

# High Annual Syphilis Testing Rates Among Gay Men in Australia, but Insufficient Retesting

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**Introduction:** Since 2000, infectious syphilis notifications have increased substantially among Australian gay men. We describe testing at a frequency lower than guidelines recommend.

**Methods:** We examined data from a cross-sectional survey of gay men in 5 Australian cities in 2010. We used logistic regression to identify correlates of no lifetime syphilis test among HIV-uninfected men and <2 tests per year in HIV-infected men and higher-risk HIV-uninfected men.

**Results:** Of 6329 HIV-uninfected men, 65% reported a syphilis test in the past year, and 86% in their lifetime, and factors associated with no lifetime syphilis test were lower social engagement with gay men, older age, fewer sexual partners, no anal sex with casual partners, and not being aware syphilis could be asymptomatic. Among higher-risk HIV-uninfected men (>10 partners in the past 6 months), factors associated with <2 syphilis tests in the past year were nonmetropolitan residence, older age, no anal sex or unprotected anal intercourse with casual partners, not aware syphilis could be acquired through oral sex, and testing at a nonregular general practitioner. Of the 580 HIV-infected, 87% reported a syphilis test in the past year, and 96% in their lifetime, and factors associated with <2 syphilis tests in the past year were unprotected anal intercourse with HIV-uninfected casual partner and recruitment from social or sex-on-premises venues.

**Conclusions:** Our analysis showed high lifetime and annual syphilis testing rates in Australian gay men, but low retesting rates. We identified factors associated with less frequent syphilis testing rates among Australian gay men to assist in developing targeted screening strategies.

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Syphilis is a highly infectious sexually transmissible infection (STI) caused by *Treponema pallidum*. The infection is systemic, usually involving ulcerative mucocutaneous lesions and rash in early phases, and serious complications including cardiovascular and neurologic disease in later phases.<sup>1</sup> Syphilis in gay men is of particular public health importance because of its potential to increase the risk of HIV transmission. Syphilis can increase susceptibility to acquiring HIV infection through the presence of ulcerative genital lesions in the early stages of infection<sup>2</sup> and can increase transmissibility by boosting HIV viral load and hence infectiousness independent of the effect of ulceration.<sup>3</sup> A recent retrospective cohort study in Australia demonstrated significant associations between a recent or past syphilis infection and HIV seroconversion.<sup>4</sup>

Since 2000, notification rates of infectious syphilis have increased substantially among gay men in Europe, the United States, and Australia.<sup>5–7</sup> Gay men with HIV infection are disproportionately affected by syphilis. Although only 10% of gay men are estimated to have HIV infection in Australia, enhanced surveillance data show between 50% and 60% of infectious syphilis notifications are in HIV-infected gay men,<sup>8</sup> and similar proportions have been reported from a wide variety of metropolitan locations in Europe and North America.<sup>5</sup> Community-based cohort studies in Australia have shown that the incidence of syphilis in HIV-infected gay men is 5 to 10 times higher than in those without HIV.<sup>9</sup> These differences reflect higher levels of risk behavior among HIV-infected men.<sup>10</sup>

Early diagnosis of syphilis is essential both to link patients to effective treatment and to prevent the spread of infection. Many countries have focused on increasing syphilis testing as a programmatic response and developed guidelines that call for more frequent syphilis testing in gay men. For example, the San Francisco Department of Public Health recommends that sexually active gay men have a serologic test for syphilis every 3 to 6 months, and that persons diagnosed with syphilis have a serologic test for syphilis at 1, 3, 6, 9, and 12 months after diagnosis.<sup>11</sup> The Australian HIV/STI testing guidelines for gay men<sup>12</sup> recommend annual HIV/STI testing for all sexually active gay men, 3-monthly syphilis testing as part of quarterly HIV monitoring for HIV-infected men, and 3- to 6-monthly HIV/STI testing for men who are at “high risk” (episodes of unprotected anal sex, have had >10 partners in the past 6 months, attend sex-on-premises venues, use recreational drugs, or seek partners through the Internet).

