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Sustained, low prevalence of undiagnosed HIV among gay and bisexual men in Sydney, Australia coincident with increased testing and pre-exposure prophylaxis use: results from repeated, bio-behavioural studies 2014-2018.

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Abstract

Background: Gay and bisexual men (GBM) with undiagnosed HIV contribute disproportionately to HIV transmission in Australia.

Methods: In 2014 and 2018 we recruited men at gay venues and events in Sydney. Participants self-completed surveys and provided oral fluid samples for HIV testing. We calculated the prevalence of HIV and undiagnosed infection, and assessed changes in behaviour, HIV testing, and the use of pre-exposure prophylaxis (PrEP). We weighted the samples to adjust for differences in where participants were recruited between rounds. Two-sample tests of proportion were used to compare prevalence estimates and chi-square tests to assess differences between the samples.

Results: In 2014, 944 men were recruited and 890 men were recruited in 2018. In 2014, the weighted estimate of HIV prevalence was 6.1% (95%CI 4.6-7.6), of which 13.8% (95%CI 5.0-22.7) was undiagnosed. In 2018, weighted HIV prevalence was 6.4% (95%CI 4.8-8.0), of which 5.3% (95%CI 0.5-11.1) was undiagnosed. Between 2014 and 2018 among all participants, men reporting at least 10 recent casual partners increased from 22.3% to 27.7% ($p=0.008$), condomless anal intercourse with casual partners in the previous six months increased from 23.9% to 37.3% ($p<.001$) and STI diagnoses in the previous year increased from 14.4% to 27.5% ($p<.001$). HIV testing and the use of PrEP in the previous six months increased from 49.6% to 56.3% ($p=0.004$) and 2.0% to 21.0% ($p<.001$), respectively.

Conclusion: Repeated, bio-behavioural surveillance suggests the prevalence of undiagnosed HIV remains low in Sydney, despite GBM reporting more casual sex partners, condomless sex and STIs.

Keywords: GBM, men who have sex with men, undiagnosed HIV infection, HIV prevalence.

INTRODUCTION

Achieving and maintaining high levels of HIV testing among people most at risk of HIV infection is a key goal for HIV prevention programs. Regular HIV testing aims to reduce the time between infection and diagnosis and the number of people with undiagnosed HIV, through earlier diagnosis following infection¹. In Australia and other countries with concentrated HIV epidemics, gay and bisexual men (GBM) with undiagnosed HIV contribute disproportionately to HIV transmission²⁻⁴. Confirming people's knowledge of their HIV status is a fundamental first step for accessing biomedical HIV prevention strategies such as pre-exposure prophylaxis (PrEP) for HIV-negative people and treatment as prevention for people living with HIV⁵⁻⁷. Timely diagnosis following HIV infection also allows people to benefit from early initiation of HIV treatment, reducing mortality and morbidity⁸.

Methods for estimating the proportion of undiagnosed HIV include biological prevalence surveys in key populations⁹, and back-projection methods using CD4 count at diagnosis among people diagnosed with HIV combined with estimates of the size of sub-populations of people living with HIV (PLHIV)¹⁰. Bio-behavioural surveillance combines behavioural data and biological samples for HIV testing to calculate prevalence estimates for diagnosed and undiagnosed HIV infection, and assess the characteristics of people with undiagnosed infection¹¹. Repeated bio-behavioural surveillance studies can help to measure the impact of

HIV prevention programs over time¹¹. However, due to the resources required for such studies, very few jurisdictions have conducted bio-behavioural studies over multiple rounds or reported change over time.

