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## Knowledge, Attitudes, and Practices Regarding Syphilis Screening Among Men Who Have Sex With Men in San Francisco

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### Abstract

**Background:** Syphilis screening for men who have sex with men (MSM) in San Francisco (SF) is recommended every 3 to 6 months. We surveyed MSM in SF to determine the prevalence and factors associated with complying with that recommendation, identify screening barriers, and investigate whether identifying low perceived syphilis risk as a reason for not testing correlated with syphilis risk factors.

**Methods:** We conducted a cross-sectional survey as part of the National HIV Behavioral Surveillance System. We used logistic regression to analyze factors associated with complying with the SF-specific screening recommendation and with identifying low perceived risk as a reason for not testing. We analyzed data on screening barriers descriptively.

**Results:** Among 441 MSM, 37.5% (95% confidence interval [CI], 31.5%–43.6%) complied with the recommendation. Compliance was associated with human immunodeficiency virus infection (odds ratio [OR], 3.6; 95% CI, 1.7–7.8), more than 10 male sex partners (OR, 4.3; 95% CI, 1.6–12.0), having unprotected anal sex with a casual partner (OR, 4.2; 95% CI, 2.0–8.9), and knowing the recommendation (OR, 4.1; 95% CI, 2.1–8.2). Low perceived risk, time constraints, and not knowing that one should get screened were identified as reasons for not testing by 61.7%, 18.9%, and 18.8%, respectively. Identifying low perceived risk as a reason for not testing was associated with having more than 10 sex partners (OR, 0.2; 95% CI, 0.1–0.5).

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**Conclusions:** Attempts to improve compliance with the syphilis screening recommendation should include education regarding recommended screening frequency and syphilis risk factors and interventions to increase screening convenience.

Cases of primary and secondary syphilis in the United States increased from a post–World War II nadir of 5979 (2.1 cases/100,000 persons) in 2000 to 13,774 (4.5 cases/100,000 persons) in 2010.<sup>1</sup> During the same period, primary and secondary syphilis cases in San Francisco City and County (here-after called *San Francisco*) increased from 53 (7.1 cases/100,000 persons)<sup>2</sup> to 375 (46.0 cases/100,000 persons).<sup>1</sup> Both increases reflected a syphilis epidemic among men who have sex with men (MSM). Accounting for only approximately 7% of cases nationally in 2000, MSM accounted for approximately 67% of cases by 2010, with MSM living with human immunodeficiency virus (HIV) disproportionately affected by the epidemic.<sup>1,3–6</sup> Rising rates of syphilis among MSM are a public health concern because of morbidity caused by syphilis, including occasional irreversible neurologic damage,<sup>7</sup> and because syphilis can facilitate HIV transmission and acquisition.<sup>8,9</sup>

Screening is one strategy to prevent and control syphilis among MSM. Since 2002, the Centers for Disease Control and Prevention (CDC) has recommended serologic screening for syphilis (among other tests) for sexually active MSM at least annually and, more frequently, for MSM who have multiple or anonymous partners or who have sex (or whose partners have sex) in conjunction with illicit drug use (particularly methamphetamine use).<sup>10,11</sup> Since the early 2000s, the San Francisco Department of Public Health has recommended serologic screening for syphilis every 3 to 6 months for all sexually active MSM.

Behavioral change campaigns have attempted, with limited success, to promote syphilis screening among MSM in San Francisco and elsewhere.<sup>12–15</sup> However, MSM in San Francisco and in the United States, including HIV-infected MSM, often are not screened for syphilis regularly.<sup>16–18</sup>

To more effectively promote regular syphilis screening among MSM according to San Francisco–specific public health recommendations, we conducted a survey of knowledge, attitudes, and practices regarding syphilis screening among MSM in San Francisco. Study objectives were the following: (1) to determine the prevalence and factors associated with having had a syphilis test during the past 3 to 6 months recommended in San Francisco; (2) to identify barriers to complying with the San Francisco–specific syphilis screening recommendation; and (3) to investigate whether identifying perceived low risk for syphilis as a reason for not complying with the screening recommendation correlated with identified risk factors for syphilis among MSM including number of male sex partners, methamphetamine use during the previous 12 months, and lack of condom use.<sup>11</sup>

## METHODS

This cross-sectional survey was conducted in San Francisco as part of the National HIV Behavioral Surveillance System (NHBS), coordinated by CDC, which uses serial cross-sectional surveys to track HIV prevalence and risk behaviors among US populations at high risk for HIV infection. Methods of the NHBS have been described in detail elsewhere.