The rationale for these Australian guidelines has been previously described,<sup>13</sup> with additional support arising from mathematical modeling showing syphilis testing will have the

greatest impact on reducing community transmission among gay men in Australia if 2 strategies are undertaken in combination: 90% of sexually active gay men with HIV infection are tested quarterly as part of HIV management checks, and 90% of gay men who have >20 partners per 6 months get tested at least twice per year.<sup>14</sup> The implementation of interventions based on these recommendations was forecasted to rapidly reduce the number of syphilis diagnoses over a 5-year period.<sup>14</sup>

To inform the monitoring and evaluation of Australia's National Gay Men's Syphilis Action Plan 2010–2013,<sup>14</sup> we describe current syphilis testing patterns among gay men in Australia, and how syphilis testing rates compare with guidelines.

## METHODS

We used data from the annual Australian Gay Community Periodic Survey in 2010 in 5 cities with the largest populations of gay men—Adelaide, Brisbane, Melbourne, Perth, and Sydney. The study protocol was approved by the Human Research Ethics Committee of the University of New South Wales, Australia.

### Participants

Participants were recruited from gay community venues, events, and clinics. In each state capital, the survey is conducted over a 1-week period to coincide with a major gay community festival, but is also conducted on a second occasion 6 months later each year in Sydney. To ensure comparability across the samples, the Sydney sample included only those men recruited during the first round of the survey in each year. Consistent recruitment procedures were used across the 5 cities.

### Questionnaire

The self-administered survey captures information about demographics, sexual self-identity, HIV/STI testing, HIV status based on results of the past HIV test (positive, negative, do not know/not tested), sexual relationships, group sex (involving at least 2 other men), and sexual practices with regular and casual partners. The sexual behavior questions relate to the past 6 months, and HIV/STI testing the past year.

In 2010, men were asked additional questions about syphilis, including (i) whether they had had none, 1, 2, 3, or more blood tests for syphilis in the past year; (ii) where did they go the last time they had a syphilis test (regular general practitioner [GP], another GP, sexual health clinic, HIV clinic, never tested); (iii) if they were aware that someone could have syphilis without any physical symptoms (aware, not aware); and (iv) if they were aware they could get syphilis through oral sex (aware, not aware).

### Data Analyses

The samples from all 5 cities were combined. Men were excluded from the analysis if they were recruited from clinics, as these men are likely to have been tested recently and could upward bias the testing rates. Men who did not know the results of their last HIV test or had never tested were excluded from the analysis, as guidelines relate specifically to HIV-infected and -uninfected men. Sexually active was defined as sex with 1 or more men in the past 6 months. Comparisons of syphilis testing patterns and knowledge according to city, HIV status, and sexual behavior were carried out.

Men were asked whether they had any kind of sex with any casual and regular male partner in the past 6 months (yes/no) and if they “never,” “occasionally,” or “often” engaged as

a receptive or insertive partner in anal intercourse with a condom, without a condom with ejaculation, and without a condom with withdrawal before ejaculating, in the past 6 months. From this, we constructed a variable of unprotected anal intercourse (UAI) with casual partners (no casual partner/no anal intercourse, no UAI with casual partner, any UAI with casual partner) and regular partners (no regular partner/no anal intercourse, no UAI with regular partner, any UAI with regular partner). These categories are based on being able to distinguish sexual behavior with casual and regular partners, which has been demonstrated to be associated with different HIV risks.<sup>15</sup>

Men were also asked about how many of their friends were gay or homosexual men (none, a few, some, or most) and how much of their free time is spent with gay or homosexual men (none, a little, some, a lot). From this, we constructed a variable of “social engagement with gay men” (lower, moderate, extensive) based on the sum of scores from the 2 variables.

Univariate and multivariate logistic regression analysis was undertaken to identify factors independently associated with testing at a frequency lower than specified in the guidelines; no lifetime syphilis test among HIV-uninfected men, <2 tests in the past year among high-risk HIV-uninfected men (>10 partners in the past 6 months), and <2 tests in the past year for HIV-infected men. We adopted a cutoff of <2 tests per year for HIV-infected men rather than <4 (which is more consistent with guideline recommendations), as a recent analysis demonstrated that at 6 clinical settings in Sydney and Melbourne, only 43% of HIV-infected men had 3 or more HIV management checks per year<sup>16</sup> because of a shift toward less frequently monitoring (6-monthly) in adherent and clinically stable patients.<sup>17</sup>

In the logistic regress analysis, marginally significant variables with  $P < 0.10$  in univariate analysis were included in multivariate analysis. Variables with  $P < 0.05$  were retained in the final multivariate logistic model in a forward stepwise manner. All analyses were performed using Stata 10.0 (College Station, TX).<sup>18</sup> A cutoff of  $P < 0.05$  was used for all statistical tests.

