included HIV risk behaviors and use of HIV-related services. Number of male sex partners was assessed by asking participants the number of men they had oral or anal sex with in the past year. Unprotected anal sex was assessed by asking "In the past 12 months, with how many of these men did you have anal sex without using a condom?" This question was asked of main, casual, and exchange partners. Having ever injected drugs was assessed by asking, "Have you ever in your life shot up or injected any drugs other than those prescribed for you? By shooting up, I mean any time you might have used drugs with a needle, either by mainlining, skin popping, or muscling" [20].

Participants were asked, "Do you currently have health insurance or coverage? This includes Medicaid or Medicare" and then asked, "What kind of health insurance or coverage do you currently have?" Access to a health care provider was assessed by asking, "Have you seen a doctor, nurse, or other health care provider in the past 12 months?"

Disclosure of same sex behavior to a health care provider was assessed by asking two questions. Participants were first asked, "Have you ever told anyone that you are attracted to or have sex with men?" Individuals who gave a positive response were then asked "I'm going to read you a list of people you may have told. Please tell me which ones apply. Have you told: a health care provider."

To assess if participants had been exposed to one-to-one HIV counseling services, participants were asked: "In the past 12 months, have you had a one-on-one conversation with an outreach worker, counselor, or prevention program worker about ways to prevent HIV? Don't count the times when you had a conversation as part of an HIV test." Conversations that were part of an HIV test were excluded to not artificially inflate a positive relationship between counseling and HIV testing.

Statistical Analysis

We investigated the relationship between frequency of venue attendance and our outcome of interest, HIV testing in the past six months, to assess the need for weighted estimates. Men with higher attendance might be more likely to be enrolled in the study. Therefore, if venue attendance was associated with our outcome, our results would be biased. We found that venue attendance was not associated with HIV testing, and therefore we did not weight our data to account for frequency of venue attendance [21].

Differences between MSMW and MSMO in use of HIV-related services were evaluated using Pearson's Chi square for categorical variables. Fisher's exact test was executed when cell sizes fell below five.

Unadjusted prevalence ratios (PR), adjusted prevalence ratios (APR) and corresponding 95% confidence intervals (95% CI) were calculated using SAS PROC GENMOD's log-binomial regression capability with a binomial distribution and a logarithmic link function [22]. For unadjusted and adjusted analyses, we used the REPEATED statement to account for clustering by venue. For multivariate analyses, we employed the COPY method if the log-binomial model did not converge [23]. Our multivariate analysis only included variables with a univariate association

with HIV testing of $p \leq 0.10$. We used prevalence ratios rather than odds ratios to approximate relative risk because the frequency of our outcome of interest, HIV testing, exceeded 10% [24]. We arrived at the most parsimonious model by removing variables that were insignificant ($p > 0.05$) using a stepwise approach. Model fit was determined using QIC (Quasi-likelihood under the Independence model Criterion). QIC is a method used to compare two GEE models to determine the model with the best fit. The model with the smaller QIC statistic is preferred. All statistical analyses were performed using Statistical Analysis Software (SAS) version 9.1 (SAS Institute, Cary, NC).

RESULTS

Participant Characteristics and Use of HIV-Related Services

The demographic characteristics of our study population has been reported elsewhere [20]. In brief, 300 (74.1%) MSM reported sex with men only and 105 (25.9%) reported sex with both men and women. The majority of the sample was African American (70.9%), under the age of 35 (63.0%), had some college education (52.1%), and identified as homosexual (66.8%) (Table **1**). As reported previously, compared to MSMO, MSMW were more likely to be African American, be homeless, have less than a high school education, be in poverty, and identify as bisexual, heterosexual or other [20].

Table **2** outlines differences between MSMW and MSMO in use of HIV-related health services. MSMW were more likely than MSMO to report no insurance (48.1% versus 34.4%, p=.0132) and to report public insurance (28.9% versus 14.6%, p=.0130). We found that MSMW were significantly less likely than MSMO to have ever disclosed their same sex behavior to a health care provider (49.5% versus 71.8%, p=<.0001) and to have heard of local organizations that provide HIV programs (33.0% versus 54.9%, p=0.0001). MSMW were as likely as MSMO to have visited a health care provider in the past year and to attend a one-on-one HIV counseling session.

