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Special Edition: HIV/AIDS and other sexually transmitted infections (STD) in men who have sex with men (MSM)

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Contents

REVIEW ARTICLES

NEWS

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HIV/AIDS and other STI in men who have sex with men – a continuous challenge for public health

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World Aids Day provides a good opportunity to take stock of the status of the HIV/AIDS epidemics in Europe and to reflect on achievements made and ongoing challenges. As shown in a rapid communication in this week's special issue of Eurosurveillance, HIV and AIDS remain a threat to public health in the European Union (EU) and the European Economic Area (EEA). Nearly 26,000 newly diagnosed HIV cases were reported for 2008 by the EU and EEA countries [1]. The growing number of new cases of HIV infection presents a burden to public health, health care systems, clinical services and the patients themselves. Over twenty-five years into the epidemic, patterns in Europe have not changed and men who have sex with men (MSM) remain the group most affected. A special issue of Eurosurveillance published on 26 November and 3 December, brings together a number of articles that address the most important issues related to HIV and sexually transmitted infections (STI) in MSM. There is accumulating evidence that the number of newly diagnosed HIV cases among MSM has been increasing in recent years, including recently acquired and acute infection [2].

Monitoring of risk behaviour is of crucial importance for obtaining relevant information on the context in which HIV transmission occurs. European study by Elford *et al.* showed that 14 EU/EEA countries had a system for behavioural surveillance among MSM while additional four conducted behavioural surveys or similar studies in this subpopulation [3]. There is a consensus on the use of common main behavioural indicators such as unprotected anal intercourse, condom use, number of partners, HIV testing; while specific indicators vary considerably across countries. These results demonstrate a clear need for harmonisation of methods and indicators to obtain comparable data in Europe.

Monitoring of risk behaviour provides evidence of the effects of specific preventive interventions, especially when this information is collected linked with data on the prevalence of HIV and STI. For instance, the risk reduction strategy used by some MSM to have unprotected anal intercourse with casual partners with known HIV status does present a risk for STI transmission and undoubtedly has contributed to the recent increases of hepatitis C and STI co-infections among HIV-positive MSM [4-7].

The overall increase in proportion of men who engage in sexual risk behaviour such as unprotected sex with casual partners presented in several articles in this issue is of concern but confirms previous studies from Denmark and the United Kingdom [8-11]. Additional evidence of risk behaviour among MSM follows from a virological study by Cuevas *et al.* who showed that HIV cases in MSM could be frequently grouped in large transmission clusters whereas clusters detected in heterosexual patients were mostly two-person clusters [12].

Monitoring of risk behaviour provides evidence of the effects of specific preventive interventions, especially when this information is collected linked with data on the prevalence of HIV and STI.

The study by Folch *et al.* also demonstrates the circumstances in which unprotected anal intercourse is more likely to happen with casual partners. It is associated with the use of different drugs, a large number of sexual partners, the use of the internet to meet sexual partners, and low self-esteem. The authors showed that men who found it difficult to live with their homo/bisexuality were more likely to have unprotected sex with casual partners, putting themselves at risk for STI and HIV [8].

Serosorting can be a strategy to reduce HIV transmission however it also carries an important risk as often the serostatus is assumed. Also, the perception of one's own serostatus may be false, as suggested by Velter *et al.*, as a fraction of the MSM who believe to be HIV-negative could in fact be infected [9]. Serosorting could in fact contribute to the risk of HIV transmission as was shown in other studies as well [13,14].

The use of serosorting was shown to be more prevalent among HIV-negative than among HIV-positive men in France [9]. Serosorting was associated with having less partners and lower level of drug use in HIV-negative men. In HIV-positive men serosorting was associated with the use of the internet to meet sexual partners and was less frequent among those who used cruising venues. The internet is a relatively new tool for MSM to meet sexual partners and for researchers to recruit MSM for behavioural surveys. It has proven to be useful for research purposes as large sample sizes at relatively low costs can be obtained in the context of a lacking proper sampling frame for MSM. The disadvantage is that samples recruited via the internet may not be representative for the MSM population and tend to overestimate the true risk of STI and HIV in the population [3].

A study in six cities in Southern and Eastern Europe shows that the HIV prevalence rates range between 17% in Barcelona,5% in Bucharest and Ljubljana, and 3% in Prague. The low prevalence in Eastern European cities is encouraging; however, the Mirandola et al also report a high level of risk behaviour and lower frequency of HIV test seeking behaviour, suggesting that there is a clear potential for increased HIV transmission [15]. HIV testing is an important indicator of the health care system's ability to reach MSM and to efficiently provide access to screening. In their study a lower access in Eastern European cities is reported as compared with Southern European cities. Maintaining lower levels of HIV among MSM require continued preventive efforts. This is also the conclusion of Tripathi *et al.* who describe high-risk behaviour in MSM and diversity in knowledge on HIV transmission for Estonia, a country with a high prevalence of HIV infection in injecting drug users [16].

Several studies in the Eurosurveillance special issue describe trends in concurrent STI and HIV among men who have sex with men. The number of syphilis cases among MSM has increased considerably in Western European countries in the past decade but Savage et al suggest that MSM in Central Europe are becoming an important risk group as well [17]. This finding is consistent with the report from Slovenia by Klavs et al which describes increasing trends of syphilis and HIV among MSM [18]. An increasing number of lymphogranuloma venereum (LGV) cases has been recently reported by several Western European countries, with close to 80% of cases being HIV-positive [19]. The slowly evolving LGV epidemic among HIV-positive MSM poses questions regarding risk factors and acquisition of infection.

Increasing trends in HIV among MSM are reported by Sasse and Defraye for Belgium [20], Semaille *et al.* for France [21], and by Diaz *et al.* for Spain [22]. Although this could be due to increased HIV testing, it is shown in Belgium that the number of tests has remained stable over time [20]. In France, about 50% of the newly diagnosed HIV infections in MSM in 2003-2008 were recently infected and high rates of co-infection with syphilis and LGV were reported [21]. On the other hand, data from Belgium and Slovenia show that a considerable proportion of HIV-positive MSM are diagnosed late (CD4 < 200 or AIDS diagnosed within three months). It is of concern that many HIV diagnoses take place during STI consultation (11% of the new HIV diagnoses in Belgium). The Belgian authors suggest implementing behavioural surveillance and qualitative research to improve effective prevention campaigns [20]. Similar conditions are described in the paper from Spain which shows high HIV prevalence rates among syphilis patients, highlighting the importance of the availability of information on HIV and STI co-infections, as this is usually not covered by the national surveillance system for HIV and STI [22].

Simultaneous infection with HIV and STI affects the progression and treatment of both HIV and other STI [23,24]. Co-infection with hepatitis poses serious clinical complications, HIV/HCV co-infection is associated with lower rates of spontaneous viral clearance, accelerated progression of liver disease and less favourable treatment outcome, as covered in the review by Urbanus *et al.* [5,24]. The emergence of hepatitis C among HIV-positive MSM is poorly understood; it raises questions in respect to the transmission of hepatitis C which seems to be associated with rough sexual techniques and blood-blood transmission rather than sexual transmission alone [5,25], which is supported by a recent case-control study [26].

Many contributions in this special issue provide evidence that high-risk behaviour is increasing across Europe, HIV transmission is ongoing, increased levels of co-infections are observed and outbreaks of STI continue among MSM. Existing prevention campaigns do not seem sufficient to contain sexual risk behaviours among this group in Europe. Prevention campaigns need to be comprehensive and easy to understand at the same time, address primary prevention (to avoid infection), secondary prevention (to avoid the further spread of infection) and tertiary prevention (to treat the infection and reduce levels of viral load). HIV prevention campaigns promoting regular screening and condom-use should be pursued and limitations of serosorting be highlighted and explained as it exposes both HIV-negative and HIV-positive men to the risk of STI.

More research is needed to better identify the circumstances of HIV and STI transmission in order to optimise target prevention campaigns. The review by Berg shows that, despite the maturity of the HIV epidemic, outcome evaluations of any form of behavioural HIV/STI intervention for MSM in Europe are scarce [27]. Although evidence-based policies and practices are needed to tackle the increasing trends in HIV/AIDS and STI, little research is carried out to evaluate the effectiveness of interventions in MSM.