## RESULTS

Approximately 65% of men who were asked to complete a questionnaire participated.

### Characteristics of Men

In 2010, 6329 of participants were HIV-uninfected, 580 were HIV-infected, and the majority identified as gay. The majority of participants were recruited through gay community events, and the highest number of participants arose from Sydney, followed by Melbourne, Brisbane, Adelaide, and Perth. Participants had a median age of 35 years (interquartile range: 27–44 years), and most were of an Anglo-Australian background, resided in metropolitan areas, were in full-time employment, and had completed tertiary education. The characteristics of men participating in the surveys were similar across participating cities, with some variations according to recruitment venue and demographics (Table 1).

A higher proportion of HIV-infected men reported a blood test for syphilis in the past year (87%) and in their lifetime (96%), compared with HIV-uninfected men (65% and 86%, respectively). Close to half of higher-risk HIV-uninfected men (reported >10 partners in the past 6 months) and HIV-infected men reported <2 syphilis tests in the past year (Table 1, Fig. 1).

Overall, syphilis knowledge was high in participating men. A higher proportion of HIV-infected men answered 2

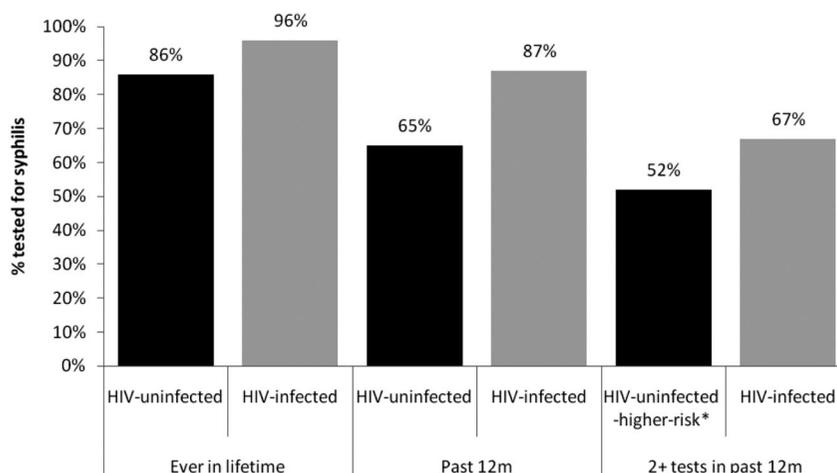
**TABLE 1.** Characteristics of Men Participating in the 2010 Gay Periodic Survey, by Australian City

