

BMJ Open Determinants of never having tested for HIV among MSM in the Netherlands

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ABSTRACT

Objectives: Men who have sex with men (MSM) who are unaware of their HIV infection are more likely to infect others, and unable to receive treatment. Therefore, we aimed to identify the proportion and characteristics of Dutch MSM who never tested for HIV.

Methods: In 2010, the European MSM Internet Survey (EMIS) recruited 174 209 men from 38 countries through an anonymous online questionnaire in 25 languages. We analysed data from participants living in the Netherlands (N=3787). The outcome we investigated was having never (lifetime) been tested for HIV.

Results: A total of 770 MSM (20.4%) had never been tested for HIV. In multivariate regression analyses, not being from Amsterdam (adjusted OR, aOR 1.54, CI 1.17 to 2.03), with low education (aOR 1.28, CI 1.04 to 1.57) and low knowledge on HIV-testing (aOR 2.23, CI 1.37 to 3.64) were significantly associated with never having tested. Lower sexual risk (including having fewer sexual partners (aOR 2.19, CI 1.57 to 3.04) and no anal intercourse (aOR 5.99, CI 3.04 to 11.77)), and less social engagement (including being less out (aOR 1.93, CI 1.55 to 2.40)) were also associated with having never been tested. Additionally, 36.1% of MSM who never tested for HIV reported high-risk sexual behaviour that may have put them at HIV risk.

Conclusions: MSM make their own risk assessments that inform their choices about HIV-testing. Nevertheless, MSM who were never tested may have been at risk for HIV, and remain important to target for HIV interventions.

INTRODUCTION

The 90-90-90 goal of United Nations Programme on AIDS (UNAIDS) states that 90% of all people living with HIV should be aware of their status, 90% of all HIV infected people should receive antiretroviral therapy, and of that group 90% should achieve viral suppression by 2020.¹ To reach this goal in the Netherlands, we specifically have to increase the number of people aware of their HIV status. Recent studies found that approximately 25–34% of people in the

Strengths and limitations of this study

- The aim of the current study was to get insight into men who have sex with men (MSM) never tested for HIV, as mobilising them could potentially reduce the number of people unaware of their HIV status.
- A strength of this study was the topic, as recent estimation studies show that there are still many MSM unaware of the HIV infection in the Netherlands.
- A limitation of this study as with most studies on MSM is that it cannot claim to be representative for the total (Dutch) MSM population (self-selection bias). We think it is likely that the proportion of MSM in the Netherlands who are not tested for HIV is actually higher than in our analytic sample.
- Our findings showed that more MSM with lower sexual risks were never tested for HIV, suggesting that MSM made risk assessments that informed their choices about testing for HIV.
- Promoting HIV testing is important, as MSM who never tested for HIV showed sexual behaviour that may put them at risk for HIV.

Netherlands are unaware of their HIV status, which is still far from the 10% goal.^{2–3} However, this is an improvement compared to 2007 when this percentage was estimated to be 40%.⁴ One estimation indeed showed that 71% of people infected with HIV were in care (17 750 of 25 000), of those 84% were on cART (16 081 of 17 750), and of those 91% had reached viral suppression (14 602 of 16 081).² Even though there is much to gain in the other steps of the treatment cascade, the percentage of people unaware of HIV infection is a priority.

One thing that could possibly explain the decrease in people unaware is the opt-out HIV screening that has been implemented in sexually transmitted infection (STI) clinics since 2010, meaning that HIV routinely takes place unless someone refuses.^{5–7} Also, men who have sex with men (MSM) are encouraged to be tested repeatedly, once every 6 months.⁸ However, these interventions



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mainly reach MSM who have already found their way to the STI clinic and might miss a population of men who have never tested. As there were 278 new HIV infections diagnosed in STI-clinics in 2014 among MSM in the Netherlands, which is a 12% decline compared to 2013,⁵ new perspectives should be added to keep up this trend. This corresponds to the general trend among MSM.²

As such, people in the most at risk populations (such as MSM), who have never tested for HIV can be seen as the ultimate unaware group, assuming that at least some of them have been at risk for HIV. People who are unaware of their HIV infection have been estimated to contribute up to 90% of new HIV infections.⁹ Therefore, mobilising the group never tested to test for HIV could potentially reduce the number of people unaware of their HIV status and onward transmission. Whereas much research focuses on the risk factors associated with contracting HIV and STIs, less research investigates risk factors associated with never testing for HIV.^{10–12} In addition, although the number of HIV diagnoses among MSM has decreased between 2013 and 2014, this is probably not explained by a reduction in sexual risk behaviour, as other STIs do keep increasing in this group.⁵

In 2011, data from the European MSM Internet Survey (EMIS) first became available with data on demographics, sexual behaviour, and psychosocial factors related to sexual health among MSM.¹³ As in 2014 70% of all new HIV cases in the Netherlands were diagnosed among MSM, they are considered important to target for prevention efforts.^{2 5} In the current study, we investigated risk factors associated with never being tested for HIV among EMIS participants residing in the Netherlands.