References

1. Van de Laar MJ, Likatavicius G. HIV and AIDS in the European Union, 2008. Euro Surveill. 2009;14(47):pii=19422. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19422
2. Sullivan PS, Hamouda O, Delpech V, Geduld JE, Prejean J, Semaille C, et al. Reemergence of the HIV epidemic among men who have sex with men in North America, Western Europe, and Australia, 1996-2005. Ann Epidemiol. 2009;19(6):423-31.
3. Elford J, Jeannin A, Spencer B, Gervasoni JP, van de Laar MJ, Dubois-Arber F, et al. HIV and STI behavioural surveillance among men who have sex with men in Europe. Euro Surveill. 2009;14(47):pii=19414. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19414
4. Götz HM, van Doornum G, Niesters HG, den Hollander JG, Thio HB, de Zwart O. A cluster of acute hepatitis C virus infection among men who have sex with men--results from contact tracing and public health implications. AIDS. 2005;19(9):969-74.
5. Urbanus AT, van de Laar TJ, Stolte IG, Schinkel J, Heijman T, Coutinho RA, et al. Hepatitis C virus infections among HIV-infected men who have sex with men: an expanding epidemic. AIDS. 2009;23(12):F1-7.
6. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.
7. Van de Laar MJ. The emergence of LGV in Western Europe: what do we know, what can we do? Euro Surveill. 2006;11(9):pii=641. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=641
8. Folch C, Muñoz R, Zaragoza K, Casabona J. Sexual risk behaviour and its determinants among men who have sex with men in Catalonia, Spain. Euro Surveill. 2009;14(47):pii=19415. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19415
9. Velter A, Bouyssou-Michel A, Arnaud A, Semaille C. Do men who have sex with men use serosorting with casual partners in France? Results of a nationwide survey (ANRS-EN17-Presse Gay 2004). Euro Surveill. 2009;14(47):pii=19416. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19416
10. Cowan SA, Haff J. HIV and risk behaviour among men who have sex with men in Denmark – the 2006 Sex Life Survey. Euro Surveill. 2008;13(48):pii=19050. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19050
11. Elford J, Bolding G, Davis M, Sherr L, Hart G. Trends in sexual behaviour among London homosexual men 1998-2003: implications for HIV prevention and sexual health promotion. Sex Transm Infect. 2004;80(6):451-4.
12. Cuevas MT, Fernández-García A, Sánchez-García A, González-Galeano M,

Pinilla M, Sánchez-Martínez M, et al. Incidence of non-B subtypes of HIV-1 in Galicia, Spain: high frequency and diversity of HIV-1 among men who have sex with men. Euro Surveill. 2009;14(47):pii=19413. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19413

13. Williamson LM, Dodds JP, Mercey DE, Hart GJ, Johnson AM. Sexual risk behaviour and knowledge of HIV status among community samples of gay men in the UK. AIDS. 2008;22(9):1063-70.
14. Eaton LA, Kalichman SC, Cain DN, Cherry C, Stearns HL, Amaral CM, et al. Serosorting sexual partners and risk for HIV among men who have sex with men. Am J Prev Med. 2007;33(6):479-85.
15. Mirandola M, Folch Toda C, Krampac I, Nita I, Stanekova D, Stehlikova D, et al. HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona. Euro Surveill. 2009;14(48):pii=19427. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19427
16. Tripathi A, Rüütel K, Parker RD. Correlates of HIV risk behavior knowledge, substance use and unprotected sex in men who have sex with men in Tallinn, Estonia. Euro Surveill. 2009;14(48):pii=19429. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19429
17. Savage EJ, Hughes G, Ison C, Lowndes CM, the European Surveillance of Sexually Transmitted Infections (ESSTI) network. Syphilis and gonorrhoea in men who have sex with men: a European overview. Euro Surveill. 2009;14(47):pii=19417. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19429http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19417
18. Klavs I, Bergant N, Kastelic Z, Lamut A, Kustec T. Disproportionate and increasing burden of HIV infection among men who have sex with men in Slovenia: surveillance data for 1999-2008. Euro Surveill. 2009;14(47):pii=19419. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19419
19. Savage EJ, van de Laar MJW, Gallay A, van der Sande M, Hamouda O, Sasse A, et al. Lymphogranuloma venereum in Europe. Euro Surveill. 2009;14(48):pii=19428. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19428
20. Sasse A, Defraye A. HIV infections and STI co-infections in men who have sex with men in Belgium: sustained increase in HIV diagnoses. Euro Surveill. 2009;14(47):pii=19420. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19420
21. Semaille C, Cazein F, Lot F, Pillonel J, Le Vu S, Le Strat Y, et al. Recently acquired HIV infection in men who have sex with men (MSM) in France, 2003-2008. Euro Surveill. 2009;14(48):pii =19425. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19425
22. Diaz A, Junquera ML, Esteban V, Martínez B, Pueyo I, Suárez J, et al. HIV/STI co-infection among men who have sex with men in Spain. Eur Surveill. 2009;14(48):pii=19426. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19426
23. Hill C, McKinney E, Lowndes CM, Munro H, Murphy G, Parry JV, et al. Epidemiology of herpes simplex virus types 2 and 1 amongst men who have sex with men attending sexual health clinics in England and Wales: implications for HIV prevention and management . Euro Surveill. 2009;14(47):pii=19418. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19418
24. Urbanus AT, van Houdt R, van de Laar TJ, Coutinho RA. Viral hepatitis among men who have sex with men, epidemiology and public health consequences. Euro Surveill. 2009;14(47):pii=19421. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19421
25. Götz HM, van Doornum G, Niesters HG, den Hollander JG, Thio HB, de Zwart O. A cluster of acute hepatitis C virus infection among men who have sex with men--results from contact tracing and public health implications. AIDS. 2005;19(9):969-74.
26. Danta M, Brown D, Bhagani S, Pybus OG, Sabin CA, Nelson M, et al. Recent epidemic of acute hepatitis C virus in HIV-positive men who have sex with men linked to high-risk sexual behaviours. AIDS. 2007;21(8):983-91.
27. Berg RG. The effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe: A systematic review. Euro Surveill. 2009;14(48):pii=19430. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19430

HIV and AIDS in the European Union, 2008

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HIV infections remain to be of major public health importance in Europe, with evidence of increasing transmission in several European countries. A total of 25,656 diagnosed cases of HIV infection were reported for 2008 by the countries of the European Union and European Economic Area (EU/EEA); data were not available from Austria, Denmark or Liechtenstein. The highest rates were reported by Estonia, Latvia, Portugal and the United Kingdom. In the EU/EEA, the predominant mode of transmission for HIV infection was sex among men who have sex with men (MSM, 40%) followed by heterosexual contact (29%), when cases in persons originating from countries with generalised epidemics were excluded. Injecting drug use accounted for 6% of the reported cases. Overall, despite incomplete reporting, the number of HIV cases in 2008 has increased while the number of reported AIDS cases continued to decline except in the Baltic States. The data presented have some limitations, due to missing data from a number of countries, limiting the conclusions that can be drawn with respect to the size of the HIV and AIDS epidemics in Europe.

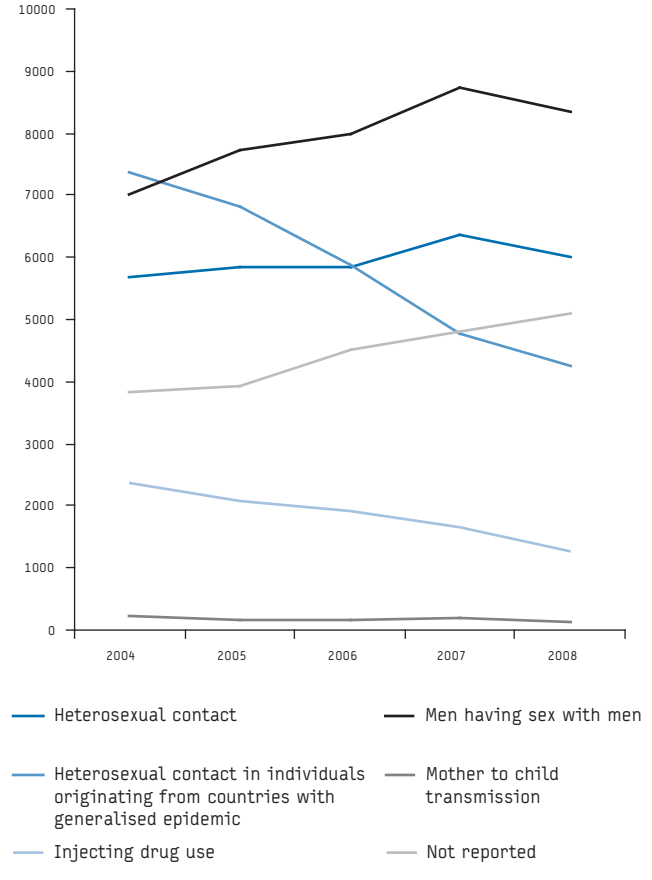
Since January 2008, the European Centre for Disease Prevention and Control (ECDC) and the World Health Organization (WHO) Regional Office for Europe have jointly carried out the HIV/AIDS surveillance in Europe. Data were collected from all countries in the WHO European region in September-October 2009. This rapid communication presents the main findings for the European Union and European Economic Area (EU/EEA) countries which will be included in a comprehensive report on the surveillance of HIV/AIDS in Europe 2008 on the occasion of World-AIDS day [1].