Category	Major Australian Cities					
	Adelaide n = 799	Brisbane n = 1274	Melbourne n = 1889	Perth n = 651	Sydney n = 2296	All N = 6909
Median age (IQR)	33 (25–44)	32 (25–43)	35 (27–43)	29 (23–41)	37 (30–45)	35 (27–44)
HIV status						
HIV-infected men	7.4	8.5	8.2	4.8	9.9	8.4
HIV-uninfected men	92.6	91.5	91.8	95.2	90.1	91.6
Recruitment venue type						
Social venue	51.8	46.4	15.1	15.7	24.3	28.2
Sex on premises venue	14.4	12.6	12.9	8.3	11.8	12.2
Fair day gay community event	33.8	41.0	72.0	76.0	63.9	59.6
Demographics						
Extensive social engagement with gay men*	26.1	25.7	31.3	25.4	38.5	31.4
Anglo–Australian background	78.1	77.4	66.3	70.4	66.9	70.4
Resides in a metropolitan area	88.1	76.9	84.4	90.3	86.1	85.5
Full-time employment	59.3	66.2	69.4	66.1	71.3	68.1
Tertiary education <sup>†</sup>	70.1	66.3	74.1	65.4	76.6	72.2
Number of male sex partners in past 6 mo						
None	15.9	11.3	8.4	12.5	9.4	10.5
1	30.7	21.8	24.0	26.6	25.2	25.0
2–10	37.8	44.5	42.2	39.7	38.3	40.7
11–20	7.3	10.2	11.5	11.0	11.1	10.6
>20	8.3	12.2	14.0	10.2	16.0	13.2
Other sexual behaviour						
UAI with casual partner in past 6 mo	33.6	37.6	33.9	39.7	33.7	35.0
UAI with regular partners in past 6 mo	59.7	57.1	61.0	57.2	61.3	59.8
Any group sex (in past 6 mo)	24.8	32.8	35.5	33.1	36.6	33.7
Syphilis testing frequency in HIV-infected men						
No test in the past year	17.9	15.7	11.5	3.6	13.5	13.3
1 test in past year	41.1	34.3	31.1	35.7	23.7	30.1
2 tests in past year	17.9	27.5	23.7	25.0	22.7	23.5
3 or more tests in past year	23.2	22.5	33.8	35.7	40.1	33.1
Syphilis testing frequency in HIV-uninfected men						
No test in the past year	35.4	32.0	33.4	33.6	36.9	34.5
1 test in past year	38.5	34.4	35.4	35.2	33.3	34.9
2 tests in past year	15.3	19.0	18.1	17.4	18.1	17.9
3 or more tests in past year	10.8	14.7	13.2	13.8	11.6	12.7
Syphilis testing frequency in HIV-uninfected men with >10 partners in past 6 mo						
No test in the past year	16.1	17.0	19.6	15.2	20.4	18.8
1 test in past year	33.3	37.4	32.0	25.0	34.6	33.4
2 tests in past year	29.9	19.6	25.0	31.3	24.9	24.9
3 or more tests in past year	20.7	26.1	23.5	28.6	20.2	23.0
Location of last syphilis test—HIV-uninfected men						
My regular GP	37.4	50.6	46.3	46.2	46.4	46.0
Another GP	3.5	5.2	4.1	6.4	4.1	4.4
Sexual health clinic	41.6	29.0	32.0	30.0	32.2	32.4
HIV clinic	5.3	1.5	2.7	2.8	2.6	2.7
Never tested	12.3	13.8	14.9	14.6	14.7	14.4
Location of last syphilis test—HIV-infected men						
My regular GP	56.9	39.1	60.3	36.7	57.8	53.9
Another GP	—	1.9	2.0	—	2.2	1.8
Sexual health clinic	22.4	32.4	17.4	33.3	17.3	21.5
HIV clinic	15.5	20.0	16.4	23.3	19.6	18.5
Never tested	5.2	6.7	3.9	6.7	3.1	4.4
Syphilis knowledge—HIV-uninfected men						
Aware that someone could have syphilis without any physical symptoms	81.2	81.2	82.2	81.3	82.1	81.8
Aware they could get syphilis through oral sex	77.0	76.8	77.9	75.5	76.1	76.8
Syphilis knowledge—HIV-infected men						
Aware that someone could have syphilis without any physical symptoms	86.2	87.9	85.1	83.3	88.4	86.9
Aware they could get syphilis through oral sex	84.5	86.9	86.3	86.2	86.2	86.2

SOPV indicates sex on premises venue; UAI, unprotected anal intercourse; GP, general practitioner; IQR, Inter-quartile range.

\*Sum of scores for “friends” and “free time.” Score <6 = some, 6–7 = moderate, 8+ = extensive.

<sup>†</sup>University, TAFE (Training and Further Education) or CAE (Centre for Adult Education).



\*higher risk=>10 male partner in the past six months, m=months

**Figure 1.** Syphilis testing frequency, Gay Community Periodic Surveys, 2010.

knowledge questions correctly, compared with HIV-uninfected men (Table 1).

### HIV-Uninfected Men—Correlates of No Lifetime Syphilis Test

In the multivariate analysis, independent correlates of never being tested for syphilis in the participant's lifetime were as follows: lower social engagement with gay men, older age, lower number of sexual partners, no anal sex with casual partners, and not being aware syphilis could be asymptomatic (Table 2).