METHODS

The EMIS is an anonymous, self-administered, cross-sectional, online study in 25 languages that covered MSM in 38 countries. In the Netherlands, 3917 men completed the EMIS questionnaire between 4 June and 31 August 2010. After data cleaning (excluding respondents with eg, discrepant answers), the Dutch sample consisted of 3783 MSM. Participants residing in the Netherlands were recruited predominantly via instant messages on internet sites visited by MSM, such as PlanetRomeo (53.0%), Gaydar (7.8%) and e-mails to Schorer Monitor participants (a Dutch internet survey; 14.6%),¹⁴ as well as via banners on websites that are frequently visited by MSM, through gay community organisations and by using printed materials at locations frequented by MSM (24.7%). An extensive description of the survey methods can be found elsewhere.^{13 15} Participants had to confirm that they had read and understood the introductory text, had reached the age of consent (16 years in the Netherlands), and consented to participate in the study before proceeding to the questions.

We analysed the association between never been tested and the variables age, residence, country of

birth, educational level, sexual identity, being out about their sexual attraction to men among family, friends and colleagues (outness or 'being out of the closet'), the proportion of gay friends among all friends, number of non-steady sexual partners in the past 12 months, anal intercourse ever, unprotected anal intercourse (UAI) with any male partner of unknown or discordant HIV serostatus in the past 12 months, ever visiting gay social venues, ever visiting sex venues, ever having had sex abroad, ever and recent (in the past 12 months) use of sex and party drugs (ie, ecstasy, amphetamine, crystal meth, mephedrone, GHB/GBL, ketamine, cocaine) and self-reported STI diagnoses in the past 12 months. We also calculated an approximation of the number of sexually active years, by subtracting age at first anal intercourse from current age. However, if MSM filled out the categories 'younger than 12' or 'older than 30' years of age at first anal intercourse, we qualified this as 12 and 31 years old at first anal intercourse.

In addition, we analysed two variables of knowledge. First, HIV test-related knowledge was measured with five items ('AIDS is caused by a virus called HIV', 'There is a medical test that can show whether or not you have HIV', 'If someone becomes infected with HIV it may take several weeks before it can be detected in a test', 'There is currently no cure for HIV infection', 'HIV infection can be controlled with medicines so that its impact on health is much less'). Men who answered 'I knew this already' to at least four items were classified as high in knowledge on HIV-testing. Second, HIV transmission-related knowledge was also measured with five items ('You cannot be confident about whether someone has HIV or not from their appearance', 'Effective treatment of HIV infection reduces the risk of HIV being transmitted', 'HIV cannot be passed during kissing, including deep kissing, because saliva does not transmit HIV', 'You can pick up HIV through your penis while being 'active' in unprotected anal or vaginal sex (fucking) with an infected partner, even if you don't ejaculate', 'You can pick up HIV through your rectum while being 'passive' in unprotected anal sex (being fucked) with an infected partner').

Univariable and multivariable logistic regression analyses were conducted to investigate associations between the outcome, demographic, psychosocial and behavioural factors. Variables showing an association of $p < 0.20$ (Wald test, univariable analysis) were included in the multivariable analyses. Backward stepwise logistic regression analyses were performed, including variables with $p < 0.05$ for the likelihood ratio test. Associations were examined using adjusted ORs (aOR) and 95% CIs. In addition, we checked the variables in the multivariate model for collinearity, and did not find any, as indicated by tolerance coefficients between 0.625 and 0.984 (below 0.1 indicates collinearity), and variance inflation factors between 1.016 and 1.600 (above 10 indicates collinearity). All statistical analyses were performed using IBM SPSS for Windows V.19.