In total 25,656 cases of HIV infection were diagnosed and reported for 2008 by 27 of the 30 EU/EEA countries (61 cases per million population); data were missing for Austria, Denmark and Liechtenstein; data from Spain and Italy do not have a national coverage. The three countries with the highest rates of newly diagnosed HIV cases in 2008 were Estonia (406/million; 545 cases), Latvia (158/million; 358 cases) and the United Kingdom (119/million; 7,298 cases). Furthermore, rates of around 100 HIV cases per million population were reported by Portugal (106/million; 1,124 cases), Belgium (101/million; 1,079 cases), Luxembourg (97/million; 47 cases) and Italy (97/million; 1,958 cases). Among those cases for which age and sex were reported, 13 per cent were individuals between 15 and 24 years of age and 30% were women. The predominant mode of transmission is sexual contact among men who have sex with men (MSM) (40%), followed by heterosexual contact (29%), when individuals from countries with generalised epidemics (19% of all diagnosed HIV cases) are excluded. Injecting drug use accounted for 6% of diagnosed HIV cases.

Among the 23 countries that have consistently reported data since 2000, the rate of diagnosed cases of HIV per million has increased by 37% from 42 per million in 2000 (13,265 cases) to 56 per million (18,019 cases) in 2008. Rates of diagnosed cases of HIV have doubled in Bulgaria, Czech Republic, Hungary, the Netherlands, Slovakia, Slovenia; rates have increased by more than 50% in Germany, Norway, Lithuania and the United Kingdom and rates have decreased by more than 20% in Latvia, Portugal and

Figure 1

HIV infections by transmission mode and origin by year of diagnosis, European Union (EU) and European Economic Area (EEA), 2004–2008



Source: HIV/AIDS surveillance report 2008

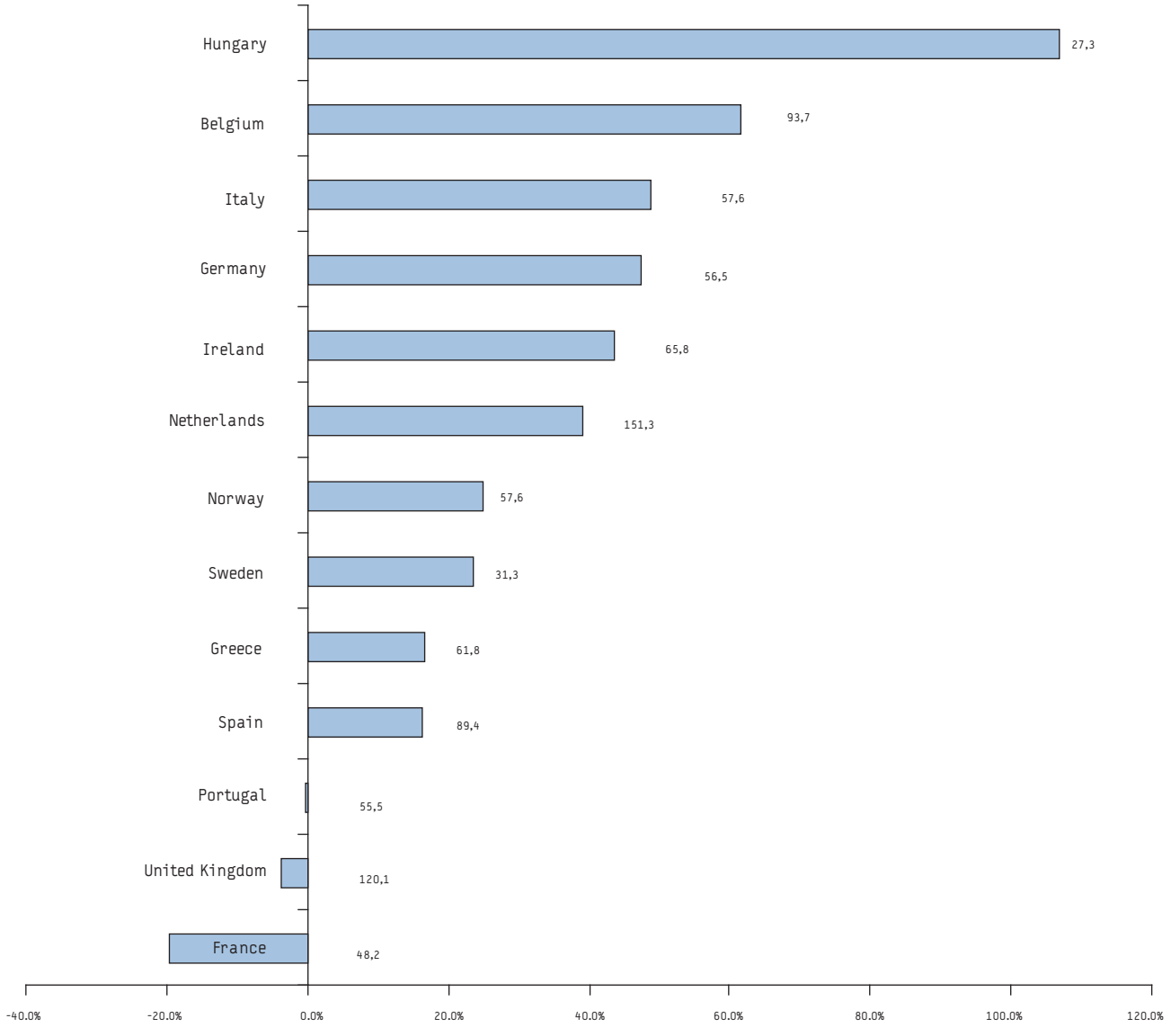
Romania. The trend data have to be interpreted with caution as reporting delays affect the actual numbers for most recent years as well as changes in reporting systems, targeting populations at risk and uptake of HIV testing may affect the numbers.

The number of HIV cases among men who have sex with men (MSM) has increased by 19% between 2004 and 2008 (Figure 1). The rate of HIV infections diagnosed in MSM as of the total male population (aged 15 – 65) ranged from 25 per million male population to 151 per million in countries that had reported at least 50 MSM diagnosed with HIV in 2008. A rate of more than 100 per million male population was found in the United Kingdom and the Netherlands. In most of the countries, diagnosed HIV cases increased between 2004 and 2008, as shown in figure 2.

The number of heterosexually acquired cases has remained fairly stable at around 6,000 cases. However, the number of cases originating from countries with generalised epidemics amongst heterosexually acquired cases decreased by 42% from 7,364 in 2004 to 4,267 in 2008. In 2008, 25 countries provided information on the origin of the cases and on the probable source of infection where the infection was acquired through heterosexual contact. In these countries, 4,267 (42%) cases were among individuals originating from countries with generalised epidemics, 113 (1%) had (or have had) a high-risk partner and 382 (4%) have had a partner from countries with generalised epidemics. The probable source of infection was unknown for 54% of cases. The proportion of heterosexually transmitted cases from countries with generalised epidemics varied from 0% in Bulgaria, Latvia, Lithuania, Poland and Slovakia to 60% in Belgium, 67% in Ireland and 69% in Norway. Around 50% of the heterosexually

Figure 2

Proportional increase in the rate of HIV infections among men who have sex with men (MSM) per million of male population between 2004 and 2008, and the rate in 2008 (for European Union and European Economic Area countries that reported at least 50 cases in MSM).



transmitted cases in Luxembourg, the Netherlands, Sweden and the United Kingdom were reported in individuals from countries with generalised epidemics.