### Higher-Risk HIV-Uninfected Men (>10 Partners in the Past 6 Months)—Correlates of <2 Syphilis Tests in the Past Year

In the multivariate analysis, independent correlates of <2 syphilis tests in the past year among higher-risk HIV-uninfected men (>10 partners in the past 6 months) were as follows: residing in nonmetropolitan areas, older age, no anal sex with casual partners, no UAI with casual partners, not aware syphilis could be acquired through oral sex, and attending a nonregular GP for their last test (Table 3).

### HIV-Infected Men—Correlates of <2 Syphilis Tests in the Past Year

In the univariate analysis, significant correlates of <2 syphilis tests in the past year in HIV-infected men were as follows: UAI with an HIV-uninfected casual partner (odds ratio [OR] = 1.92, 95% CI: 1.02–3.60) compared with UAI with an HIV-infected casual partner, and recruitment from social venues (OR = 1.80, 95% CI: 1.19–2.73) and sex-on-premises venues (OR = 1.62, 95% CI: 1.00–2.62) compared with the Fair Day gay community event. No multivariate analysis was undertaken.

## DISCUSSION

Our analysis has shown that although lifetime and annual syphilis testing rates are high in gay men in Australia, retesting rates are not optimal compared with recommendations in guidelines. Only about half of the HIV-infected men and half of high-risk HIV-uninfected men reported 2 or more syphilis

tests in the past year. Also 14% of HIV-uninfected men reported never being tested for syphilis in their lifetime.

Of the HIV-infected and -uninfected men in the surveys, 87% and 65% reported a blood test for syphilis in the past year, respectively. These rates are substantially higher than many other countries in the world. For example, in Germany in 2006, 16% of HIV-uninfected men (including men not tested for HIV) reported a syphilis test in the past 12 months and 23% in their lifetime, and 54% of HIV-infected men reported a syphilis test in the past 12 months and 67% in their lifetime.<sup>19</sup> Data from the 2003–2005 men who have sex with men (MSM) cycle of the USA National HIV Behavioral Surveillance System showed the proportion of sexually active HIV-negative MSM reporting syphilis testing during the previous year was 39%.<sup>20</sup>

Our analysis demonstrated that although a large proportion of men reported having a test for syphilis in the past year, only about half of the high-risk HIV-uninfected men (>10 partners in the past 6 months) reported having 2 or more syphilis tests in the past year, despite guidelines recommending HIV/STI testing every 3 to 6 months for these men.<sup>12</sup> Holt et al. explored perceptions about STIs and testing in qualitative interviews with 60 gay men in Sydney recently and found that men perceived STIs to be less important than HIV; STIs could generate feelings of shame, embarrassment, and annoyance for some men; and STIs were generally regarded as inconvenient consequences of sexual activity.<sup>21</sup> Also reported barriers to more frequent HIV/STI testing among gay men at higher risk have included not perceiving themselves to be at risk, and the time required to test and return for results.<sup>22</sup> In Australia, most clinics adopt protocols for HIV/STI testing where men are recommended to return to the clinic to receive their results in person, and cannot obtain their results by phone or email. The reported barriers and low retesting rates provide a strong argument to change these protocols and disclose STI results by phone or e-mail in the future.

Social marketing campaigns have been demonstrated to increase syphilis testing rates.<sup>23,24</sup> The evaluation of the "Healthy Penis" campaign in San Francisco found higher rates of syphilis testing and knowledge among those aware of the campaign compared with those unaware.<sup>23</sup> The evaluation of the "dogs are talking" campaign in San Francisco found higher syphilis testing rates among HIV-infected men aware of the

**TABLE 2.** Correlates of No Lifetime Syphilis Test in HIV-Uninfected Men, 2010 Gay Periodic Survey, 5 Australian Cities

