

# Increased HIV testing and reduced undiagnosed infection among gay men in Scotland, 2005–8: support for the opt-out testing policy?

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Accepted 20 December 2010  
Published Online First  
16 February 2011

## ABSTRACT

**Objective** To examine changes in HIV testing and undiagnosed infection among men who have sex with men in Scotland between 2005 and 2008.

**Methods** Self-completed questionnaires and Orasure oral fluid collection kits were distributed to men visiting the commercial gay scene in Glasgow and Edinburgh.

**Results** Questionnaires and oral fluid specimens were provided by 1350 men (51.6% response rate) in 2005 and 1277 (59.7% response rate) in 2008. 2572 men were eligible for inclusion in the analyses. Recent HIV testing increased from 33.2% in 2005 to 48.3% in 2008 ( $p < 0.001$ ). HIV prevalence was comparable in 2005 and 2008 (4.4% and 4.6%, respectively). Among HIV-positive men, there was a reduction in undiagnosed infection between 2005 and 2008 from 41.7% to 26.3% ( $p = 0.08$ ). Undiagnosed HIV did not differ between men who were and were not tested in the past year. In 2008, only four (26.7%) HIV-positive men tested in the past 6 months were undiagnosed, compared with 11 (42.3%) HIV-positive men who had not tested ( $p = 0.03$ ).

**Conclusion** There was a substantial increase in recent HIV testing between 2005 and 2008. Although there was a concurrent (non-significant) reduction in undiagnosed HIV, there was no difference in undiagnosed infection between men who had and had not tested recently. However, lower proportions of undiagnosed infection among the most recent HIV-positive testers suggest frequent testing could play a role in reducing undiagnosed HIV and should remain central to HIV prevention efforts.

A resurgence in diagnosed HIV has been noted among men who have sex with men (MSM) in north America, western Europe and Australia.<sup>1</sup> Evidence suggests that increases in diagnoses among UK MSM are the result of increasing HIV testing<sup>2</sup> and, since the introduction of opt-out testing (whereby all patients should be offered a test regardless of symptoms or risk factors), uptake in genitourinary medicine clinics has increased markedly.<sup>3</sup> In Scotland, opt-out testing was implemented as part of the Scottish sexual health strategy, published in 2005. A concurrent increase in HIV testing was observed in our community-based surveys of MSM in Scotland.<sup>4</sup>

MSM remain the group most at risk of acquiring HIV in the UK, and over one quarter of HIV-positive MSM is estimated to be undiagnosed.<sup>3</sup> Although the increase in HIV testing in clinics has been accompanied by a fall in the proportions who leave clinics undiagnosed,<sup>3</sup> reducing undiagnosed HIV remains a key policy aim,<sup>3–5</sup> and further expansion of HIV testing in clinical and community

settings is recommended.<sup>3</sup> In Scotland, undiagnosed infection (measured by unlinked anonymous testing of Glasgow genitourinary medicine clinic attendees) among MSM fell from 49% in 2004 to 8% in 2007 and, although recent figures show an increase to 41% in 2008, the previous decrease was attributed to the introduction of opt-out HIV testing.<sup>6</sup> Since 2005, we have included the collection of oral mucosal specimens to be tested anonymously for HIV antibodies in our community-based surveys, which allows us to examine HIV testing and its association with undiagnosed infection in this population. Here, we examine changes between 2005 and 2008, the association between HIV testing and undiagnosed infection, and discuss the implications for future HIV testing policy in the UK.

## METHODS

The 2005 and 2008 Medical Research Council (MRC) Gay Men's Surveys collected anonymous, self-completed questionnaires and (Orasure) oral fluid specimens. Time and location sampling was used to recruit representative samples in commercial gay venues (11 bars/two saunas in 2005; 12 bars/two saunas in 2008) in Glasgow and Edinburgh, Scotland's two largest cities.<sup>7</sup>

Questionnaires included demographics and HIV testing history. Recent HIV testing was categorised in 2005, as those tested in the year of, or immediately before, the survey (ie, 2004 or 2005—the 2005 survey was conducted in late April, giving a total of 16 months defined as recent testing), and in 2008, those indicating their last test was 'in the past 6 months' or 'between 6 months and 1 year ago' (a total of 12 months). Oral fluid specimens were analysed at the West of Scotland Specialist Virology Centre (screened for anti-HIV using an enzyme immunoassay; positives re-screened, and repeat reactives confirmed using western blot). Data were analysed with SPSS 15.0. Logistic regression was used to estimate OR and 95% CI, adjusted for survey venue, age, qualifications and frequency of gay scene use, which differed between the surveys. Ethical approval was granted by University of Glasgow, Faculty of Medicine Ethics Committee.