The number of HIV reports among injecting drug users (IDU) has declined by 41% in the same period. The number of cases with unknown risk factors increased by 33% (from 3,817 to 5,083).

A total of 5,218 cases of AIDS were diagnosed in the EU/EEA countries in 2008 (no data from Denmark, Sweden or Liechtenstein), representing a rate of 11 cases per million population. The highest rates were reported by Estonia (46/million; 61 cases), Latvia (44/million; 99 cases), Portugal (36/million; 387 cases), and Spain (29/million; 1,170 cases). Since 2000, the number of reported AIDS cases diagnosed has declined by 36% in 2007 and more than 50% in 2008. The steady decrease in the number of AIDS diagnoses during this period could be due to the availability of highly active antiretroviral therapy (HAART), under-reporting and reporting delay particularly in the most recent years. During this period, the number of reported AIDS cases diagnosed has increased in ten and decreased in 17 countries. The largest increase was reported by Estonia, from three cases in 2000 (2/million) to 61 (46/million) in 2008. Other substantial increases (doubled or more) were observed in Latvia and Lithuania.

Conclusions

The highest proportion of the total number of HIV cases in EU/EFTA countries was reported among MSM. Despite the relatively low absolute number of cases diagnosed in these groups, IDU and MSM are disproportionately affected by the HIV epidemic compared with the heterosexual population because of the relatively small sizes of the populations and the high levels of HIV in these groups. National prevention programmes aimed at reducing HIV transmission within Europe should have a strong focus on MSM and take IDU into account. In addition, although, heterosexual HIV transmission remains important and is increasing in several countries, a considerable proportion of heterosexually acquired cases are diagnosed in persons originating from countries with generalised epidemics. As these populations affect the HIV and AIDS epidemics in Europe they should also be targeted in national prevention programmes and their access to treatment and care services should be ensured. Although there seems to be a decline in the number of new diagnoses among IDU, injecting drug use is still the predominant transmission mode in the Baltic States.

Enhanced surveillance of HIV and AIDS in Europe is essential to provide the information that is necessary to monitor the epidemic and evaluate the public health response to control the transmission of infections. In order to achieve this aim, countries in Europe need to ensure that surveillance data is of high quality, and to provide complete case reports with HIV and AIDS surveillance data. Achieving full coverage of reporting in all countries in Europe is of paramount importance.

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References

1. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. HIV/AIDS surveillance in Europe 2008: Stockholm, European Centre for Disease Prevention and Control; 2009 [in press]

Incidence of non-B subtypes of HIV-1 in Galicia, Spain: high frequency and diversity of HIV-1 among men who have sex with men

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An increase in HIV transmission among men who have sex with men (MSM) has been reported in eight regions of Spain from 2003 to 2007. In order to study the incidence of HIV-1 genetic forms in Galicia, northwest of Spain, in particular the spread of HIV-1 variants among MSM, 93 newly diagnosed HIV-1 patients, including those with acute and recently acquired infections, were studied for a year from August 2008 to August 2009. Thirty eight (41%) were MSM. Of them, nine (24%) were infected by non-B viruses, including seven different genetic forms. The analysis of transmission clusters showed that 23 (60%) MSM grouped in different clusters and mostly in large clusters. Resistance mutations were detected in six (16%) MSM.

Introduction

Subtype B of HIV-1 is the most prevalent in Western Europe, including Spain, however, an increase in the circulation of non-B subtypes has been observed in recent years [1,2]. Another trend is the increase in HIV transmission among MSM, a phenomenon recently described in eight countries in North America, Western Europe and Australia [3].

The objective of this survey was to study the incidence of HIV-1 genetic forms in Galicia, north-western Spain, in particular the spread of HIV-1 variants among MSM.

Patients and methods

A total of 93 newly diagnosed HIV-1 patients, 72 males and 21 females who attended six hospitals of the Public Health Service of Galicia, Spain, were recruited from August 2008 to August 2009. Seventy nine (85%) were born in Spain and 14 (15%) were foreigners. Sixteen patients (17%) were at the early phase of infection, including nine with acute and seven with recently acquired infection. Transmission route was mainly by sexual contact (84%), less frequent was injecting drug use (16%).

Of the patients included in the study 38 (41%) were MSM. Of them, 32 were born in Spain. Their average age was 30.6 years (excluding a 73-year-old man), lower than the average of age of heterosexual patients (44.3 years).

RNA was extracted from plasma and amplified by RT-PCR in *pol* region, corresponding to protease and partial reverse transcriptase (PR-RT), (HXB2 positions 2107 to 3630). Sequences were assembled using Seqman software and edited with Bioedit program. For subtype assignment, phylogenetic trees were done with Mega software (http://www.megasoftware.net/) using neighbour joining method and Rega software was also used (http://dbpartners.stanford.edu/RegaSubtyping/). Resistance mutations were defined following Standford Database criteria (http://hivdb.stanford.edu/). Transmission clusters were also analysed and defined as those sequences which grouped together with a bootstrap value >=70%, following the criteria of Hillis et al. [4], where a bootstrap proportion of >=70% usually corresponds to a probability of >=95% that the corresponding clade is real. Simplot programme was used to analyse recombinants by bootscanning [5].

Results

Twenty eight (30%) patients, including 22 Spanish, were infected with non-B subtypes, with a high diversity: four pure subtypes (A, C, G, F1), four circulating recombinant forms (CRFs) (CRF01_AE, CRF02_AG, CRF12_BF, CRF24_BG) and three unique recombinant forms (URFs) (BG, BF, DB). Subtype F and BF recombinants represented 25% of non-B subtype viruses. Fifteen (54%) non-B viruses corresponded to acute and recently acquired infections (subtypes F1, G, CRF24_BG and URF BG).

Of the 38 MSM included in the study, nine (24%) were infected with non-B viruses (two F1, two CRF12_BF, one C, one CRF24_BG, one CRF01_AE, one DB and one G). Of the nine MSM with non-B subtypes, seven were Spanish, one was from Argentina (CRF12_BF) and one from Cuba (G).

The phylogenetic tree including transmission clusters is shown in Figure 1. Only bootstrap values >=70%, considered significant, are indicated in the tree. On the whole, 45 (48%) patients, including 23 of the 38 MSM (60%), could be grouped in different clusters. Their characteristics are presented in the Table. It is worth mentioning that the clusters include four patients with acute and five patients with recently acquired infection.

We identified a total of 17 clusters: one formed by nine patients, four including three individuals and 12 two-person clusters. Although in our study a bootstrap proportion of >=70% was considered significant [4], it is to be underlined that all but two clusters were grouped with a bootstrap value close to 100%. The samples X2558 and X2578, corresponding to IDU patients and included in the only cluster with a bootstrap value of 70%, were analysed more in-depth by bootscanning (Figure 2A and B). One of these samples (X2578) was defined as subtype B strain and the other (X-2558) resulted a BG recombinant with a recombination point at position 2700 (HXB2). In the second plot (Figure 2B) it is shown that subtype B sequence of this BG recombinant grouped with the B sequence of X-2578. The fact that both samples only shared a fragment of PR/RT sequence could be the cause of the bootstrap value of 70%.

Of the 23 MSM who were grouped in transmission clusters, it is worth mentioning that seven were included in the large cluster, six in two clusters of three patients and six in two-person clusters, all of them infected with subtype B. The remaining four MSM were grouped with non-MSM patients, as follows: one in a cluster of three individuals infected with subtype F, and three in two-person clusters infected with subtype B, G and CRF12_BF, respectively. Most of the MSM who were grouped in transmission clusters attended the same hospital (Xeral-Cies, Vigo, Pontevedra)

Resistance mutations were detected in 17 (18%) samples: two against nucleoside RT inhibitors (RTIs), nine against non nucleoside RTI (NNRTIs), four against both classes of RTIs, one against PR inhibitors (PRIs), and one against both PRI and NNRTIs. Of the 17 resistance samples, six corresponded to MSM, four subtype B, one DB recombinant and one CRF12_BF. Resistance mutations against NNRTIs were detected in three patients, two against NRTIs and NNRTIs and one against NNRTIs and PRIs.

The majority of resistance strains (nine out of 17) were part of the transmission clusters. The most frequent mutation was K103N, detected in six patients, three of them were MSM included in one transmission cluster.