Category	No Lifetime Syphilis Test (%)	Univariate		Multivariate	
		Odds Ratio (95% CI)	<i>P</i>	Adjusted Odds Ratio (95% CI)	<i>P</i>
Overall	872/6309 (13.8)				
Social engagement with gay men*					
Low	251/1380 (18.2)	1.71 (1.41–2.08)	<0.001	1.52 (1.24–0.1.86)	<0.001
Moderate	394/2972 (13.3)	1.18 (0.99–1.40)	0.065	1.08 (0.91–1.30)	0.395
Extensive	225/1957 (11.5)	1		1	
Area of residence					
Regional/rural	129/965 (13.4)	1		—	—
Metropolitan	743/5364 (13.9)	1.04 (0.85–1.27)	0.688	—	—
Age group (yr)					
<25	122/1181 (10.3)	1		1	
25–29	129/1177 (11.0)	1.07 (0.82–1.39)	0.620	1.04 (0.80–1.37)	0.737
30–39	266/1762 (15.1)	1.54 (1.23–1.94)	<0.001	1.62 (1.28–2.06)	<0.001
40–49	210/1388 (17.8)	1.55 (1.22–1.96)	<0.001	1.76 (1.37–2.26)	<0.001
50+	143/802 (17.8)	1.88 (1.45–2.44)	<0.001	2.09 (1.59–2.75)	<0.001
No. male sex partners in past 6 mo					
None	170/660 (25.8)	4.75 (3.43–6.57)	<0.001	3.16 (2.18–4.57)	<0.001
1	316/1636 (19.3)	3.28 (2.43–4.42)	<0.001	2.52 (1.79–3.54)	<0.001
2–10	293/2580 (11.4)	1.75 (1.30–2.37)	<0.001	1.63 (1.19–2.21)	0.002
11–20	38/645 (6.0)	0.86 (0.56–1.31)	0.479	0.84 (0.54–1.29)	0.426
21+	50/764 (6.5)	1		1	
UAI with casual partners in past 6 mo					
No casual partners/no anal intercourse	585/3111 (18.8)	2.66 (2.14–3.32)	<0.001	1.58 (1.21–2.06)	0.001
100% protected sex	183/1918 (9.5)	1.21 (0.94–1.56)	0.133	1.17 (0.90–1.51)	0.245
Any UAI with casual partners	104/1300 (8.0)	1		1	
Any group sex in past 6 mo					
No	688/4248 (16.2)	1.99 (1.68–2.37)	<0.001	—	—
Yes	184/2081 (8.8)	1		—	—
UAI with casual partners by HIV status of casual partners <sup>†</sup>					
Negative	42/703 (6.0)	0.56 (0.37–0.85)	0.007	—	—
Positive	3/119 (2.5)	1		—	—
Unknown	41/585 (7.0)	0.87 (0.57–1.32)	0.521	—	—
UAI with regular partners in past 6 mo					
No regular partners/no anal intercourse	393/2560 (15.4)	1.23 (1.06–1.44)	0.009	—	—
100% protected sex	143/1146 (12.5)	0.97 (0.79–1.20)	<0.001	—	—
Any UAI with regular partners	336/2623 (12.8)	1		—	—
UAI with regular partners by HIV status of regular partner <sup>‡</sup>					
Negative	211/1696 (78.7)	1.05 (0.79–1.39)	0.733	—	—
Positive	6/65 (2.2)	1		—	—
Unknown	51/306 (19.0)	1.48 (1.00–2.18)	0.047	—	—
Syphilis knowledge					
Not aware that someone could have syphilis without any physical symptoms	297/1120 (26.5)	2.91 (2.48–3.41)	<0.001	3.00 (2.54–3.54)	<0.001
Not aware that they could get syphilis through oral sex	339/1425 (23.8)	2.56 (2.20–2.98)	<0.001	—	—
Recruitment venue type					
Social venue	230/1809 (12.7)	1		—	—
Sex on premises venue	73/749 (9.8)	0.73 (0.56–0.97)	0.029	—	—
Fair day gay community event	566/3763 (15.1)	1.20 (1.02–1.42)	0.027	—	—

SOPV indicates sex on premises venue; UAI, unprotected anal intercourse.

\*Sum of scores for “friends” and “free time.” Score <6 = some, 6–7 = moderate, 8+ = extensive.

<sup>†</sup>Restricted those reporting any UAI with casual partners.

<sup>‡</sup>Restricted those reporting any UAI with regular partners.

campaign compared with those unaware, but no difference in HIV-uninfected men.<sup>24</sup> However, it is likely that any increase in syphilis testing achieved by social marketing alone is likely to be short-lived and needs to be coupled with other strategies.