Repeated bio-behavioural studies in high-income settings that have collected biological specimens from GBM have reported a wide range in the prevalence of undiagnosed HIV, but also declines over time in undiagnosed infection. In Melbourne, Australia, the proportion of undiagnosed HIV among HIV-positive GBM fell from 31.1% in 2008 to 7.1% in 2014^{12,13}. In San Francisco, United States, the proportion undiagnosed fell from 21.7% in 2004, to 18.0% in 2008, and 7.5% in 2011¹⁴. In Edinburgh and Glasgow, Scotland, undiagnosed HIV fell from 41.7% in 2005, to 26.3% in 2008, and then 25.4% in 2011¹⁵. Across ten serial cross-sectional studies conducted between 2000 and 2013 in London, England, the proportion undiagnosed fell from 34% to 24%¹⁶. To our knowledge, there have been no repeated estimates of undiagnosed HIV in a period where HIV biomedical prevention strategies like PrEP have been introduced and scaled up.

In New South Wales (NSW), Australia, state-wide HIV strategies since 2012 have focussed on reducing undiagnosed HIV infections through increasing the frequency of HIV testing in priority populations. There have also been initiatives to increase the proportion of people diagnosed with HIV on treatment, and to offer PrEP to people at high risk of HIV^{17,18}. In 2014 we implemented a cross-sectional bio-behavioural surveillance study among GBM in Sydney, NSW, as part of a national study¹². In 2018 we repeated this study to assess changes in the prevalence of undiagnosed HIV among GBM in NSW and characteristics of men with undiagnosed HIV, as part of the evaluation of the NSW HIV Strategies.

METHODS

Participants and procedures

In February 2014 and February 2018 participants were recruited through the Sydney Gay Community Periodic Survey (SGCPS), an annual behavioural surveillance study^{19,20}. Trained staff recruited participants at bars and sex-on-premises venues, and at the Sydney Gay and Lesbian Mardi Gras Fair Day (hereafter Fair Day), a large community event. Eligible participants were men aged 18 and over who reported regular participation in the Sydney gay community, sex with male partners in the past five years and/or identified as gay or bisexual. Consenting participants self-completed a questionnaire. The Gay Community Periodic Surveys methods and the methods of the 2014 study have been described elsewhere^{12,19,20}.

Men who completed a SGCPS questionnaire were eligible to participate in an additional study (Community-Based Study of Undiagnosed HIV and Testing, or COUNT) to measure HIV prevalence. COUNT recruitment took place at most SGCPS recruitment locations, but clinics, gyms and online recruitment were excluded. Participants were asked to provide additional consent and a biological sample for HIV testing. Participants could elect to participate anonymously, in which case their test result would not be provided, or confidentially, in which case they agreed to be contacted and receive their result. Oral fluid samples were collected using the OraSure® Oral Specimen Collection Device. In order to match behavioural data with biological specimens, recruiters labelled questionnaires and specimens with unique identifiers and participants' dates of birth. To enable delivery of test results to confidential participants, their consent forms including contact details were also labelled.

Oral fluid samples were sent to the National Serology Reference Laboratory. Samples were tested using an anti-HIV-1 IgG antibody capture enzyme-linked immunosorbent assay²¹.

Samples that were reactive or indeterminate were repeat tested and reactive results confirmed by Western blot. Consent forms, test results, and questionnaires were sent to the Centre for Social Research in Health at UNSW Sydney for data processing and storage.

Study staff trained in HIV test discussions provided results to participants. Where the laboratory test result was concordant with the participant's reported HIV status, a notification was sent by mobile phone text message or email. Participants who reported that they were HIV-negative or untested/unknown and received a non-reactive result were notified that their result was 'negative' and provided a link to a secure website, which contained further information about the study, the test result, details of the test window period, and contacts for clinical and support services. Participants who reported that they had previously been diagnosed with HIV and whose test results were reactive were sent a message saying that their results were 'positive' and a link to the secure website. For these men, the website contained information about the study, the test result and contacts for clinical and support services. For these two groups of men, the notification SMS or email did not mention HIV to protect confidentiality. Participants whose test results were invalid, or whose results were reactive, suggesting undiagnosed HIV, were sent a text message asking them to call the study telephone line. If they did not call within 48 hours, they were called repeatedly until contacted. Trained staff handled all calls, provided support and facilitated appointments for confirmatory serology at local clinics.

The COUNT study was approved by the ethics committees of UNSW Sydney and the community-based organisation ACON.