About half of the MSM in our study had been tested for HIV in the past year (MSMO 56.0%, MSMW 47.6%,

Table 1.   Socio-Demographic Characteristics of MSMO and MSMW (n=405)

	Total	MSM/O (Column %)	MSM/W (Column %)	P-Value
Socioeconomic Characteristics	n (%)	n (%)	n (%)	
Total	405	300 (74.1)	105 (25.9)	
Race				
Black/African American	287 (70.9)	197 (65.7)	90 (85.7)	<.0001
White	94 (23.2)	85 (28.3)	9 (8.6)	<.0001
Other	24 (5.9)	18 (6.0)	6 (5.7)	0.9150
Age				
< 24 years old	134 (33.1)	107 (35.7)	27 (25.7)	0.0621
25-34 years old	121 (29.9)	89 (29.7)	32 (30.5)	0.8761
35-44 years old	99 (24.4)	69 (23.0)	30 (28.6)	0.2529
> 45 years old	51 (12.6)	35 (11.7)	16 (15.2)	0.3424
Current Homeless				
No	381 (94.1)	292 (97.3)	89 (84.8)	<0.0001
Yes	24 (5.9)	8 (2.7)	16 (15.2)	<0.0001
Education				
High school or less	194 (47.9)	128 (42.7)	66 (62.9)	0.0004
College or some college	187 (46.2)	151 (50.3)	36 (34.3)	0.0045
Graduate education	24 (5.9)	21 (7.0)	3 (2.9)	0.1218
Poverty				
No	282 (69.6)	222 (74.0)	60 (57.1)	0.0012
Yes	123 (30.4)	78 (26.0)	45 (42.9)	0.0012
Sexual Identity				
Homosexual	269 (66.8)	257 (86.0)	12 (11.5)	<0.0001
Bisexual	125 (31.0)	40 (13.4)	85 (81.7)	<0.0001
Heterosexual/other	9 (2.2)	2 (0.7)	7 (6.7)	0.0003

Table 2.   Differences in Use of Health Services Related to HIV Testing Between MSMO and MSMW (N=405)

	Total	MSM/O (Column %)	MSM/W (Column %)	P-Value
Use of Health Services	n (%)	n (%)	n (%)	
Total	405	300 (74.1)	105 (25.9)	
Health insurance				
None	151 (37.9)	101(34.4)	50 (48.1)	0.0132
Public	73 (18.3)	43 (14.6)	30 (28.9)	0.0013
Private	174 (43.7)	150 (51.0)	24 (23.1)	<.0001
Visited health care provider				
No	85 (21.0)	57 (19.0)	28 (26. 7)	0.0968
Yes	320 (79.0)	243 (81.0)	77 (73.3)	0.0968
HIV test last 12 months				
No	185 (46.1)	131 (44.0)	54 (52.4)	0.1373
Yes	216 (53.9)	167 (56.0)	49 (47.6)	0.1373
HIV test last 6 months				
No	258 (64.3)	189 (63.4)	69 (67.0)	0.5147
Yes	143 (35.7)	109 (36.7)	34 (33.0)	0.5147
HIV test last 3 months				
No	305 (76.1)	225 (75.5)	80 (77.7)	0.6569
Yes	96 (23.9)	73 (24.5)	23 (22.3)	0.6569
Ever disclosed same sex behavior to health care provider				
No	137 (34.0)	84 (28.2)	53 (50.5)	<.0001
Yes	266 (66.0)	214 (71.8)	52 (49.5)	<.0001
Attended one-on-one HIV counseling				
No	326 (80.5)	238 (79.3)	88 (83.8)	0.3191
Yes	79 (19.5)	62 (20.7)	17 (16.9)	0.3191
Heard of local HIV programs				
No	204 (50.8)	135 (45.2)	69 (67.0)	0.0001
Yes	198 (49.3)	164 (54.9)	34 (33.0)	0.0001

p=.1373), and about a third had been tested in the past six months (MSMO 36.7%, MSMW 33.0%, *p*=.5147). MSMO and MSMW were equally likely to have been tested for HIV in the past three months. When we looked at differences in risk behavior among those who had and had not been tested, we found no differences in unprotected anal intercourse (UAI) with men in the past year, UAI with men at last sex, or in number of male sex partners. We also found no differences when we stratified this analysis by MSMO and MSMW (results not shown).