16,19–22 Briefly, in 2008, NHBS surveyed MSM in 21 metropolitan areas by using time-location sampling, a method to study difficult-to-reach populations that uses venue-based recruitment. Sampling began with formative research to identify places where and times when MSM congregate and then randomly selected a sample of those venue-day-times. At selected venue-day-times, research staff systematically approached men entering a pre-determined area, assessed eligibility (men, age ≥ 18 years, and a resident of 1 of 3 counties: San Francisco, Marin, or San Mateo) and invited eligible persons to participate in the survey, which was interviewer administered by using a handheld computer. For this analysis, we included only male residents of San Francisco who reported having oral or anal sex with a man during the prior 12 months.

Syphilis-related questions in the survey (Appendix; see Supplementary Material, at <http://links.lww.com/OLQ/A62>) asked participants about age, race/ethnicity, HIV infection status, health insurance status, methamphetamine use history, syphilis history, meeting sex partners by using the Internet, and disclosing same-sex sexual behavior to health care providers. We categorized condom use by the number of casual partners with whom unprotected anal sex was reporting during the past year (none, 1, or not sure). The survey also asked participants to identify the recommended screening interval for MSM in San Francisco, to assess their perceived risk for syphilis, and to report the date they were last tested for syphilis. Correctly knowing the recommended interval was defined as a response of every 3 months or every 3 to 6 months. Complying with the San Francisco screening recommendation was defined as a self-reported syphilis test during the prior 180 days. We asked men who did not comply with the recommendation to identify reasons for not having had a test from a prepared list of reasons or to articulate a reason not listed.

We conducted 2 logistic regression analyses. The first examined factors associated with complying with the San Francisco syphilis screening recommendation, and the second analyzed factors associated with identifying a perceived low risk for syphilis as a reason for not testing. For both analyses, we entered factors with  $P < 0.1$  in univariate analyses into a multivariate model, by using a backward-stepwise procedure in which factors with  $P < 0.05$  were sequentially removed in order of magnitude of  $P$  value, to construct a final model. We analyzed reasons for not being tested during the prior 180 days descriptively.

We excluded from all analyses participants for whom any data were missing. We weighted observations by the inverse probability of a man being approached at selected venue-day-times. For all analyses except that investigating associations between behaviors and perceived risk for syphilis, we used the SVY command in Stata (StataCorp LP, College Station, TX) to adjust standard errors for clustering by venue, which required excluding men surveyed at venue-day-times where no other man was surveyed. For the perceived risk analysis, we did not adjust for clustering because doing so precluded calculation of confidence intervals (CIs) because of a stratum with a single sampling unit. In addition, for the perceived risk analysis, we included only men who had not been tested during the prior 180 days and excluded men who did not know about their risk for syphilis or declined to answer the question. To focus the analysis on screening rather than testing, we excluded men who reported having syphilis during the prior 12 months, whose syphilis tests would have been part of clinical follow-up. We conducted statistical analyses by using Stata 11.0. The

CDC Human Research Protections Office determined that this study was research, but CDC was not engaged, thus requiring only local institutional review board approval. The study was reviewed and approved by the University of California, San Francisco's Committee on Human Research.

## RESULTS

Of 590 men interviewed, we excluded 67 (11%) who were not residents of San Francisco, 62 (11%) who were not MSM, 5 (1%) who were surveyed at venue-day-times where no other man was surveyed, and 15 (3%) who reported having syphilis during the prior 12 months, leaving 441 (75%) of 590 men in the analysis. For the perceived risk analysis, we excluded 4 (2%) of 246 men not complying with the syphilis screening recommendation because they did not know about their risk for syphilis or declined to answer the question.