Measures

To describe the sample, we assessed sociodemographic characteristics, sexual practices with men in the previous six months, recent HIV and sexual health testing history and drug use. Details of these measures have been published elsewhere²⁰. Participants were classified as living in 'gay Sydney' if they reported living in one of seven postcodes in inner Sydney that have been identified as having a high proportion of gay male residents²². The primary outcome variable was the participant's HIV status, constructed from self-reported HIV status and laboratory test results (HIV-negative, previously diagnosed HIV-positive, or previously undiagnosed HIV-positive). Test results were matched with participants' self-reported HIV status from questionnaires, and any discrepancies resolved by referring to other questionnaire items (year of HIV diagnosis, HIV treatment status, attending HIV care, viral load and CD4 count), or by contacting participants (if they had consented to contact).

Data analysis

Chi-squared tests were used to compare the characteristics of the samples recruited in each round. We calculated the prevalence of HIV and undiagnosed infection and 95% confidence intervals (CIs). To adjust for potential differences in HIV prevalence by recruitment source over time, we calculated adjusted prevalence estimates by weighting prevalence results by recruitment venue. The weighting method used was to multiply the observed frequencies recruited from each recruitment location type (community event, social venue, sex venue) by the inverse of the proportion recruited at each location type. The prevalence estimates (proportions) were then recalculated for the adjusted (weighted) sample and applied to the observed sample size, so that the estimated number of cases and 95% confidence intervals could be calculated. Two sample tests of proportion were used to compare the prevalence

estimates in 2014 and 2018. Due to the small number of undiagnosed cases, we describe the characteristics of the undiagnosed cases in 2018 and did not compare them to previously diagnosed men or HIV-negative and untested men.

RESULTS

Of the 2222 men recruited face-to-face in the SGCPs in 2014 and the 2158 recruited in 2018, the proportion who participated in the COUNT study was 42.5% (n=944) in 2014 and 41.2% (n=890) in 2018. If we limit this to recruitment locations where COUNT recruitment took place (i.e. locations like clinics and gyms were excluded from COUNT), the proportion of SGCPs participants who took part in COUNT was 55.0% in 2014 (944/1715) and 50.6% in 2018 (890/1758). The characteristics of COUNT participants are shown in Table 1. A greater proportion of participants were recruited from social venues (bars) in 2018 than in 2014, and in 2018 more participants chose to participate anonymously (and not receive their test result). In 2018, anonymous participation was strongly correlated with PrEP use. PrEP users (n=107/179, 59.4%) were more likely than other non-HIV-positive men (n=196/662, 29.4%) to participate anonymously and not receive their test results ($\chi^2 = 50.65$, $p < .001$). The mean age of the samples was similar in 2014 and 2018, as were levels of education and full-time employment and the proportions who identified as gay or resided in 'gay Sydney' postcodes²². Compared to 2014, in 2018 fewer men identified as Anglo-Australian and a higher proportion were born overseas, particularly from Central and South America.

[Insert table 1 here]

Compared to 2014, in 2018 the proportion of men who had been tested for HIV in the previous six months and for STIs in the previous twelve months (excluding blood tests)

increased significantly (from 49.6% to 56.3%, $p=0.004$, and from 61.7% to 69.2%, $p<0.001$, respectively) (see Table 1). There was also a significant increase in the proportion of men who had been diagnosed with any sexually transmitted infection (STI) in the last 12 months (from 14.4% to 27.5%, $p=0.001$). Similar proportions had recently taken post-exposure prophylaxis (PEP) for HIV, but there was a large and significant increase in the proportion of men who had taken PrEP in 2018 (from 2.1% in 2014 to 23.0% in 2018, $p<0.001$). In 2018, significantly higher proportions of men reported having met male sex partners via mobile apps (45.9% to 53.4%, $p=0.001$), having more than 10 male sex partners in the last six months (22.3% to 27.7%, $p=0.008$), having had recent condomless sex with regular or casual partners (39.9% to 44.6%, $p=0.043$, and 23.9% to 37.3%, $p<0.001$, respectively), and recently participating in group sex (32.8% to 37.8%, $p=0.028$).