Table **3** highlights associations between HIV risk behaviors, use of health services and HIV testing among MSMW. In bivariate analyses race/ethnicity, having unprotected sex with a female partner in the past year, having been to a health care provider in the past year, and attending one-on-one counseling were associated with HIV testing at the p<.10 level. In multivariate analyses MSMW who had been to a health care provider in the past year were

three times more likely to have been tested for HIV in the past six months (APR =3.1; 95% CI=1.3-7.6), and MSMW who had attended an one-on-one counseling session were two times more likely to have been tested for HIV in the past six months (APR= 2.2; 95% CI= 1.2-4.1). The QIC for the final model was 112.8. To assess if HIV predictive factors differed by MSMO/MSMW status, we looked at predictors of HIV testing among the total population of 405 MSM with MSMO or MSMW status included as an interaction term. We found that for the combined sample, MSM who had visited a health care provider in the past year were 1.3 times as likely to have been tested for HIV in the past six months (APR=1.3; 95% CI=1.0-1.7), and that MSM who had attended a one-on-one counseling session were 2.0 times as likely to have been tested for HIV in the past six months (APR=2.0; 95% CI=1.2-3.2) (results not displayed). When we tested for interactions by MSMW status we found that neither the relationship between visiting a health care

Table 3.   Associations with HIV Testing in the Past Six Months Among MSMW (N=105)

	HIV Testing Past 6 Months				
	HIV Test n (%)	**PR (95% CI)**	**P-Value**	**Adjusted PR (APR) (95% CI)**	**Adjusted P-Value**
Demographic Characteristics					
Race					
Black/African American	25 (28.7)	Ref	Ref	Ref	Ref
White	3 (37.5)	1.3 (0.7-2.4)	0.3968	1.5 (0.9-2.5)	0.0841
Other	4 (66.7)	2.3 (1.2-4.5)	0.0122	1.6 (0.9-2.6)	0.0900
Age					
Thirty or less	16 (37.2)	Ref	Ref		
Greater than thirty	16 (27.6)	0.7 (0.4-1.2)	0.2450		
Education					
High school or less	17 (26.6)	Ref	Ref		
College greater	15 (40.5)	1.5 (0.9-2.5)	0.1046		
HIV Risk Behaviors					
More than five male oral or anal partners					
No	23 (34.3)	Ref	Ref		
Yes	9 (26.5)	0.8 (0.3-1.9)	0.5608		
Unprotected sex, male partners					
No	24 (32.9)	Ref	Ref		
Yes	8 (28.6)	0.9 (0.4-1.8)	0.7002		
Unprotected sex, female partners					
No	22 (38.6)	Ref	Ref		
Yes	10 (22.7)	0.6 (0.3-1.1)	0.0718		
Ever injected drugs					
No	27 (30.3)	Ref	Ref		
Yes	5 (41.7)	1.4 (0.9-2.2)	0.1855		
Health services					
Health insurance					
No	16 (32.7)	Ref	Ref		
Yes	16 (31.4)	1.0 (0.6-1.7)	0.8876		
Visited health care provider					
No	3 (11.1)	Ref	Ref	Ref	Ref
Yes	29 (39.2)	3.5 (1.4-9.0)	0.0087	3.1 (1.3-7.6)	0.0143
Ever disclosed same sex behavior to health care provider					
No	13 (26.0)	Ref	Ref		
Yes	19 (37.3)	1.4 (0.8-2.7)	0.2634		
Attended one-on-one HIV counseling					
No	21 (25.0)	Ref	Ref	Ref	Ref
Yes	11 (64.7)	2.6 (1.4-4.8)	0.0022	2.2 (1.2-4.1)	0.0127
Heard of local HIV programs					
No	21 (31.3)	Ref	Ref		
Yes	11 (32.4)	1.0 (0.6-1.8)	0.9147		

provide and HIV testing (*p*=0.3467) nor the relationship between one-on-one counseling and HIV testing (*p*=0.0701) varied across MSMO/MSMW strata (results not displayed).