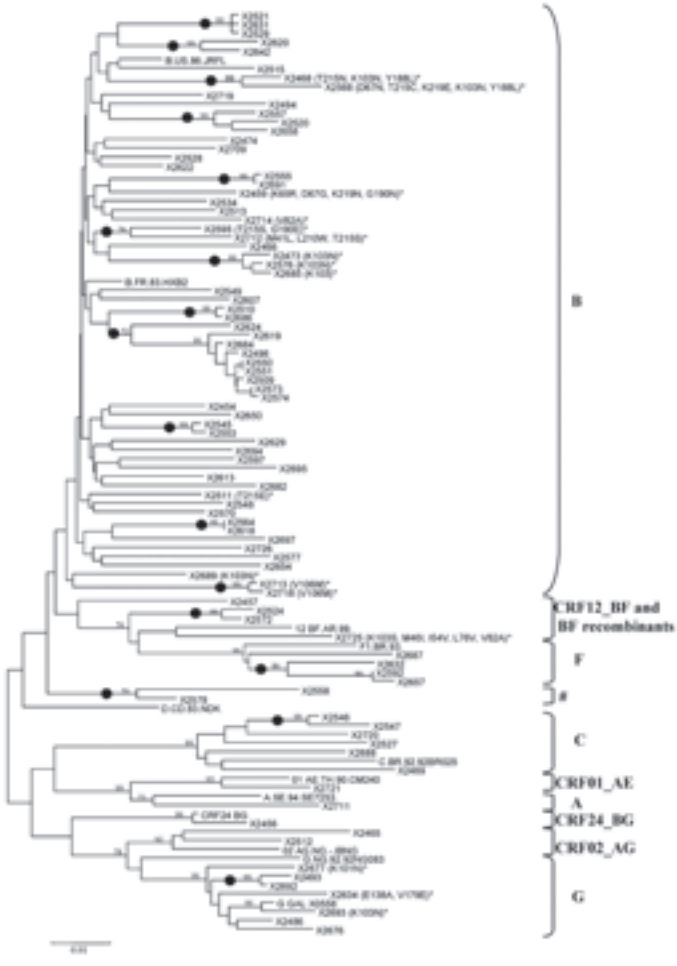
Discussion

Of the newly diagnosed HIV-1 patients included in our study, 41% were MSM, which adds evidence to the observation of increasing transmission among this risk group. This is in line with earlier findings indicating an increase in the percentage of MSM among newly diagnosed HIV cases in Galicia from 31% in 2006 to 33% in 2007 (data not published). In another study with 261 newly diagnosed patients from the Basque Country, Spain, we noted an increase in the proportion of MSM from 15.7% in 2004 to 51.2% in 2007 [2]. These results are in agreement with studies from other industrialised countries [3,6], underlining that efforts are required to target HIV prevention measures specifically at MSM.

A high prevalence (30%) of HIV-1 non-B subtypes and a high HIV-1 diversity have been detected in our study, indicating an

Figure 1

Phylogenetic analysis of newly diagnosed HIV cases, Galicia, Spain, 2008-2009



Neighbour-joining algorithm implemented in Molecular Evolutionary Genetic Analysis (MEGA) version 3.1 was used to build the phylogenetic tree of newly diagnosed patients from Galicia. One hundred bootstrap replicates were used to assess the reliability of tree topologies. Bootstrap values of 70% or higher, considered as significant, were included in the tree. Clusters are indicated with dots. Reference of the specific subtype G strain which is circulating in Galicia is included with the name G GAL XO558. Resistance mutations are also included in brackets and highlighted with an asterisk. The # symbol was used to mark a cluster formed by a BG sample and a B sample as is shown in Figure 2. The sequence X2556 has been excluded because it showed mixtures.

Table

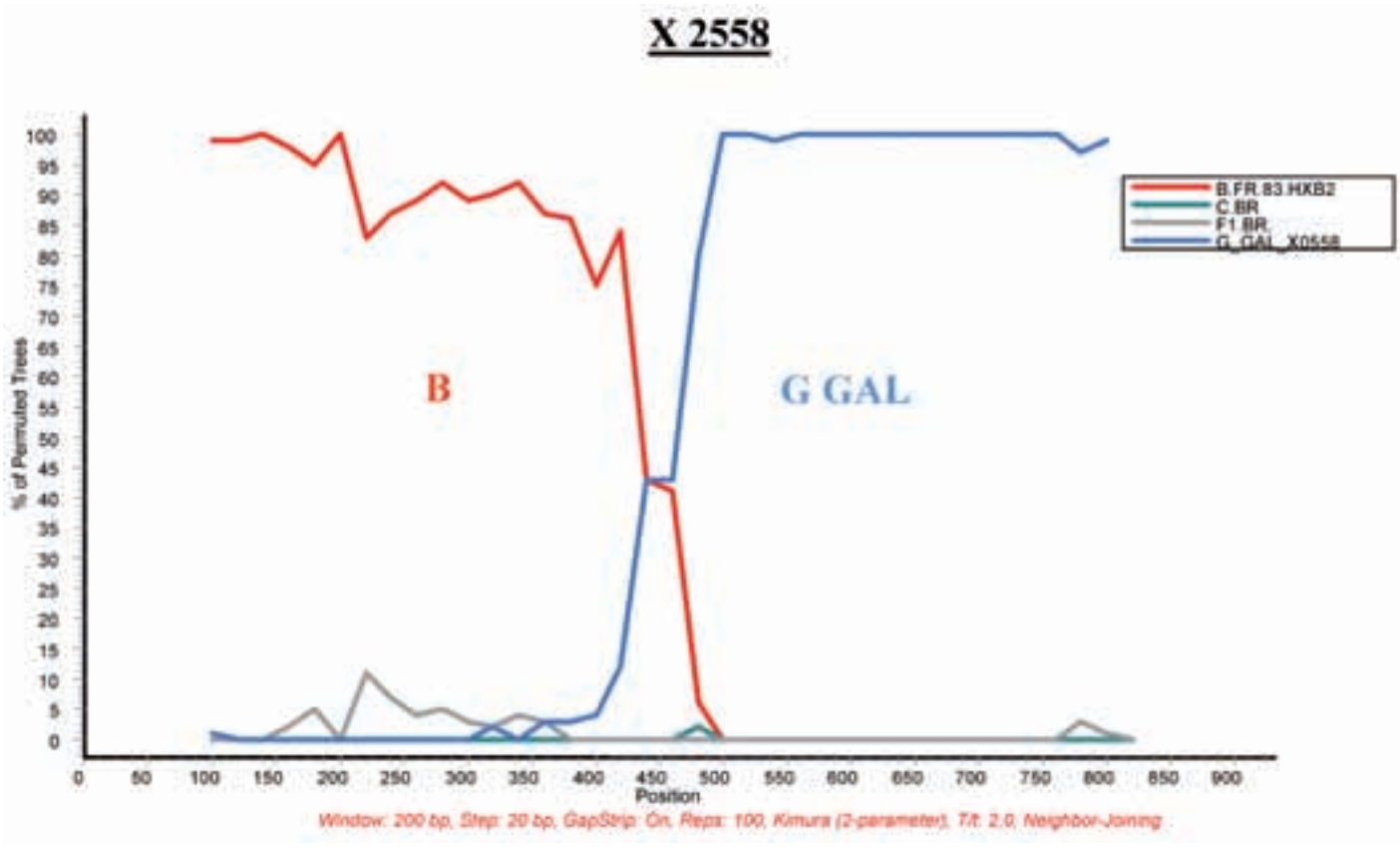
Characteristics of HIV patients grouped in transmission clusters based on phylogenetic analysis, Galicia, Spain, 2008-2009

HIV genetic form	Number of clusters	Number of patients	Gender		Transmission mode		
			M	F	MSM	HT	IDU
B	13*	36	29	7	20	9	7
G	1	2	2		1	1	
F1	1	3	1	2	1	2	
C	1	2	1	1		2	
CRF12_BF	1	2	1	1	1	1	
TOTAL	17	45	34	11	23	15	7