In 2014 and 2018, similar proportions of men reported the use of party drugs for sex (Table 1), and the use of cannabis, crystal methamphetamine, ecstasy, gamma-hydroxybutyrate (GHB) and erectile dysfunction medication. In 2018, a lower proportion of men reported recent injecting, but more use of amyl nitrite and ketamine was reported.

Prevalence estimates of HIV and undiagnosed infection

Estimates for HIV and undiagnosed infection prevalence are shown in Table 2. HIV prevalence based on biological testing was 6.9% (65 of 944) in 2014 and 5.5% (49 of 890) in 2018. Among men who were confirmed as HIV-positive by testing, seven tested HIV-positive and were classified as previously undiagnosed in 2014 (10.8%; 95% CI: 3.2-18.3) and four in 2018 (8.2% 95% CI: 0.5-15.8). As a proportion of men who reported that they were HIV-negative or untested at the time of recruitment, undiagnosed men represented 0.8%

(95% CI: 0.2%-1.4%) in 2014 and 0.4% (95% CI: 0.0%-0.9%) in 2018. There were no statistical differences between the prevalence estimates in 2014 and 2018.

[Insert Table 2 here]

We weighted the samples to adjust for differences in the numbers of participants recruited from different recruitment locations in each round (Table 3). After this adjustment, HIV prevalence was similar in each year (6.1% in 2014 and 6.4% in 2018). In the adjusted analysis, undiagnosed HIV as a proportion of all HIV-positive cases was 13.8% (95% CI: 5.0-22.7) in 2014 and 5.3% (95% CI: 0.5-11.1) in 2018 ($p = 0.12$). As a proportion of all HIV-negative and untested men, undiagnosed HIV was 0.9% (95% CI: 0.3-1.5) and 0.4% (95% CI: 0.0-0.8) in 2014 and 2018, respectively, in the adjusted analysis ($p = 0.16$).

[Insert Table 3 here]

Characteristics of men with undiagnosed HIV in 2018

Due to the small number of undiagnosed men it was not possible to statistically analyse the factors associated with undiagnosed infection. The four men who had undiagnosed HIV in 2018 ranged in age between 28 and 37 years. One was born in Australia, two were born in other high-income English-speaking countries and one was born in South America. All four men identified as gay, but only one lived in a 'gay Sydney' postcode. Three men were recruited from bars and one at a community event. All four men reported having been tested for HIV within the previous six months, and having at least two HIV tests in the previous 12 months. Two of the previously undiagnosed men reported no condomless anal intercourse with casual or regular partners in the previous six months, but all four men reported having participated in group sex at least once in the previous six months. Two men reported having

been diagnosed with a sexually transmitted infection in the previous 12 months. Two men reported using crystal methamphetamine, ecstasy, or GHB in the past six months. One man reported using PrEP in the previous six months.

DISCUSSION

In 2014-2018 the prevalence of undiagnosed HIV infection among GBM in Sydney remained low, but the apparent decline in undiagnosed infection was not statistically significant. Based on weighted estimates used to adjust for recruitment variation between rounds, the prevalence of undiagnosed infection among HIV-positive men was 13.8% in 2014 and 5.3% in 2018. Our estimate of undiagnosed HIV infection among HIV-positive GBM in NSW (5.3%) in 2018 is similar to the results of a recent study using the back-projection method of CD4 count at diagnosis, that estimated that 8.4% of HIV-positive GBM in NSW were undiagnosed in 2016²³.