As shown in our analysis, most men are getting tested for syphilis at their regular GP or a sexual health service, so initiatives in these clinical settings should be considered, such as recall systems, opportunistic testing at routine visits, and

**TABLE 3.** Correlates of Reporting <2 Tests in Past Year in High-Risk HIV-Uninfected Men (>10 Partners in Past 6 mo), 2010 Gay Periodic Survey, 5 Australian Cities

Category	<2 Syphilis Tests in Past Year	Univariate		Multivariate	
		Odds Ratio (95% CI)	<i>P</i>	Adjusted Odds Ratio (95% CI)	<i>P</i>
Overall	650/1409	—	—	—	—
Social engagement with gay men*					
Low	110/236 (46.6)	1	—	—	—
Moderate	292/629 (46.4)	1.00 (0.74–1.35)	0.996	—	—
Extensive	247/541 (45.7)	0.97 (0.71–1.31)	0.839	—	—
Area of residence					
Regional/rural	119/222 (53.6)	1.43 (1.07–1.90)	0.015	1.45 (1.07–1.96)	0.015
Metropolitan	531/1187 (44.7)	1	—	1	—
Age group (yr)					
<25	70/206 (34.0)	1	—	1	—
25–29	86/224 (38.4)	1.21 (0.82–1.80)	0.342	1.13 (0.75–1.71)	0.544
30–39	199/411 (48.4)	1.82 (1.29–2.58)	0.001	1.74 (1.22–2.50)	0.003
40–49	190/368 (51.6)	2.07 (1.46–2.95)	<0.001	1.88 (1.30–2.71)	0.001
50+	104/194 (53.6)	2.25 (1.50–3.36)	<0.001	1.97 (1.29–2.99)	0.002
UAI with casual partners in past 6 mo					
No casual partners/no anal intercourse	96/180 (53.3)	1.74 (1.24–2.44)	0.001	1.72 (1.21–2.47)	0.003
100% protected sex	331/666 (49.7)	1.51 (1.20–1.89)	<0.001	1.42 (1.11–1.84)	0.006
Any UAI with casual partners	223/563 (39.6)	1	—	1	—
Any group sex (in past 6 mo)					
No	191/364 (52.5)	1.41 (1.11–1.79)	0.005	—	—
Yes	459/1045 (43.9)	1	—	—	—
UAI with casual partners by HIV status of casual partners <sup>†</sup>					
Negative	111/329 (33.7)	0.53 (0.37–0.75)	<0.001	—	—
Positive	20/80 (25.0)	1	—	—	—
Unknown	127/312 (40.7)	1.27 (0.89–1.80)	0.191	—	—
UAI with regular partners in past 6 mo					
No regular partners/no anal intercourse	313/571 (54.8)	2.18 (1.70–2.79)	<0.001	1.94 (1.50–2.50)	<0.001
100% protected sex	159/340 (46.8)	1.58 (1.19–2.09)	0.001	1.32 (1.11–1.84)	0.081
Any UAI with regular partners	178/498 (35.7)	1	—	1	—
UAI with regular partners by HIV status of partner <sup>‡</sup>					
Negative	87/244 (71.9)	0.93 (0.63–1.39)	0.740	—	—
Positive	10/29 (8.4)	1	—	—	—
Unknown	24/74 (19.8)	0.81 (0.46–1.44)	0.470	—	—
Syphilis knowledge					
Not aware that someone could have syphilis without any physical symptoms	111/212 (52.4)	1.34 (1.00–1.80)	0.049	—	—
Not aware that they could get syphilis through oral sex	166/309 (53.7)	1.48 (1.15–1.90)	0.003	1.57 (1.21–2.05)	0.001
Recruitment venue type					
Social venue	179/388 (46.1)	1.10 (0.86–1.42)	0.444	—	—
Sex on premises venue	172/337 (51.0)	1.34 (1.03–1.74)	0.027	—	—
Fair day gay community event	299/683 (43.8)	1	—	—	—
Venue type last tested					
My regular GP	275/657 (41.9)	1	—	1	—
Another GP	41/61 (67.2)	2.47 (1.42–4.29)	0.001	2.62 (1.48–4.65)	0.001
Sexual health clinic	240/540 (45.8)	1.02 (0.82–1.27)	0.879	1.02 (0.81–1.28)	0.892
HIV clinic	11/35 (31.4)	0.55 (0.27–1.14)	0.109	0.52 (0.25–1.10)	0.086

SOPV indicates sex on premises venue; UAI, unprotected anal intercourse; GP, general practitioner.