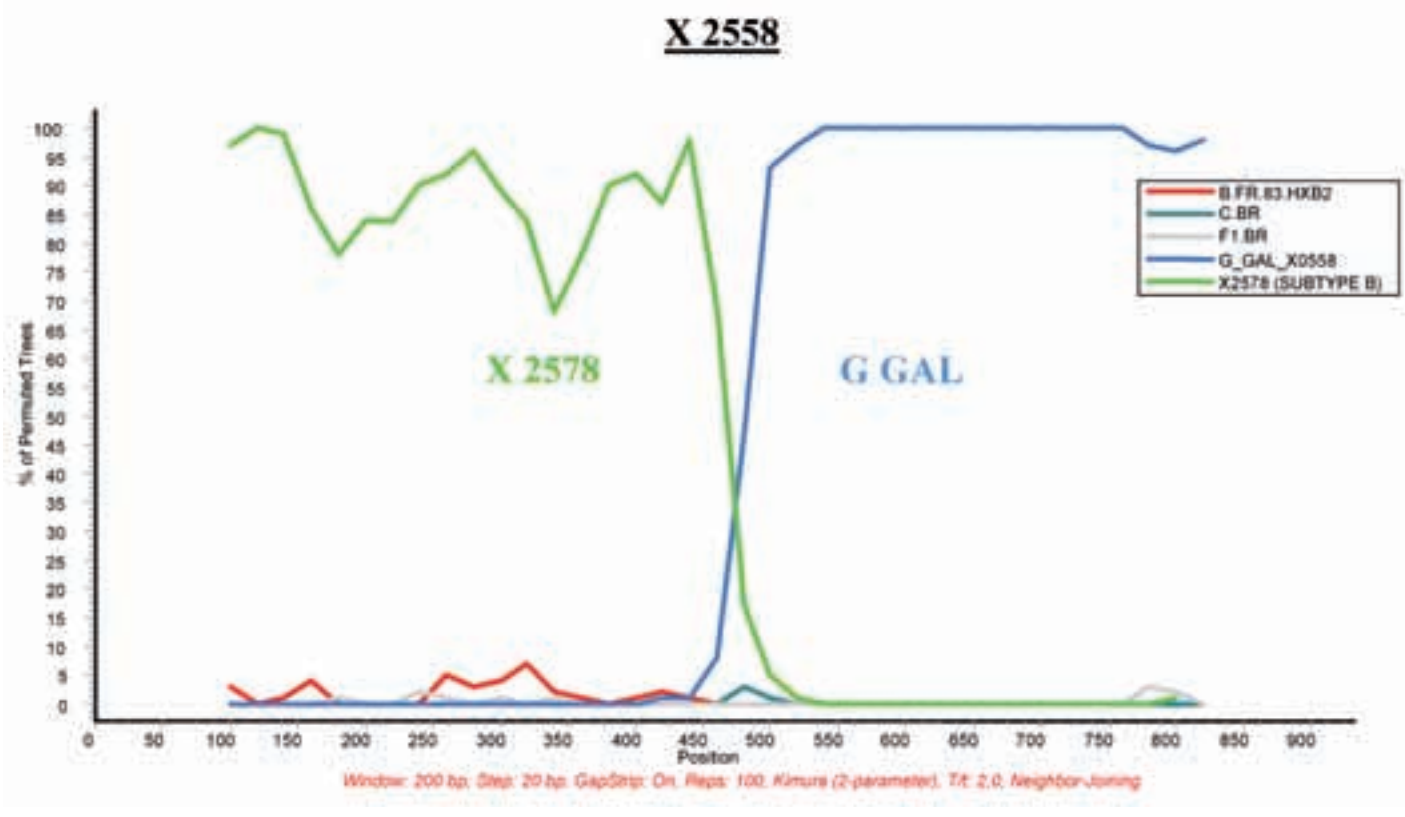
M: male, F: female, MSM: men who have sex with men, HT: heterosexual contact; IDU: injecting drug use.
* One of these clusters is composed by a B strain and a BG recombinant.

Figure 2

Bootscan analysis of pol sequence of sample X2558



A) The horizontal axis represents the nucleotide position of the midpoint of the window from the 5´end of protease, and the vertical axis represents the bootstrap value supporting clustering with the corresponding subtype. A window size of 200 nt and a step size of 20 nt was used. Reliability of tree topologies was assessed with 100 bootstrap replicates for each window. Neighbour-joining trees were constructed using Kimura´s two-parameter distances. The plot shows a recombination between subtype B and G. The reference subtype G used (G_GAL_X0558) is subtype G circulating in Galicia and Portugal.



B) The horizontal axis represents the nucleotide position of the midpoint of the window from the 5´end of protease, and the vertical axis represents the bootstrap value supporting clustering with the corresponding subtype. A window size of 200 nt and a step size of 20 nt was used. Reliability of tree topologies was assessed with 100 bootstrap replicates for each window. Neighbour-joining trees were constructed using Kimura´s two-parameter distances The sequence X2578, corresponding to the sequence clustering with X2558 in the initial analysis, was also used as subtype B reference, showing that the B sequence of X-2558 clustered with X2578 instead of B reference.

increase in comparison with the results of previous studies in this area [7,8]. Most (79%) of the non-B subtype strains were found in the native Spanish population. It is worth mentioning that non-B subtypes were also detected in patients with acute or recently acquired infection, indicating that these might be the most commonly viruses circulating in Galicia at the time of this survey.

The proportion of non-B subtypes among MSM (24%) was similar between Spanish and non-Spanish patients and higher than that described in an Italian survey [9], although in this study a higher frequency among non-Italian patients was detected. In our study, nine different genetics forms were detected, including subtypes, CRFs and URFs. It is worth mentioning the presence of subtype G among MSM, because this subtype was initially transmitted among intravenous drug users [8].

A high proportion of patients, close to half, were phylogenetically clustered. This result is in agreement with the results of Lee et al. [10] whose study focussed on acute and recent drug-naïve seroconverters. It is worth mentioning that 23 out 38 (61%) MSM were grouped in transmission clusters and most frequently in large clusters, whereas clusters detected in heterosexual patients were mostly two-person clusters. Although in our study a bootstrap proportion of >=70% was considered significant [2,4,11], it is notable that all but two clusters were grouped with a bootstrap value close to 100%, data that are in agreement with other authors [12], suggesting a common origin of the infection.

One of the most important problems related to newly diagnosed patients is the presence of transmitted resistance mutations which can persist throughout the years, limiting the future treatments [13]. This problem becomes aggravated when newly diagnosed patients and treated patients harbouring resistance mutations [2,14] take part in the same transmission clusters [2,14], facilitating the spread of these resistance strains. In our study most of the resistance strains (nine out of 17) were part of transmission clusters, and three out of six patients with K103N resistance mutation constituted one cluster of three MSM.

In conclusion, our results showed an increase in HIV-1 transmission among MSM, showing a high variability of genetic forms. A high proportion of MSM were grouped in transmission clusters, suggesting an increase in sexual risk behaviour in this group.

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The sequences reported in this article have been sent to GenBank, the accession numbers are: GU326099-GU326190. [added on 7 January 2010.]