Characteristics of included participants ( $n = 441$ ) are reported in Table 1. Overall, 37.5% (95% CI, 31.5%–43.6%) reported complying with the screening recommendation. Overall, 71.3% (95% CI, 65.6%–77.0%) knew the recommended syphilis screening interval. Of those who knew the recommended screening interval, 46.5% met the screening recommendation, compared with 17.8% of MSM who did not know the recommended screening interval ( $P < 0.0001$ ).

In univariate analyses, factors associated with complying with the San Francisco syphilis screening recommendation with  $P < 0.1$  that were entered into the multivariate analysis included HIV infection status, methamphetamine use, Internet use to meet sex partners, number of male sex partners, having ever disclosed attraction to or having sex with men to a health care provider, believing oneself to be at risk for contracting syphilis, and knowing the recommended syphilis screening interval (Table 1). In multivariate analyses, complying with the recommendation was associated with HIV infection (odds ratio [OR], 3.6; 95% CI, 1.7–7.6), number of male partners (OR, 8.9 for  $>10$ , compared with 1 partner; 95% CI, 3.5–22.4), knowing the recommended screening interval (OR, 4.5; 95% CI, 2.3–8.7), and having engaged in unprotected anal sex with 1 or more casual partners during the past year (OR, 2.9; 95% CI, 1.2–6.7) (Table 1).

Among 244 men not complying with the screening recommendation, the most commonly identified reason was perceiving oneself to be at low risk for syphilis (61.7% [weighted]) (Table 2). Other reasons identified by more than 10% of participants were not having time to test (18.9%) and not knowing whether one should get tested (18.8%).

Two hundred forty men who did not meet the screening recommendation answered the question about perceived risk for syphilis. Among those 240, identifying low perceived risk for syphilis as a reason for not testing during the prior 180 days was inversely associated, in multivariate analyses, only with the number of male oral or anal sex partners (OR, 0.2 for MSM with  $>10$ , compared with 1 partner during the past year; 95% CI, 0.1–0.5) and not methamphetamine use or numbers of male casual partners with whom the participant had unprotected anal sex (Table 3).

## DISCUSSION

Even after intensive campaigns to improve compliance with local syphilis screening recommendations, only 37.5% of MSM in San Francisco in 2008 met the syphilis screening recommendation, and 71.3% knew the recommended syphilis screening interval. Compared with MSM who did not know the recommended interval, MSM who knew the recommended interval had 4.1 times the odds of reporting a past screening consistent with complying with the San Francisco screening recommendation. That association indicates that knowledge of the recommended screening interval might lead to improved compliance with the screening recommendation.

Three other factors associated with complying with the recommended interval—HIV infection, greater numbers of sex partners, and having unprotected anal sex with casual partners— might reflect more contact with the health care system for HIV treatment or sexually transmitted disease–related testing or treatment. Efforts to promote the importance of syphilis screening among those populations should continue.

Barriers to complying with the screening recommendation included low perceived syphilis risk, lack of knowledge of the screening recommendation, and lack of time to test. Structural factors (e.g., testing site locations or hours, transportation, money, or insurance) were not commonly identified as barriers. Those findings provide evidence that efforts to promote compliance with the screening recommendation should focus on attitudes and knowledge. Free syphilis screening for MSM at convenient times and locations should continue.

Identifying perceived low risk for syphilis as a reason for not complying with the screening recommendation was associated with number of male partners, but not unprotected anal sex with casual male partners or methamphetamine use, during the prior 12 months. At least regarding number of male partners, therefore, MSM in San Francisco might already have an understanding of sexual risk behaviors (e.g., numbers of partners) that increase risk for syphilis; not so for methamphetamine use or for engaging in unprotected anal sex.

This study is subject to limitations. First, time-location sampling might have introduced selection bias into the study by not including all possible venue-day-times or by not sampling MSM who never congregate at venue-day-times. Second, self-reports of syphilis testing might be inaccurate, resulting in misclassification. Third, data analyzed in this study were cross sectional, and causality between characteristics of MSM, including knowledge of the recommended screening interval, and screening behaviors cannot be determined. Fourth, syphilis elimination efforts in San Francisco, including behavioral change campaigns aimed at MSM, have been relatively well funded and high profile; as a result, the knowledge, attitudes, and practices among MSM in San Francisco regarding syphilis screening might have limited generalizability to areas where MSM have received less syphilis education.