\*Sum of scores for “friends” and “free time.” Score <6 = some, 6–7 = moderate, 8+ = extensive.

<sup>†</sup>Restricted those reporting any UAI with casual partners.

<sup>‡</sup>Restricted those reporting any UAI with regular partners.

raising awareness. Bissessor et al. at Melbourne Sexual Health Centre conducted an intervention to increase opportunistic syphilis testing in HIV-infected men as part of regular HIV checks and detected a substantial number of asymptomatic

infections that would have otherwise remained undiagnosed.<sup>25</sup> The simple intervention involved stamping syphilis serology automatically on all pathology request forms in the HIV monitoring clinic and resulted in increased frequency of syphilis

screening from a median of 1 test per person per year before the intervention to 2 tests per person per year.<sup>25</sup> Also in an HIV outpatient clinic in the United Kingdom, syphilis screening was integrated into routine HIV management checks and detected increasing numbers of HIV outpatients with early asymptomatic syphilis.<sup>26</sup> One issue that may be a barrier to achieving 3 or more syphilis screens per year in conjunction with HIV monitoring is guidelines now support extending the interval for CD4 count and HIV RNA monitoring to every 6 months for clinically stable patients.<sup>17</sup> A recent analysis demonstrated only 43% of HIV-infected men attending 6 clinical sites in Australia had 3 or more HIV viral loads in a year.<sup>16</sup>

Another innovative clinical procedural development in the area of improving syphilis retesting has been the use of text message reminders at the Sydney Sexual Health Centre, where HIV/STI retesting rates within 9 months increased to 64% in men receiving a text message reminder to attend the clinic, compared with 30% in those men who did not receive the text message reminder ( $P < 0.001$ ).<sup>27</sup> Text message reminders are cheap, convenient, and efficient, which make them appealing to busy clinical settings.<sup>27</sup> Also, in Chicago, patient reminder phone calls for follow-up and expanded efforts by disease intervention specialists to encourage patients to screen regularly in the first year after diagnosis, resulted in improved syphilis retesting from 53% in 2002–2006 to 76% in 2007–2008.<sup>28</sup>

There are several limitations associated with this study. Although the data used in this study come from surveys that recruited a large number of gay men in Australia, the sample may not be representative of all Australian MSM. A representative sample of Australian MSM is likely to be 70% gay, 26% bisexual, and 4% other.<sup>29</sup> The Gay Community Periodic Surveys typically attract a sample that is 90% gay, 9% bisexual, and 1% other, which is a close fit to MSM most at risk of HIV.<sup>30</sup> Second, the behavioral surveys were based on self-report and may therefore be biased in ways that cannot be ascertained. Third, some men may not realize they are being tested for syphilis, particularly if integrated into routine HIV management checks, or HIV-uninfected men may be tested for HIV but are unaware they are also tested for syphilis, and thus the frequency of testing could be an underestimation. Alternatively, some men may assume they are tested for syphilis when they are not, thus overestimating testing rates. Fourth, the 2 knowledge questions were single correct statements (someone could have syphilis without any physical symptoms, and men could get syphilis through oral sex), and thus may have overestimated the true knowledge of the participant. Finally, the sexual behavior was related to a 6-month period, whereas the syphilis testing history was for a 12-month period.

In conclusion, this analysis has provided important information about syphilis testing in the Australian gay community. We found that although annual syphilis testing rates are high, a significant proportion of gay men do not seek syphilis testing at regular intervals, and 14% of HIV-uninfected men had never had a syphilis test in their lifetime. The findings from our analysis can be used to target syphilis testing strategies appropriately in the National Gay Men's Syphilis Action Plan 2010–2013.<sup>14</sup>

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