References

1. Madeddu G, Rezza G, Mura MS. Trends in European HIV/AIDS epidemic: a prespective from Italy. Expert Rev Anti Infect Ther. 2009;7(1):25-36.
2. Cuevas MT, Muñoz-Nieto M, Thomson MM, Delgado E, Iribarren JA, Cilla G, et al. HIV-1 transmission cluster with T215D revertant mutation among newly diagnosed patients from the Basque Country, Spain. J Acquir Immune Defic Syndr. 2009;51(1):99-103.
3. Sullivan PS, Hamouda O, Delpech V, Geduld JE, Prejean J, Semaille C, et al. Reemergence of the HIV epidemic among men who have sex with men in North America, Western Europe, and Australia, 1996-2005. Ann Epidemiol. 2009;19(6):423-31.
4. Hillis DM, Bull JJ. An empirical test of bootstrapping as a method for assessing confidence in phylogenetic analysis. Systematic Biology 1993;42(2):182-192.
5. Salminen MO, Carr JK, Burke DS, McCutchan FE. Identification of breakpoints in intergenotypic recombinant of HIV-1 by bootscanning. AIDS Res Hum Retroviruses. 1995;11(11):1423-5.
6. Stall R, Duran L, Wisniewski SR, Friedman MS, Marshal MP, McFarland W, et al. Running in place: implications of HIV incidence estimates among urban men who have sex with men in the United States and other industrialized countries. AIDS Behav. 2009;13(4):615-29.
7. Pérez-Alvarez L, Carmona R, Muñoz M, Delgado E, Thomson MM, Contreras G, et al. High incidence of non-B and recombinant HIV-1 strains in newly diagnosed patients in Galicia, Spain: study of genotypic resistance. Antivir Ther. 2003;8(4):355-60.
8. Thomson MM, Delgado E, Manjón N, Ocampo A, Villahermosa ML, Mariño A, et al. HIV-1 genetic diversity in Galicia Spain: BG intersubtype recombinant viruses circulating among injecting drug users. AIDS. 2001;15(4):509-16.
9. Giuliani M, Montieri S, Palamara G, Latini A, Alteri C, Perno CF, et al. Non-B HIV type 1 subtypes among men who have sex with men in Rome, Italy. AIDS Res Hum Retroviruses. 2009;25(2):157-64.
10. Lee C, Sun YJ, Barkham T, Leo YS. Primary drug resistance and transmission analysis of HIV-1 in acute and recent drug-naïve seroconverters in Singapore. HIV Med. 2009;10(6):370-7.
11. Cardoso LP, Queiroz BB, Stefani MM. HIV-1 pol phylogentic diversity and antiretroviral resistance mutations in treated naïve patients from Central West Brazil. J Clin Virol46(2):134-9.
12. Hue S, Clewley JP, Cane PA, Pillay D. HIV-1 pol gene variation is sufficient for reconstruction in the era of antiretroviral therapy. AIDS. 2004;18(5):719-28.
13. Hué S, Gifford RJ, Dunn D, Fernhill E, Pillay D, UK Collaborative Group on HIV Drug Resistance. Demonstration of sustained drug-resistance human immunodeficiency virus type 1 lineages circulating among treatment-naïve individuals. J Virol. 2009;83(6):2645-54.
14. Cuevas MT, Thomson MM, Delgado E, Fernandez-García A, Trigo M, Rodríguez A, et al. HIV-1 transmission clusters: a major issue for epidemiological surveillance studies and resistance mutations transmission. Reviews in Antiviral Therapy. 2009;7: 22-23.

Symptomatic primary HIV infection in a 49-year-old man who has sex with men: beware of the window phase

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A 49-year-old man with a history of receptive unprotected anal intercourse with multiple anonymous men presented with a symptomatic primary HIV infection. Upon his initial visit the rapid HIV antibody screening test was negative but a p24 antigen test suggested a highly infectious phase in the HIV infection. An immunoblot assay confirmed the HIV diagnosis only 14 days later. Recent infections are characterised by a highly infectious phase and, if gone unnoticed, can have a large contribution to the ongoing transmission of HIV. Healthcare providers should be aware of primary HIV infection and the pitfalls in its diagnosis.

Case report

A 49-year-old man visited the Amsterdam STI outpatient clinic in the fall of 2009 with fever, malaise, generalised rash, anal itching and rectal discharge after unprotected receptive anal and oral intercourse with an anonymous partner in a gay cinema one week before. In the last six months he had engaged in protected and unprotected receptive anal and oral intercourse with 15 different male partners. The last HIV test was performed one year ago and gave a negative test result. He was treated for a syphilis infection with unknown duration in 2004.

The patient presented with fever (39.2 degrees Celsius), generalised erythemato-squamous rash, generalised lymphadenopathy, erythematous pharyngeal mucosa and perianal ulceration. Anoscopy revealed erythematous rectal mucosa which bled easily upon manipulation.

Laboratory findings and follow up

The patient was routinely screened for syphilis, *Neisseria gonorrhoeae, Chlamydia trachomatis,* HIV and hepatitis B, according to the standard protocol described before [1]. Awaiting definite results of syphilis serology (*Treponema pallidum* particle agglutination assay, TPPA), secondary stage syphilis was excluded with a directly performed Rapid Plasma Reagin card test (RPR nosticon II, bioMerieux, France). The direct RPR card test was non reactive in both 1:1 and 1:32 serum dilutions. Also, a point of care rapid HIV ELISA antibody test (Determine HIV 1/2, Inverness Medical, United Kingdom) was negative. A Gram-stained smear obtained during anoscopy from the rectal mucosa showed more than 10 polymorphic nucleated leucocytes (PMNL) per high power field without intracellular diplococci, suggestive for a non-specific proctitis. Based on these preliminary results the patient was treated with doxycycline 100 mg twice a day and requested to return seven days later for additional results and follow-up.

From the rectal site a *N. gonorrhoeae* strain was cultivated which showed resistance to ciprofloxacin and tetracycline, intermediate resistance to penicillin and reduced susceptibility to cefotaxime (with a minimal inhibitory concentration [MIC] of 0.19 µg/ml). *C. trachomatis* infection was excluded with a nucleic acid amplification assay (Aptima combo, Tigris, Genprobe, United States) performed on a rectal swab and a first void urine sample. Syphilis serology was in concordance with a past, adequately treated, syphilis infection (TPPA 1:160, RPR negative, FTA-absorption positive, *Treponema pallidum* immunoblot positive). A polymerase chain reaction of the swab taken from the rectal ulcer was negative for *Treponema pallidum*, herpes simplex virus type 1 and 2 and varicella zoster virus [2,3]. Hepatitis B serology was indicative for a past recovered infection (hepatitis B core antibody positive, hepatitis B surface antigen negative). The rectal gonorrhoea infection was additionally treated with 500 mg ceftriaxone in one intra-muscular dose, while the doxycycline regimen was discontinued.

An HIV antigen/antibody (Ag/Ab) COMBO assay (AxSYM HIV Ag/Ab Combo, Abbott, United States) performed on the serum sample obtained during the initial visit showed a weak positive result (1.22 s/co). Since we suspected a primary symptomatic HIV infection, and according to routine laboratory procedures, the serum was further tested for the presence of HIV p24 antigen (VIDAS HIV P24, bioMérieux, France), and showed a positive result (31.2 pg/ml). The immunoblot analysis (INNO-LIA HIV I/II Score, Innogenetics, Belgium) was negative for all antigen bands. Based on these test results from the initial visit, the official criteria for an HIV diagnosis could not be met. Upon return seven days after the initial visit, the skin symptoms, proctitis complaints and fever had subsided. Again, the HIV Ag/Ab COMBO assay was weak positive (1.43 s/

co), the HIV p24 antigen load was 17.6 pg/ml and all bands in the immunoblot were negative. Only 14 days after the initial visit the HIV Ag/Ab COMBO assay turned positive (5.2 s/co), the HIV p24 antigen load was 64.6 pg/ml. Immunoblot analysis showed positive bands for anti-GP41 and anti-p24 which confirmed the HIV infection. The patient was referred to an HIV treatment centre for further monitoring and care.

Repeated serologic testing for syphilis 14 days after the initial visit showed the same results as before (TPPA 1:160, RPR negative) consistent with an adequately treated syphilis infection. The negative repeat TPPA may still miss an early syphilis infection but, given the negative polymerase chain reaction for *Treponema pallidum* of the swab taken from the rectal ulcer at the initial visit, an early syphilis infection was unlikely.

Discussion and conclusion

We report a 49-year-old male patient with marked exanthema, genital ulcer, and fever suspected for a primary HIV infection. A rapid HIV antibody test was negative at the initial visit. We could only establish the diagnosis 14 days after the initial visit, when the immunoblot turned positive for antibodies against HIV-1.

Primary HIV infections play a key role in the spread of HIV [4,5]. During this first phase, the viral load in blood plasma is high [6,7] and patients can shed high concentrations of HIV through semen, saliva and blood [8,9]. The Rakai study in Uganda showed that the average per-act transmission rate during primary infection equalled 0.03604 per sex encounter compared to 0.00084 per sex encounter for chronic HIV infections. In that same study, primary-phase transmission accounted for 89.1% of all transmission events in the first 20 months of follow-up [10,11]. It is possible that primary-phase transmission is even more frequent for MSM since anal intercourse contributes to transmission risk.

Patients with a primary HIV infection are often unaware of their (positive) HIV status and assuming they are uninfected they continue to engage in high-risk sexual behaviour [12]. Moreover, primary HIV infection can cause mucosal ulceration and, due to the disrupted mucosal barrier, HIV transmission risk is further increased. In our case the patient had peri-anal ulceration possibly due to the primary HIV infection (genital herpes and syphilis were all excluded by negative nucleic acid amplification test results for HSV-1 and 2 and *Treponema pallidum* on ulcer swabs). Both ulcerative and non-ulcerative STI further increase the risk of HIV transmission two- to five-fold [13,14]. Our patient also had a rectal co-infection with a multi-resistant *N. gonorrhoeae* strain with reduced susceptibility to third generation parenteral cephalosporins. We recently reported on a disquieting increase of *N. gonorrhoeae* strains with reduced susceptibility to cephalosporins among MSM [15]. Parenteral cephalosporins are recommended for *N. gonorrhoeae* in most countries nowadays. Further susceptibility reduction towards resistance for cephalosporins would set a serious limitation in available therapy options.