HIV prevention initiatives in NSW are very likely to have contributed to the low prevalence of undiagnosed HIV among GBM, despite increases in condomless sex and STI diagnoses. The NSW HIV Strategies have prioritised increased HIV testing, earlier initiation of ART, and the rapid scale-up of PrEP among high-risk GBM^{17,18}. New peer-led rapid HIV testing services and express HIV testing services at sexual health clinics have attracted high proportions of GBM clients who have never previously tested, or who had tested infrequently before²⁴. In 2016, NSW met the UNAIDS 90-90-90 goals for HIV diagnosis and treatment²³. Between 2014 and 2018, HIV testing frequency among GBM increased, time to HIV treatment decreased, and the level of PrEP use among non-HIV-positive men increased dramatically^{25,26}. All of these factors are likely to have contributed to the low prevalence of undiagnosed HIV.

Although we could not conduct a detailed analysis of factors associated with undiagnosed infection in 2018, three of the four men with undiagnosed infection were born overseas. Three lived outside gay Sydney, all were recently tested, suggesting that they had acquired their infections recently, and three had not recently used PrEP. Two had recently been diagnosed with syphilis. This echoes HIV epidemiology in NSW which has shown increases in HIV diagnoses among overseas-born GBM, declines in HIV in 'gay Sydney' but not elsewhere (most likely due to differential uptake of PrEP), and that recent STI diagnoses remain an indicator of risk for HIV infection among GBM not using PrEP²⁷.

Australian HIV testing guidelines published in 2014 recommended annual HIV testing for all sexually active GBM, and 3-6 monthly testing among men with higher risk²⁸. All four of the undiagnosed men in the 2018 study reported that their last HIV test was within the previous six months, so they appeared to be testing at the frequency recommended in HIV testing guidelines, and three of the four reported behaviour or a history of STI diagnoses that would place them in the higher risk category in the testing guidelines. Although the average annual number of HIV tests among high-risk men attending clinics in NSW has increased in recent years²⁷, until 2018 these data included GBM on PrEP, who must test frequently as part of PrEP monitoring. From mid-2018 reporting of these data in NSW has been stratified by PrEP use²⁷. This new method of reporting revealed that while testing frequency has increased among men on PrEP, there had been no increase in HIV testing among high-risk GBM who are not on PrEP²⁷. A recent analysis of behavioural surveillance data from Australian GBM also found that while HIV testing frequency among PrEP users had increased between 2013 and 2018, there was no increase among high-risk men not on PrEP²⁹. Collectively, these findings suggest a need to target effective prevention methods to high-risk GBM who are not on PrEP. Targeted interventions to support men to remain on PrEP or re-initiate use of PrEP at times of increased risk are also needed.

There are some limitations to consider regarding our study. The prevalence of HIV confirmed by testing in our study was 6.2% in 2014 and 5.1% in 2018, well below the self-reported rates in the corresponding SGPCS samples each year, which were 12.9% and 9.1%, respectively²⁶. This indicates that in both rounds, previously diagnosed HIV-positive men were less likely to participate in the prevalence study than other GBM. Additionally, increases in HIV testing and PrEP use between 2014 and 2018 created difficulties in recruiting GBM in the 2018 study. Although our recruiters explained to potential participants that the aim of the study was to measure HIV prevalence among all GBM, men who were on PrEP or who had recently tested for HIV sometimes commented that they saw little benefit in participating in the study (or felt that they would be wasting study resources). Ultimately, the proportion of SGPCS participants who were approached and took part in COUNT in 2014 and 2018 was 50-55%, which may have introduced sampling bias. Due to differences in recruitment between the 2014 and 2018 studies, we developed a weighted sample to account for differences in the proportion of men recruited from different recruitment locations. After weighting, the HIV prevalence in 2014 and 2018 appeared similar and there was no notable change in our estimate of undiagnosed HIV. International guidelines suggest that behavioural prevalence studies should only be conducted in populations with the “highest HIV prevalence”, with a minimum sample size of 500³⁰. In the context of falling HIV diagnoses among Australian-born GBM in NSW, and the extremely low prevalence of undiagnosed HIV we have observed, it is likely to become more difficult to document any further decline in undiagnosed HIV prevalence through this type of study. Our study was conducted as part of an ongoing program of behavioural HIV surveillance and, given the achievable sample size and low prevalence of undiagnosed HIV in 2014, it had limited statistical power to identify changes in the prevalence of undiagnosed infection in 2018. Recruiting the substantially larger samples required to achieve satisfactory statistical power is

likely to be unfeasible. A suggestion for future studies could be the targeted assessment of risk factors and undiagnosed HIV infection among overseas-born GBM, among whom HIV notifications in Australia have not fallen ³¹.