## RESULTS

Questionnaires and oral fluid specimens were provided by 1350 men (51.6% response rate) in 2005 and 1277 (59.7% response rate) in 2008. Fifty-five men are excluded from these analyses (2005:



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**Table 1** HIV testing history, HIV prevalence and undiagnosed infection among gay men in Scotland: 2005 and 2008 (N=2572)

	Year of survey				p Value
	2005 (N = 1344)		2008 (N = 1228)		
	n	%	n	%	
HIV testing history					
Never tested	518	39.2	302	25.4	<0.001
Ever tested	805	60.8	887	74.6	
Recent HIV testing*					
Never tested or test >1 year ago	826	66.0	615	51.7	<0.001
HIV test in past year	425	34.0	574	48.3	
HIV prevalence (oral fluid specimen result)					
HIV negative	1284	95.5	1171	95.4	0.8
HIV positive	60	4.4	57	4.6	
Awareness of HIV-positive status (N=117)					
Diagnosed HIV positive	35	58.3	42	73.7	0.08
Undiagnosed HIV positive	25	41.7	15	26.3	

\*Recent HIV testing: for the 2005 survey, recent testers includes men reporting testing in the year of or immediately before the survey, that is 2005 or 2004; for the 2008 survey, recent testers includes men who indicated that their last test was 'in the past 6 months' or 'between 6 months and 1 year ago'.

one specimen with insufficient volume, five unconfirmed cases; 2008: 45 heterosexual men who reported no sexual contact with men in the previous 12 months, four laboratory specimens not returned).

The proportion of men who had ever had an HIV test increased significantly from 60.8% in 2005 to 74.6% in 2008; recent testing increased from 34.0% to 48.3% (table 1). HIV prevalence was comparable in 2005 and 2008 (4.4% and 4.6%, respectively, table 1), as was the prevalence of undiagnosed HIV in the sample as a whole (1.9% and 1.2%, respectively; adjusted OR 0.65, 95% CI 0.33 to 1.29). Among HIV-positive men, there was a (non-significant) reduction in undiagnosed infection from 41.7% to 26.3% (table 1).

In multivariate analysis, controlling for the demographic differences between the surveys, the 2008 increases in ever and

recent HIV testing remained significant (table 2). Age and frequency of gay scene use were also significantly associated with ever and recent testing, as was survey venue with recent testing. In multivariate analysis, there was no significant change in HIV prevalence, or undiagnosed infection (among HIV-positive men) over time (table 2). The odds of testing HIV positive were higher among men surveyed in saunas (compared with bars) and lower among men with a degree or post-graduate (compared with secondary) education. Compared with men aged under 26 years, the odds of being HIV positive were higher among men aged 26 years or older, while the odds of being undiagnosed were lower.

In 2005, only four of the 25 men with undiagnosed HIV had never had an HIV test, while 11 reported recent (negative) testing; three perceived themselves to be HIV positive. In 2008,

**Table 2** Unadjusted and multivariate logistic regression for recent HIV testing, HIV prevalence and undiagnosed infection among gay men in Scotland

	Ever had HIV test (N = 2512)			Recent HIV test* (N = 2440)			HIV-positive oral fluid specimen result (N = 2572)			Undiagnosed HIV positive† (N = 117)		
	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value	OR	95% CI	p Value
Unadjusted year												
2005	1			1			1			1		
2008	1.89	1.59 to 2.24	<0.001	1.81	1.54 to 2.14	<0.001	1.04	0.72 to 1.51	0.83	0.50	0.23 to 1.09	0.08
Adjusted year												
2005	1			1			1			1		
2008	1.95	1.63 to 2.33	<0.001	1.89	1.59 to 2.23	<0.001	1.01	0.68 to 1.51	0.94	0.50	0.21 to 1.22	0.13
Survey venue												
Bar	1			1			1			1		
Sauna	1.42	0.86 to 2.36	0.18	2.00	1.30 to 3.08	0.002	2.07	0.99 to 4.32	0.05	1.75	0.33 to 9.12	0.50
Age, years												
<26	1			1			1			1		
26+	1.88	1.55 to 2.27	<0.001	0.80	0.66 to 0.96	0.017	3.65	2.01 to 6.63	<0.001	0.25	0.07 to 0.89	0.03
Qualifications												
Secondary	1			1			1			1		
Further/vocational	1.04	0.81 to 1.34	0.76	0.92	0.72 to 1.18	0.52	0.61	0.36 to 1.02	0.06	0.53	0.16 to 1.77	0.30
Degree/post-graduate	1.17	0.91 to 1.50	0.22	1.01	0.79 to 1.28	0.96	0.45	0.27 to 0.74	0.002	1.45	0.51 to 4.16	0.49
Frequency of gay scene use												
Once a month or less	1			1			1			1		
2/3 Times a month	1.23	0.95 to 1.60	0.12	1.26	0.98 to 1.64	0.08	0.81	0.45 to 1.45	0.50	1.45	0.41 to 5.10	0.56
1/2 Times a week	1.29	1.00 to 1.67	0.05	1.61	1.25 to 2.07	<0.001	1.28	0.75 to 2.17	0.36	1.09	0.34 to 3.56	0.88
4/5 Times a week	1.68	1.23 to 2.29	0.001	2.15	1.60 to 2.89	<0.001	0.63	0.30 to 1.33	0.23	0.79	0.14 to 4.59	0.80