RESULTS

Respondents residing in the Netherlands were mostly older than 40 years (48.5%) compared to 12.4% younger than 25 years, and 39%, between 25 and 39 years, of Dutch origin (76.5%), from Amsterdam (28.9%) and highly educated (61.8% with tertiary education). The proportion of MSM who reported to never have tested for HIV during their lifetime was 20.4% (N=770). The median age of MSM who were never tested was 35 years (range 16–87). Of all MSM who were never tested for HIV, 65.4% had sex with one or more casual partners in the past 12 months and 36.1% had unprotected anal intercourse. Among those who were tested for HIV, 19.7% were tested HIV positive and 80.3% were diagnosed HIV negative at their last test. Among MSM who had tested negative at their last test, 53.5% were tested longer than 6 months ago.

Demographics associated with never being tested for HIV in univariable analysis were age group and residence. Untested MSM were particularly likely to be younger than 25 years (27.9%), and MSM living outside of Amsterdam (table 1). Higher odds to never be tested for HIV were also found among MSM who had low to moderate educational levels, who had low to moderate knowledge about HIV testing and transmission. In the univariable analysis, MSM with a country of birth other than the Netherlands were less likely to be never tested for HIV. This was mainly explained by lower odds of never been tested for MSM from Europe (OR 0.57, 95% CI 0.43 to 0.77), and from North America, Canada and Australia (OR 0.43, CI 0.21 to 0.86).

In addition, some social factors played an important role in never being tested. Notably, MSM who were sexually active for less than 5 years, those were not 'out' to nearly everybody, and those with a lower proportion of gay friends had higher odds to never be tested for HIV. Finally, related to sexual behaviour, MSM who had fewer non-steady sexual partners, who never had anal intercourse, who had no recent UAI with any male partner of unknown or discordant HIV serostatus, who had no sex abroad, who did not visit social venues, who did not visit sex venues, who reported to have never used sex or party drugs, and who reported no STI diagnoses in the past 12 months had higher odds to have never tested for HIV in the univariable analyses.

In multivariable analysis, there was still an association between never being tested and living in Amsterdam, lower education, lower knowledge on HIV-testing, less than 5 years of sexual activity, low outness (or 'being closeted'), not visiting social venues, having fewer gay friends, having fewer non-steady sexual partners, no anal intercourse ever, no sex abroad and no self-reported STI diagnoses.

DISCUSSION

Our findings show that perceived higher sexual risks in the recent past decreased the odds to never be tested

for HIV. It makes sense that MSM who behave in less risky ways, for example who have not had UAI with any male partner of unknown or discordant HIV status, had fewer non-steady sexual partners or have not had sex abroad, also perceived their risk for contracting HIV as lower, and therefore did not feel the need to test for HIV. Importantly, however, 36.1% of untested men reported UAI with a male partner of unknown or discordant HIV serostatus in the past 12 months, underlining that the untested group is an important target for HIV-testing campaigns.

Additionally, educational level, knowledge about HIV-testing were also related to testing. Knowledge about HIV-testing seemed to be especially important in the testing decision, people with less knowledge were more likely to never be tested, or in other words people with more knowledge were less likely to never been tested. Notably, HIV-testing in the Netherlands is predominantly organised in specialised centres (not hospitals or clinics), and differs in this regard from other Western European countries. MSM who are more assimilated into the gay community seemed less likely to never be tested for HIV, as exemplified by having a higher proportion of gay friends, visit social venues and being out to nearly everybody. These MSM possibly had more positive examples or role models and social support.

Analysis of EMIS data of Portuguese MSM showed that higher educational level, gay or homosexual sexual identity and number of sexual partners in the past 12 months were associated with HIV testing.¹⁰ These factors were also associated with HIV testing among Dutch MSM, however, gay or homosexual sexual identity did not reach significance in our multivariable model. An Australian study found that HIV testing was associated with sexual practices as well, and that many of the untested men reported multiple sex partners and unprotected anal intercourse.¹²

Insights into the risk factors associated with never having tested for HIV remain important. Specifically, our findings show that in order to reach the group of MSM who have never tested for HIV assimilation into the gay community is important. In the current climate, in which mobile applications seem to be replacing gay venues as primary meeting ground,¹⁶ it could become increasingly difficult for young MSM to build supportive social networks. Healthcare professionals and health promoters should be vigilant that the reduction of gay venues (social or sexual) does not lead to more MSM who never test for HIV and try to stay in touch with the population through other means.