Syphilis screening among MSM and, particularly, HIV-infected MSM remains critical for syphilis prevention and control and might contribute to HIV prevention, as well.<sup>11,23</sup> Together, these findings indicate that attempts to improve compliance with syphilis screening recommendations should be multifaceted, addressing multiple barriers to complying with the syphilis screening recommendation. Efforts to educate MSM regarding

the recommended screening interval should continue. Targeting other behavioral barriers identified in this study, including risk knowledge for acquiring syphilis, might also improve compliance. Finally, introducing online access to syphilis screening,<sup>24,25</sup> enhancing community-based opportunities for screening,<sup>26</sup> or adding express visits options at sexually transmitted disease clinics during which asymptomatic clients forego a physical examination and are asked a minimal set of questions to quickly determine and meet their screening needs<sup>27</sup> might address concerns that complying with the screening recommendation takes too much time. Evaluation of future behavioral change campaigns and clinic- and community-based interventions on the basis of study results should more adequately identify effective ways to improve compliance with syphilis screening recommendations among MSM.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Characteristics of San Francisco–Resident MSM Surveyed in the NHBS in 2008 and ORs for Having Had a Syphilis Test During the Prior 180 Days (n = 441)

**TABLE 1.**

Characteristic	No *	Unweighted Percentage †	Weighted Percentage (95% CI) ‡	Weighted Percentage Tested During Prior 180 Days §	OR (95% CI) ¶	P	Adjusted OR (95% CI)	P
Overall	441	100	100	37.5				
Age (18–29, 30–39, 40–49, or >49 y)						0.61		
Racial/ethnic group (white, Hispanic, black, Asian/Pacific Islander/Native Hawaiian, or other/missing)¶¶						0.34		
Sexual orientation (gay, bisexual, or straight)						0.70		
HIV infection status						0.0001		0.0008
HIV uninfected	329	74.6	79.7 (75.0–84.3)	34.3	1		1	
HIV infected	80	18.1	14.9 (10.8–19.0)	64.0	3.4 (1.7–6.7)		3.6 (1.7–7.8)	
Not sure or no answer	32	7.3	5.4 (2.6–8.2)	12.6	0.3 (0.1–0.8)		0.5 (0.2–1.3)	
Ever diagnosed with syphilis (yes or no)						0.47		
Methamphetamine use during the past year (yes or no)						0.07		
Used Internet to meet sex partners during the past year (yes or no)						0.07		
No. male oral or anal sex partners during the past year						0.002		0.05
1	81	18.4	20.4 (15.8–25.0)	17.5	1		1	
2–4	138	31.3	32.5 (26.3–38.7)	34.1	2.4 (1.0–5.7)		2.2 (0.8–5.7)	
5–10	111	25.2	25.6 (20.0–31.2)	39.6	3.1 (1.3–7.4)		2.3 (0.9–6.0)	
>10	111	25.2	21.5 (16.4–26.6)	59.3	6.9 (2.9–16.3)		4.3 (1.6–12.0)	
No. male casual partners with whom participant had unprotected anal intercourse during the past year						<0.001		0.02
None	149	36.3	31.7 (26.1–37.2)	32.2	1		1	
1	84	20.4	18.6 (13.5–23.8)	66.5	4.2 (2.0–8.9)		2.9 (1.2–6.7)	
Not sure	178	43.3	49.7 (43.3–56.1)	26.2	0.7 (0.4–1.4)		0.8 (0.4–1.7)	
Has health insurance (yes or no)						0.80		
Ever told health care provider about attraction to or having sex with men						0.06		



Characteristic	No <sup>*</sup>	Unweighted Percentage <sup>†</sup>	Weighted Percentage (95% CI) <sup>‡</sup>	Weighted Percentage Tested During Prior 180 Days <sup>§</sup>	OR (95% CI) <sup>¶</sup>	P	Adjusted OR (95% CI)	P
No	57	12.9	13.2 (7.8–18.6)	21.7	1			
Yes	374	84.8	83.8 (78.1–89.4)	40.8	2.5 (1.0–6.0)			
Not sure	10	2.3	3.0 (0.9–5.0)	17.3	0.8 (0.1–4.8)			
Agreed or strongly agreed that he is at risk of getting syphilis						0.01		
No	201	46.4	50.2 (43.8–56.7)	30.6	1			
Yes	232	53.6	49.8 (43.3–56.2)	46.4	2.0 (1.2–3.4)			
Knew recommended frequency of syphilis screening						<0.0001		<0.001
No	131	30.1	28.7 (23.0–34.4)	17.8	1		1	
Yes	304	69.9	71.3 (65.6–77.0)	46.5	4.0 (2.2–12)		4.1 (2.1–8.2)	