DISCUSSION

When we looked at differences between MSMO and MSMW in likelihood of testing, we found that MSMO and MSMW were equally likely to have been tested in the past three, six, and twelve months. Previous research has found that MSMW were less likely than MSMO to have been tested ever [6, 8, 25] or in the past five years [26]. Our finding that MSMO and MSMW are equally likely to have been tested is encouraging. The implementation of HIV screening in health care settings combined with testing in non-clinical settings such as mobile vans and shelters might

help to explain these findings. Because we do not have information on where respondents were tested, we were not able to assess if MSMW and MSMO are being testing in the same locations. This represents an area in need of further study.

Our finding that MSMW were less likely to disclose same-sex behavior to a health care provider (HCP) than MSMO supports earlier research [27, 28]. In bivariate analyses our data indicated a positive but non-significant relationship between disclosing same-sex behavior to a HCP and HIV testing among MSMW. Past research has found that disclosure of same-sex behavior was positively associated with HIV testing [6, 27, 28]. Theory suggests that decision-making about disclosure of same-sex behavior is driven by the characteristics of the health care provider, the health care environment, and the individual considering disclosure. Factors that inhibit disclosure of same-sex behavior include: fear of poor care, discrimination, rejection, hostility and judgment from the provider, perceptions that the provider may not be able "to handle" the subject matter or that the provider might be uncomfortable with same-sex behavior, and concerns about confidentiality [28-30].

In multivariate analyses, we found that attending a one-on-one HIV counseling session was associated with HIV testing. Previous research suggests that counseling is an effective intervention for health behavior change among MSM [31-34]. Our findings suggest that one-on-one counseling that is not part of HIV testing is positively associated with HIV testing, and therefore might be a useful strategy for increasing HIV testing in Baltimore. In Baltimore, the prevalence of undiagnosed seropositivity among HIV positive MSMW is estimated to be 87.9% [10]. We found that predictors of HIV testing did not differ for MSMO and MSMW populations. However, the unique needs of MSMW and the degree of marginalization that this population faces, warrant tailored HIV testing and prevention interventions.

Our study has multiple limitations. First, the behavioral study data was self-reported by participants and the validity of self-report data has been questioned. Participants may have underreported stigmatized behaviors and over reported normative behaviors [35]. A literature review conducted by National Institutes of Health in 1998 found that well-designed interviews and questionnaires can provide acceptable data when administered appropriately [36]. Steps recommended in this article were followed during the implementation of BESURE-MSM2, such as conducting formative research, using easy to understand language, and using time sequence techniques. An additional limitation of this study is that it is cross-sectional and does not assess causality. The sample size for the analyses presented in this paper is small, which might have limited our ability to detect significant differences. We would like to note that the confidence intervals for visiting a health care provider and attending a one-to-one HIV counseling session in our multivariate analysis are wide, which might suggest that our sample population was not large enough. Finally, individuals who opted to not participate in BESURE might be systematically different from those who did. For example, participants who agreed to participant in the study might be

of lower income that individuals who did not participate in the study, resulting in selection bias.

The findings from this study represent MSMW and MSMO over 18 who live in Baltimore, who attend the type venues included in this study (bars, parks, and street corners) and who are not known HIV seropositive. Generalizability beyond these characteristics and settings is unknown [20].

Despite the study limitations, our findings have important implications for future research and for HIV prevention programs. Further research is needed to better understand the factors, including social contextual factors that influence HIV testing, knowing one's HIV results and delayed HIV diagnosis among MSMW. One-on-one HIV counseling prevention programs might be an effective strategy to increase HIV testing among MSMW, a highly marginalized sub-population of MSM at increased risk for undiagnosed seropositivity.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

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