The current findings correspond with known barriers to test, namely low-risk perception and fear and worries.¹⁷ MSM in our sample also made risk assessments that informed their testing behaviour. However, a low-risk perception was not always similar to no-risk, emphasising the importance to also reach lower risk MSM. In addition, assimilation in the gay community

Table 1 Characteristics of MSM (N=3783) who ever and who never tested for HIV in the Netherlands

	Total N (%)	Ever tested N (%)	Never tested N (%)	OR (95% CI)	aOR (95% CI)
Age (years)					
>40	1828 (48.5)	1539 (51.4)	289 (37.5)	1	NS
25–39	1471 (39.0)	1205 (40.2)	266 (34.5)	1.18 (0.98 to 1.41)	
<25	468 (12.4)	253 (8.4)	215 (27.9)	4.53 (3.63 to 5.65)	
Residence					
Amsterdam	953 (28.9)	858 (32.8)	95 (14.0)	1	1
Other	2341 (71.1)	1759 (67.2)	582 (86.0)	2.99 (2.37 to 3.77)	1.54 (1.17 to 2.03)
Country of birth					
Netherlands	2817 (76.5)	2198 (75.2)	619 (81.4)	1	NS
Other	864 (23.5)	723 (24.8)	141 (18.6)	0.69 (0.57 to 0.85)	
Education level					
High*	2317 (61.8)	1950 (65.3)	367 (47.9)	1	1
Low/medium	1433 (38.2)	1034 (34.7)	399 (52.1)	2.05 (1.75 to 2.41)	1.28 (1.04 to 1.57)
Knowledge HIV testing					
High†	3642 (96.8)	2941 (98.2)	701 (91.2)	1	1
Low/moderate	121 (3.2)	53 (1.8)	68 (8.8)	5.38 (3.72 to 7.78)	2.23 (1.37 to 3.64)
Knowledge HIV transmission					
High	3288 (77.3)	2664 (88.9)	624 (81.0)	1	NS
Low/moderate	477 (12.7)	331 (11.1)	146 (19.0)	1.88 (1.52 to 2.33)	
Sexual identity					
Gay/homosexual	3269 (87.1)	2685 (89.9)	584 (75.9)	1	NS
Bisexual/other	486 (12.9)	301 (10.1)	185 (24.1)	2.83 (2.31 to 3.47)	
Sexual active					
≥5 years	2987 (87.3)	2551 (90.6)	436 (72.1)	1	1
<5 years	435 (12.7)	266 (9.4)	169 (27.9)	3.72 (2.99 to 4.62)	2.03 (1.55 to 2.66)
Outness to nearly everybody					
Out	2638 (70.3)	2267 (76.0)	396 (51.6)	1	1
Not out	1112 (29.7)	716 (24.0)	371 (48.4)	3.38 (2.87 to 3.98)	1.93 (1.55 to 2.40)
Proportion of gay friends					
Most	764 (20.4)	685 (22.9)	79 (10.3)	1	1
Some	2205 (58.8)	1837 (61.5)	368 (48.0)	1.74 (1.34 to 2.50)	1.22 (0.91 to 1.64)
Few	783 (20.9)	463 (15.5)	32–0 (41.7)	5.99 (4.56 to 7.87)	1.85 (1.32 to 2.59)
Sexual partners in past 12 months					
>10	1189 (32.0)	1064 (36.0)	125 (16.5)	1	1
6–10	572 (15.4)	488 (16.5)	84 (11.1)	1.47 (1.09 to 1.97)	1.42 (1.01 to 2.00)
2–5	958 (25.8)	749 (25.3)	209 (27.6)	2.38 (1.87 to 3.02)	1.70 (1.26 to 2.28)
1	235 (6.3)	158 (5.3)	77 (10.2)	4.15 (2.98 to 5.77)	2.03 (1.33 to 3.11)
0	759 (20.4)	498 (16.8)	261 (34.5)	4.46 (3.52 to 5.66)	2.19 (1.57 to 3.04)
AI ever					
Yes	3564 (96.5)	2932 (98.5)	632 (88.1)	1	1
No	129 (3.5)	44 (1.5)	85 (11.9)	8.96 (6.17 to 13.03)	5.99 (3.04 to 11.77)
UAI‡					
Yes	1060 (28.6)	787 (26.7)	273 (36.1)	1	1
No	2476 (66.9)	2095 (71.1)	381 (50.4)	0.52 (0.44 to 0.63)	0.26 (0.21 to 0.32)
No sex with men	166 (4.5)	64 (2.2)	102 (13.5)	4.59 (3.27 to 6.47)	0.60 (0.35 to 1.02)
Visit to social venues					
Ever	3450 (91.9)	2866 (95.9)	584 (75.9)	1	1
Never	306 (8.1)	121 (4.1)	185 (24.1)	7.50 (5.87 to 9.59)	1.94 (1.39 to 2.71)
Visit to sex venues					
Ever	3060 (81.5)	2581 (86.4)	479 (62.3)	1	NS
Never	696 (18.5)	406 (13.6)	290 (37.7)	3.85 (3.22 to 4.61)	
Sex abroad in the past 12 months					
Yes	2648 (72.1)	2307 (77.8)	341 (48.0)	1	1
No	1026 (27.9)	657 (22.2)	369 (52.0)	3.80 (3.20 to 4.51)	1.61 (1.29 to 2.01)
Sex/party drugs§					
Yes <12 months	1009 (26.9)	923 (31.0)	86 (11.3)	1	1
Yes ever	430 (11.5)	378 (12.7)	52 (6.8)	1.48 (1.03 to 2.13)	1.38 (0.91 to 2.09)
No	2305 (61.6)	1681 (56.4)	624 (81.9)	3.98 (3.14 to 5.06)	2.06 (1.55 to 2.75)