\* Data missing for 10 participants or less for some characteristics, except for condom use during anal sex, for which data were missing for 30 participants.

† The denominator for calculations was the number of participants for whom data were not missing.

‡ Weighted by the inverse probability of being approached at a selected venue-day-time. The denominator for calculations for each characteristic was the number of participants for whom data were not missing.

§ Except where indicated, 95% CIs are not available because standard errors could not be calculated because of 1 or more strata with a single sampling unit.

¶ Odds ratios included only for variables statistically significantly associated with having had a syphilis test during the prior 180 days.

// All non-Hispanic except for Hispanic group.

**TABLE 2.**

Reasons\* for Not Having Had a Syphilis Test During the Prior 180 Days Identified by San Francisco–Resident MSM Surveyed in the NHBS in 2008 Who Reported Not Having Had a Test During That Time Frame (n = 244)

Reason	No. Identifying Reason as a Factor for Not Having Tested	Unweighted Percentage	Weighted Percentage
You think you are at low risk for syphilis	154	63.1	61.7
You did not have time	55	22.5	18.9
You did not know you should get tested	38	15.6	18.8
Hours at testing sites are inconvenient	14	5.7	5.9
You did not have the money or the insurance to pay for the test	10	4.1	4.6
Locations of testing sites are inconvenient	8	3.3	3.5
You do not like needles	11	4.5	3.4
You did not know where to go to get tested	12	4.9	3.3
You were worried your name would be reported to the government if you tested positive	7	2.9	2.3
You could not get transportation to a testing place	2	0.8	1.1
Some other reason <sup>†</sup>	25	10.2	8.0

\* Participants could choose more than 1 reason for not having had a syphilis test during the prior 180 days.

<sup>†</sup> Reasons stated included the following (n = 1 for all except where noted): too busy (n = 4), did not think about it (n = 4), lazy (n = 3), no sex (n = 2), scared to know, would see signs, no idea, none, waiting for right time, not dealing with it, absent minded, do not know why, could not get results, tested every 7 months, did not care enough, and no symptoms.

**TABLE 3.** ORs From Univariate Analyses of Identifying a Perceived Low Risk for Syphilis as a Reason for Not Complying With the Syphilis Screening Recommendation Among San Francisco–Resident MSM, According to Methamphetamine Use and Number of Male Oral or Anal Sex Partners During the Past Year (n = 240)\*

Characteristic	No. Identifying a Perceived Low Risk for Syphilis as a Reason for Not Complying With Syphilis Screening Recommendation	Unweighted Percentage	Weighted Percentage <sup>†</sup>	OR of Identifying a Perceived Low Risk for Syphilis as a Reason for Not Complying With Syphilis Screening Recommendation (95% CI)	P
Overall	154	62.6	61.7		
Methamphetamine use during the past year					0.54
No	135	64.9	63.4	1	
Yes	19	59.4	61.2	0.8 (0.4–1.7)	
No. male oral or anal sex partners during past year					0.002
1	46	79.3	82.5	1	
2–4	61	69.3	58.9	0.6 (0.3–1.3)	
5–10	30	53.6	57.5	0.3 (0.1–0.7)	
>10	17	44.7	42.7	0.2 (0.1–0.5)	
No. male casual partners with whom participant had unprotected anal intercourse during past year					0.002
None	49	57.0	59.0	1	
1	12	41.4	41.6	0.5 (0.2–1.3)	
Not sure	86	74.1	69.4	2.2 (1.2–3.9)	

\* Only the number of male oral or anal sex partners during the past year was statistically significant in the final multivariate model.

<sup>†</sup> Weighted by the inverse probability of being approached at a selected venue-day-time.