CONCLUSIONS

Based on the results of repeated bio-behavioural surveillance among GBM in Sydney in 2014 and 2018, we found that the prevalence of undiagnosed HIV infections remained low. High levels of HIV testing, treatment and PrEP use appear to have contributed to a sustained low prevalence of undiagnosed HIV among GBM in NSW.

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APPENDIX

The investigators on the NSW HIV Prevention Partnership Project Study are Professor Andrew Grulich, Dr Christine Selvey, Professor Rebecca Guy, Associate Professor Garrett Prestage, Associate Professor Iryna Zablotska, Jo Holden, Tim Duck, Craig Cooper, Karen Price, Professor Martin Holt, Professor John de Wit, Professor John Kaldor, Professor Anthony Kelleher, and Professor David Wilson. The late Alan Brotherton, the late Professor David A Cooper, and the late Adjunct Associate Professor Levinia Crooks were also investigators on the grant. The project steering committee included these investigators and Bill Whittaker, Phillip Keen, Dr Denton Callander, Daniel Madeddu, Dr Heather-Marie Schmidt, Barbara Telfer, Karen Price, Dr Mark Boyd, Dr Benjamin R Bavinton, Scott McGill, Dr Prital Patel, Cherie Power, Dr Angie Pinto, Dr Steven Nigro, Tina Gordon, Lance Feeney, Carolyn Murray, Jane Costello, and ToveLysa Fitzgerald.

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Table 1. Characteristics of participants in 2014 and 2018

	2014 N=944 n (%)	2018 N=890 n (%)	χ^2	<i>p</i> value
Recruitment location			31.03	<.001
Fair Day	445 (47.1)	308 (34.7)		
Social venue	398 (42.2)	480 (53.9)		
Sex venue	101 (10.7)	102 (11.5)		
Recruitment arm			26.70	<.001
Anonymous	253 (26.8)	339 (38.1)		
Confidential	691 (73.2)	551 (61.9)		
Self-reported HIV status			1.83	0.34
HIV-negative	778 (82.4)	753 (84.6)		
Untested/unknown	107 (11.2)	92 (10.3)		
HIV-positive	59 (6.2)	45 (5.1)		
Mean age in years (SD)	34.4 (11.2)	35.2 (11.0)		0.12
Anglo-Australian	594 (62.9)	504 (56.6)	7.55	0.006
Born in Australia	595 (63.0)	514 (57.8)	5.33	0.021
Born overseas	346 (36.6)	370 (41.6)		
Overseas region of birth				
High income, English-speaking country	137 (14.5)	139 (15.6)	0.43	0.51
Europe, non-English-speaking country	53 (5.6)	52 (5.8)	0.04	0.83
Asia	96 (10.2)	102 (11.5)	0.79	0.37
Central/South America	14 (1.5)	30 (3.4)	6.97	0.009
Other	46 (4.8)	47 (5.3)	0.15	0.41
University degree	543 (57.5)	549 (61.7)	3.29	0.07
Full-time employed	759 (80.4)	718 (80.7)	0.02	0.88