\*Recent HIV testing: for the 2005 survey, recent testers includes men reporting testing in the year of or immediately before the survey, that is 2005 or 2004; for the 2008 survey, recent testers includes men who indicated that their last test was 'in the past 6 months' or 'between 6 months and 1 year ago'.

†Among men with HIV-positive oral fluid specimens.

only two of the 15 undiagnosed men had never tested and seven reported testing in the past year; none perceived themselves to be positive. The prevalence of undiagnosed HIV did not differ between men who were and were not recent testers (1.8% and 1.4%, respectively,  $p=0.4$ ); among HIV-positive men, 18 (31.6%) who reported recent testing were undiagnosed, compared with 20 (40.8%) who did not ( $p=0.3$ ). In 2008, 408 men (34.4%) reported having tested in the past 6 months. Only four (26.7%) HIV-positive men tested in the past 6 months were undiagnosed, compared with 11 (42.3%) HIV-positive men who had not tested in the past 6 months ( $p=0.03$ ); 1.0% and 1.4% of the total sample, respectively ( $p=0.5$ ).

## DISCUSSION

Between 2005 and 2008, there was a substantial increase in the proportion of men reporting ever and recent HIV testing in community-based surveys in Scotland (in continuation of a trend noted previously).<sup>4</sup> Collection of oral fluid specimens in 2005 and 2008 provided the unique opportunity to assess the association of this increase with undiagnosed infection in this population for the first time. There are some limitations to note when considering our results. This was a venue-based sample so caution should be exercised when generalising to the wider population. The oral fluid specimen response rate was relatively low, and may not be representative. However, the overall survey response rate was higher (66% in 2005 and 71% in 2008), and there were few differences between the men who did and did not provide oral fluid specimens;<sup>7,8</sup> suggesting that the men who provided these were representative of the larger venue-based sample. It should also be noted that the question used to derive recent HIV testing, and therefore the period defined as recent testing, was different in 2005 and 2008 (16 months in 2005 and 12 months in 2008). However, if this had affected the results then reported recent testing would almost certainly have been higher in 2005 than in 2008, which was not the case. Finally, caution should be exercised in interpreting our findings on the recency of HIV testing and undiagnosed infection, given the small numbers involved. This could also have limited power to detect a difference between years.

Although testing rates have traditionally been lower in the Scottish surveys than those observed in other UK cities,<sup>4,9</sup> the rates are now more similar to those reported in comparable venue-based surveys in London, Manchester and Brighton.<sup>10</sup> Almost half of the men surveyed in Glasgow and Edinburgh reported having tested in the past year. It is encouraging that recent HIV testing has continued to increase among MSM in Scotland; strong evidence of an impact beyond the clinical setting of the opt-out testing policy, now recommended throughout the UK.<sup>11</sup> However, although there was a concurrent, albeit non-significant, reduction in undiagnosed HIV, our results cannot address whether the two are causally linked and do not suggest the two are directly correlated, with no difference in undiagnosed infection between men who had and had not tested recently. This raises the question of what more can be done to reduce undiagnosed HIV in this population?