Continued

Table 1 Continued

	Total N (%)	Ever tested N (%)	Never tested N (%)	OR (95% CI)	aOR (95% CI)
STI diagnosis in the past 12 months					
Yes	530 (14.2)	516 (17.3)	14 (1.8)	1	1
No	3211 (85.8)	2462 (82.7)	749 (98.2)	11.21 (6.55 to 19.19)	8.55 (4.69 to 15.61)

Bold printed statistics differ significantly (p value <0.05).

*High education=tertiary education (ISCED-1997 levels 5 and 6).

†High knowledge=Men stating to have already known at least 4 of 5 true statements on HIV-testing, or respectively, HIV-transmission.

‡UAI with any male partners of unknown or discordant HIV serostatus in the past 12 months.

§Use of sex and party drugs (ie, ecstasy, amphetamine, crystal meth, mephedrone, GHB/GBL, ketamine, cocaine).

AI indicates anal intercourse; aOR, adjusted OR; NS, not significant; STI, sexually transmitted infection; UAI, unprotected anal intercourse.

was important, which could influence the amount of stigma, fear and worries MSM experience.

A limitation to our study is that the data used has been collected in 2010. We have several reasons for still considering this data as important. First, a recently published paper indicated that in the Netherlands there is still an unacceptable large group of people who are unaware of their diagnosis.³ We believe this might partly be explained by MSM who never tested, who as our paper shows do behave less riskily, but who still are at risk for HIV. Therefore, we think having better insights in risk factors for never being tested still is important. Strength of this study is its completeness regarding testing behaviour, sexual behaviour, and possible variables influencing this behaviour.

Second, although more frequent testing is encouraged, in the past couple of years there have not been many initiatives focusing on never tested MSM. Therefore, we have no reason to believe that their behaviour has changed dramatically. We instead believe that increased use of applications for meeting sexual partners might have made this group more difficult to find, making insight into risk factors even more important. Although EMIS data have been collected 5 years ago, it offers the most comprehensive data set on this group of men, including most factors that could play a role in not testing for HIV. A repeat EMIS study would allow us to see whether the proportion of MSM never tested for HIV has already decreased in the Netherlands and other European countries.

Another limitation could be recruitment bias, as more than 50% of the men were recruited from PlanetRomeo. Although PlanetRomeo users were rather young, they were less likely to have never tested for HIV (14.9%), compared to Gaydar (24.5%), Schorer E-mail (19.7%) and other recruitment methods (31.7%). This might have caused recruitment bias, we however think that PlanetRomeo users might be more sexually active, therefore at higher risk, which explains the smaller odds to never be tested. Moreover, a recent study found that the proportion of MSM never tested for HIV in the EMIS is comparable to the proportion of another internet survey in that same year (Schorer Monitor), which found a proportion of 24% of MSM never tested for HIV. Another

venue-based recruitment method found that a lower percentage of MSM were never tested (12.9%), however this could be explained by the venue used namely STI clinics.¹⁸

Despite the possible recruitment bias, this way of recruiting MSM probably is more generalisable than venue-based sampling frames, specifically for insights into MSM at risk for HIV. Moreover, in the Netherlands over 98% of the population has access to the internet (at home), therefore we believe that an internet survey does not limit the possible response due to lack of internet access.

In this light, we think this way of recruiting MSM could actually be the strength of this study, even though we might reach more sexually active MSM, but in particular this group is interesting when looking at those within this group who have never tested for HIV. We find that they still behave riskily and could contract HIV, thus determinants influencing never testing is particularly interesting.