	2014 N=944 n (%)	2018 N=890 n (%)	χ^2	<i>p</i> value
Gay-identified	838 (88.8)	787 (88.4)	0.05	0.82
Resides in "gay Sydney"*	315 (33.4)	292 (32.8)	0.06	0.80
Resides in rest of Sydney	629 (66.6)	598 (67.2)		
HIV test in last six months	468 (49.6)	501 (56.3)	8.29	0.004
Any STI test in last 12 months (excluding blood test)	582 (61.7)	616 (69.2)	11.56	0.001
Any STI diagnosis in last 12 months	136 (14.4)	245 (27.5)	47.92	<.001
PEP use in last 6 months	39 (4.9)	44 (4.9)	0.70	0.40
PrEP use in last 6 months (prescribed)	16 (2.1)	173 (23.0)	154.73	<.001
How men met their partners in the last 6 months				
Internet	332 (35.2)	290 (32.5)	1.36	0.24
Mobile app	433 (45.9)	475 (53.4)	10.31	0.001
Gay bar	295 (31.3)	280 (31.5)	0.01	0.92
Sex venue	300 (31.8)	303 (34.0)	1.06	0.30
More than 10 male partners last 6 months	210 (22.3)	246 (27.7)	7.13	0.008
Any condomless sex with regular partners last 6 months	377 (39.9)	397 (44.6)	4.09	0.043
Any condomless sex with casual partners last 6 months	226 (23.9)	332 (37.3)	38.6	<.001
Any group sex last 6 months	310 (32.8)	336 (37.8)	4.84	0.028
Used party drugs for sex in last 6 months	236 (25.0)	201(22.6)	1.33	0.25
Any injecting in last 6 months	49 (5.2)	25 (2.8)	6.71	0.01

	2014 N=944 n (%)	2018 N=890 n (%)	χ^2	<i>p</i> value
Drugs used in last 6 months				
Amyl nitrite	414 (43.9)	437 (49.1)	5.06	0.024
Cannabis	316 (33.5)	292 (32.8)	0.09	0.76
Crystal methamphetamine	128 (13.6)	97(10.9)	3.01	0.08
Ecstasy	284 (30.1)	256 (28.8)	0.38	0.54
Erectile dysfunction medication	188 (19.9)	191 (21.5)	0.66	0.41
Gamma hydroxybutyrate	104 (11.0)	121 (13.6)	2.82	0.09
Ketamine	66 (7.0)	114 (12.8)	17.51	<.001

* “Gay Sydney” refers to a set of seven post codes in inner Sydney which have previously been identified as having a high proportion of gay male residents.

Table 2. Prevalence estimates of HIV and undiagnosed infection (unadjusted)

	COUNT 2014 N=944 n (%)	95% CI for %	COUNT 2018 N=890 n (%)	95% CI for %	p value*
HIV-negative (confirmed by testing)	879/944 (93.1)	91.5–94.7	841/890 (94.5)	93.0–96.0	0.22
HIV-positive (confirmed by testing)	65/944 (6.9)	5.3–8.5	49/890 (5.5)	4.0–7.0	0.22
Previously diagnosed	58/944 (6.1)	4.6–7.7	45/890 (5.0)	3.6–6.5	0.31
Previously undiagnosed	7/944 (0.7)	0.2–1.2	4/890 (0.4)	0.0–0.9	0.42
Undiagnosed HIV as a proportion of					
All HIV-positive participants (confirmed by testing)	7/65 (10.8)	3.2–18.3	4/49 (8.2)	0.5–15.8	0.64
HIV-negative and untested participants (self-reported)	7/886 (0.8)	0.2–1.4	4/845 (0.4)	0.0–0.9	0.41

* Two-sample test of proportions

Table 3. Adjusted prevalence estimates of HIV and undiagnosed infection (weighted by recruitment location)

	COUNT 2014 N=944 %	95% CI for %	COUNT 2018 N=890 %	95% CI for %	p value*
HIV-negative (confirmed by testing)	93.9	92.3–95.3	93.6	91.9–95.2	0.81
HIV-positive (confirmed by testing)	6.1	4.6–7.6	6.4	4.8–8.0	0.82
Previously diagnosed	5.3	3.8–6.7	6.1	4.5–7.6	0.48
Previously undiagnosed	0.8	0.3–1.4	0.3	0.0–0.7	0.16
Undiagnosed HIV as a proportion of					
All HIV-positive participants (confirmed by testing)	13.8	5.0–22.7	5.3	0.5–11.1	0.12
HIV-negative and untested participants (self-reported)	0.9	0.3–1.5	0.4	0.0–0.8	0.16

* Two-sample test of proportions