Estimates suggest one in five UK MSM newly diagnosed with HIV are diagnosed within 6 months of infection.<sup>5</sup> Here, just under half of undiagnosed HIV-positive men reported having had a (negative) HIV test in the past year. With high viral loads immediately after seroconversion,<sup>12</sup> the risk of onward HIV transmission is apparent. Lower proportions of undiagnosed infection among the most recent HIV-positive testers (in the past 6 months) are consistent with even more frequent (than

annual) testing playing a role in reducing undiagnosed HIV. However, the decline in recent testing with age (noted here and in our previous analysis of trends between 1996 and 2005)<sup>4</sup> suggests that men may not test regularly. This implies that the challenge now is to increase the frequency of HIV testing, and essentially 'normalise' regular testing among gay men at risk of HIV. Current policy recommends annual testing,<sup>11</sup> but there is a case for testing the acceptability of greater frequencies of 6, 3 or even 1-monthly intervals. This is no easy task, and as much attention must be given to why men would want (and therefore be willing) to increase the frequency of testing,<sup>13</sup> as to achieving this.

There is growing interest and debate around the use of treatment for HIV transmission prevention.<sup>14–17</sup> The premise for this is that if new HIV infections are predominantly transmitted from HIV-infected individuals not on treatment, treating all HIV-infected individuals regardless of CD4 cell counts could ultimately reduce HIV transmission at the community level.<sup>14</sup> For new infections to be promptly identified and treated, frequent, regular HIV testing among at-risk groups is central to this approach. Although the evidence is mainly limited to modelling or ecological and observational studies,<sup>14, 18–21</sup> a 'test and (immediate) treat' approach has been adopted in San Francisco.<sup>22</sup> The Strategic Timing of Antiretroviral Treatment (START) study (clinicaltrials.gov NCT00867048) will inform us whether earlier treatment initiation is of individual benefit. If demonstrated to be the case, increasing the frequency of HIV testing will be vital.

There is also still some question as to whether treatment does reduce sexual transmission of HIV.<sup>23</sup> Although there is evidence to suggest this could be the case within heterosexual partnerships,<sup>24</sup> there is not currently the same evidence for MSM. There are further concerns about the development of drug resistance, the interaction of other sexually transmitted infections, and the possible impact of increasing risk behaviours.<sup>14, 15, 17</sup> Studies have shown that most HIV-positive MSM reduce sexual risk behaviour after diagnosis;<sup>25–27</sup> however, a recent review reported that the prevalence of unprotected anal intercourse with a partner of unknown or discordant HIV status in the past 12 months was 26% among diagnosed HIV-positive MSM in the USA.<sup>28</sup> We previously found similarly high rates of sexual risk among this group in the UK,<sup>29</sup> not all of which could be accounted for by risk-reduction strategies, and there was some suggestion that it was maintaining safer sex behaviour that men find difficult (with higher risk among men diagnosed over a year earlier). Therefore, behaviour change, particularly during the period immediately after seroconversion when HIV transmission could be more likely,<sup>12</sup> remains a necessary goal of any HIV prevention strategy.

## Key messages

- Between 2005 and 2008, there was a substantial increase in the proportion of MSM reporting ever and recent HIV testing in community-based surveys in Scotland.
- Although there was a concurrent reduction in undiagnosed HIV, there was no difference in undiagnosed infection between men who had and had not tested recently.
- To reduce undiagnosed HIV further, the challenge now is to increase the frequency of HIV testing among gay men at risk of HIV.

The UK policy change to opt-out HIV testing appears to have had a significant impact on the testing rates of MSM. However, with only one in five UK MSM newly diagnosed with HIV diagnosed within 6 months of infection,<sup>3</sup> and high viral loads immediately after seroconversion,<sup>12</sup> increasing earlier diagnosis is imperative. Further expansion of HIV testing in clinical and community settings has been recommended to reduce undiagnosed HIV further,<sup>3</sup> but beyond providing additional testing opportunities, there is little to suggest this would have any great impact on the frequency with which MSM test for HIV. It is the latter that remains the challenge to be met and may have the greatest chance of reducing the undiagnosed fraction and having a real impact on the HIV epidemic among MSM in the UK.

**Acknowledgements** The authors thank the survey staff and fieldworkers in each city, the venue managers, their staff and the men who agreed to participate in the survey. The UK Medical Research Council funds LMM and the Gay Men's Survey as part of the Sexual and Reproductive Health Programme (WBS U.1300.00.005) at the Social and Public Health Sciences Unit.

**Funding** This study was funded by the UK Medical Research Council.

**Competing interests** None.

**Ethics approval** This study was conducted with the approval of the University of Glasgow Faculty of Medicine Ethics Committee.

**Contributors** LMM and GJH devised the paper. LMM conducted the analyses and wrote the first draft. GJH contributed to subsequent drafts and both authors approved the final version of the manuscript.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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