CONCLUSION

MSM with lower sexual risks were more likely to be never tested for HIV, suggesting that MSM made risk assessments that informed their choices about whether to test for HIV or not. However, we also showed that MSM who never tested for HIV showed sexual behaviour that may put them at risk for HIV, and are therefore an important group for targeted HIV interventions.

Interventions should encourage regular HIV-testing for sexually active MSM. With the evolving of mobile meeting applications that could replace gay venues, it seems important that especially young MSM do develop strong social ties, to have role models and social support to inspire testing for HIV. Otherwise, mobile applications could be used for intervention (ie, to increase knowledge or encourage testing) in the increasingly individualistic social contexts and among MSM lacking strong social connections in the gay community.

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REFERENCES

1. Joint United Nations Programme on HIV/AIDS: 90-90-90: An ambitious treatment target to help end the AIDS epidemic. UNAIDS, 2014. <http://www.unaids.org/en/resources/documents/2014/90-90-90>. 2014.
2. Stichting HIV Monitoring. *Monitoringrapport 2014*. HIV infectie in Nederland, 2014.
3. Op de Coul ELM, Schreuder I, Conti S, *et al*. Changing patterns of undiagnosed HIV infection in the Netherlands: who benefits most from intensified HIV test and treat policies? *PLoS ONE* 2015;10:e0133232.
4. van Veen MG, Presanis AM, Conti S, *et al*. National estimate of HIV prevalence in the Netherlands: comparison and applicability of different estimation tools. *AIDS* 2011;25:229–37.
5. van Oeffelen AAM, Van Aar F, Van den Broek IV, *et al*. *Sexually transmitted infections including HIV, in the Netherlands in 2014*. Bilthoven: Centre for Infectious Disease Control, National Institute for Public Health and the Environment (RIVM), 2015.
6. Dukers-Muijers NH, Niekamp AM, Vergoossen MM, *et al*. Effectiveness of an opting-out strategy for HIV testing: evaluation of 4 years of standard HIV testing in a STI clinic. *STI* 2009;85:226–30.
7. Heijman RL, Stolte IG, Thiesbrummel HF, *et al*. Opting out increases HIV testing in a large sexually transmitted infections outpatient clinic. *STI* 2009;85:249–55.
8. SOA AIDS Nederland. *“Strategie voor de aanpak van soa’s en hiv onder MSM in Nederland 2013–2018” [in Dutch]*. Amsterdam, The Netherlands: SOA AIDS Nederland, 2013.
9. Bezemer D, de Wolf F, Boerlijst MC, *et al*. A resurgent HIV-1 epidemic among men who have sex with men in the era of potent antiretroviral therapy. *AIDS* 2008;22:1071–7.
10. Carvalho C, Furtos R, Lucas R, *et al*. HIV testing among Portuguese men who have sex with men—results from the European MSM Internet Survey (EMIS). *HIV Med* 2013;14(Suppl 3):15–18.
11. Margolis AD, Joseph H, Belcher L, *et al*. ‘Never testing for HIV’ among men who have sex with men recruited from a sexual networking website, United States. *AIDS Behav* 2012;16:23–9.
12. Zablotska I, Holt M, de Wit J, *et al*. Gay men who are not getting tested for HIV. *AIDS Behav* 2012;16:1887–94.
13. The EMIS Network. EMIS 2010: the European Men-Who-Have-Sex-With-Men Internet Survey. Findings from 38 countries. Stockholm: European Centre for Disease Prevention and Control. 2013. <http://www.emis-project.eu>
14. van empelen P, van Berkel M, Roos E, Zuilhof W: Schorer Monitor 2011. Amsterdam, The Netherlands: Schorer; 2011.
15. Weatherburn P, Schmidt AJ, Hickson F, *et al*. The European Men-who-have-sex-with-men internet survey (EMIS): design and methods. *Sex Res Soc Policy* 2013;10:243–57.
16. Gilbert VL, Simms I, Jenkins C, *et al*. Sex, drugs and smart phone applications: findings from semistructured interviews with men who have sex with men diagnosed with *Shigella flexneri* 3a in England and Wales. *Sex Transm Infect* 2015;91:598–602
17. Deblonde J, De Koker P, Hamers FF, *et al*. Barriers to HIV testing in Europe: a systematic review. *Eur J Pub Health* 2010;20:422–32.
18. den Daas C, Goenee M, Bakker BH, *et al*. Comparing databases: determinants of sexually transmitted infections, HIV diagnoses, and lack of HIV testing among men who have sex with men. *BMC Public Health* 2015;15:1114.