Primary HIV infections are often missed or misdiagnosed as common flu, since HIV viraemia can affect all organs and cause a wide variety of non-specific symptoms like fever, fatigue, exanthema and mucosal ulceration, diarrhoea and airway infection. Hence primary care physicians should be alert for a possible primary HIV infection in patients involved in high risk behaviour, especially if they have influenza-like symptoms.

Single antibody HIV tests in particular can be false negative in primary HIV infections, as it can take on average three to four weeks before HIV antibodies become detectable (the window-phase), as shown again in this case [16,17]. It is therefore generally advised to repeat serologic testing for both HIV and syphilis three months after the last high risk sexual contact. For the detection of a symptomatic primary HIV infection, antibody testing alone is insufficient. Combined HIV antigen/antibody assays reduce the diagnostic window period by circa six days compared to single antibody testing alone [18]. The addition of a Nucleic Acid Amplification Test (NAAT) for HIV RNA to an HIV screening algorithm increases the identification of infected cases with 3.9 percent compared to single antibody testing using enzyme linked assays (EIA) as shown by Pilcher *et al*. [19]. Data on cost-effectiveness are needed before implementation of HIV RNA NAAT assays in screening algorithms is effected. Apart from increased expenses of HIV screening, NAAT testing might add to the turnaround time for test results [20]. A combined HIV antigen/antibody assay as part of a screening algorithm is a good alternative which detects approximately 90% of the acute HIV infections compared to HIV RNA detection in a screening algorithm [21]. Presently we are introducing a rapid combined HIV antigen/antibody assay for screening purposes in our clinic. In cases suspected of symptomatic primary HIV infection with a negative combined HIV antigen/antibody combined assay result, HIV-RNA testing and/or repeated combined HIV testing is advisable.

References

1. Heijman TL, Van der Bij AK, De Vries HJ, Van Leent EJM, Thiesbrummel HF, Fennema HS. Effectiveness of a risk-based visitor-prioritizing system at a sexually transmitted infection outpatient clinic. Sex Transm Dis. 2007;34(7):508-12.
2. Koek AG, Bruisten SM, Dierdorp M, van Dam AP, Templeton K. Specific and sensitive diagnosis of syphilis using a real-time PCR for Treponema pallidum. Clin Microbiol Infect. 2006;12(12):1233-6.
3. Bruisten SM, Cairo I, Fennema H, Pijl A, Buimer M, Peerbooms PG, et al. Diagnosing genital ulcer disease in a clinic for sexually transmitted diseases in Amsterdam, The Netherlands. J Clin Microbiol. 2001;39(2):601-5.
4. Pilcher CD, Tien HC, Eron JJ Jr, Vernazza PL, Leu SY, Stewart PW, et al. Brief but efficient: acute HIV infection and the sexual transmission of HIV. J Infect Dis. 2004;189(10):1785-92.
5. Yerly S, Vora S, Rizzardi P, Chave JP, Vernazza PL, Flepp M, et al. Acute HIV infection: impact on the spread of HIV and transmission of drug resistance. AIDS. 2001;15(17):2287-92.
6. Daar ES, Moudgil T, Meyer RD, Ho DD. Transient high levels of viremia in patients with primary human immunodeficiency virus type 1 infection. N Engl J Med. 1991;324(14):961-4.
7. Clark SJ, Saag MS, Decker WD, Campbell-Hill S, Roberson JL, Veldkamp PJ, et al. High titers of cytopathic virus in plasma of patients with symptomatic primary HIV-1 infection. N Engl J Med. 1991;324(14):954-60.
8. Pilcher CD, Shugars DC, Fiscus SA, Miller WC, Menezes P, Giner J, et al. HIV in body fluids during primary HIV infection: implications for pathogenesis, treatment and public health. AIDS. 2001;15(7):837-45.
9. Tindall B, Evans L, Cunningham P, McQueen P, Hurren L, Vasak E, et al. Identification of HIV-1 in semen following primary HIV-1 infection. AIDS. 1992;6(9):949-52.
10. Pinkerton SD. Probability of HIV transmission during acute infection in Rakai, Uganda. AIDS Behav. 2008;12(5):677-84.
11. Wawer MJ, Gray RH, Sewankambo NK, Serwadda D, Li X, Laeyendecker O, et al. Rates of HIV-1 transmission per coital act, by stage of HIV-1 infection, in Rakai, Uganda. J Infect Dis. 2005;191(9):1403-9.
12. Bezemer D, de Wolf F, Boerlijst MC, van Sighem A, Hollingsworth TD, Prins M, et al. A resurgent HIV-1 epidemic among men who have sex with men in the era of potent antiretroviral therapy. AIDS. 2008;22(9):1071-7.
13. HIV prevention through early detection and treatment of other sexually transmitted diseases--United States. Recommendations of the Advisory Committee for HIV and STD prevention. MMWR Recomm Rep. 1998;47(RR-12):1-24.

14. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. Sex Transm Infect. 1999;75(1):3-17.

15. de Vries HJ, van der Helm JJ, Schim van der Loeff MF, van Dam AP. Multidrug-resistant Neisseria gonorrhoeae with reduced cefotaxime susceptibility is increasingly common in men who have sex with men, Amsterdam, the Netherlands. Euro Surveill. 2009;14(37):pii=19330. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19330

16. Kwon JA, Yoon SY, Lee CK, Lim CS, Lee KN, Sung HJ, et al. Performance evaluation of three automated human immunodeficiency virus antigen-antibody combination immunoassays. J Virol Methods. 2006;133(1):20-6.

17. Fiebig EW, Wright DJ, Rawal BD, Garrett PE, Schumacher RT, Peddada L, et al. Dynamics of HIV viremia and antibody seroconversion in plasma donors: implications for diagnosis and staging of primary HIV infection. AIDS. 2003;17(13):1871-9.

18. Sickinger E, Stieler M, Kaufman B, Kapprell HP, West D, Sandridge A, et al. Multicenter evaluation of a new, automated enzyme-linked immunoassay for detection of human immunodeficiency virus-specific antibodies and antigen. J Clin Microbiol. 2004;42(1):21-9.

19. Pilcher CD, Fiscus SA, Nguyen TQ, Foust E, Wolf L, Williams D, et al. Detection of acute infections during HIV testing in North Carolina. N Engl J Med. 2005;352(18):1873-83.

20. Centers for Disease Control and Prevention (CDC). Acute HIV infection - New York City, 2008. MMWR Morb Mortal Wkly Rep. 2009; 58(46):1296-1299.

21. Fiscus SA, Pilcher CD, Miller WC, Powers KA, Hoffman IF, Price M, et al. Rapid, real-time detection of acute HIV infection in patients in Africa. J Infect Dis. 2007;195(3):416-24.

HIV and STI behavioural surveillance among men who have sex with men in Europe

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This paper describes behavioural surveillance for HIV and sexually transmitted infections (STI) among men who have sex with men (MSM) in Europe, focusing on the methods and indicators used. In August 2008, questionnaires were sent to European Union Member States and European Free Trade Association countries seeking information on behavioural surveillance activities among eight population groups including MSM. Thirty-one countries were invited to take part in the survey and 27 returned a questionnaire on MSM. Of these 27 countries, 14 reported that there was a system of behavioural surveillance among MSM in their country while another four countries had conducted behavioural surveys of some kind in this subpopulation. In the absence of a sampling frame, all European countries used convenience samples for behavioural surveillance among MSM. Most European countries used the Internet for recruiting and surveying MSM for behavioural surveillance reflecting increasing use of the Internet by MSM for meeting sexual partners. While there was a general consensus about the main behavioural indicators (unprotected anal intercourse, condom use, number of partners, HIV testing), there was considerable diversity between countries in the specific indicators used. We suggest that European countries reach an agreement on a core set of indicators. In addition we recommend that the process of harmonising HIV and STI behavioural surveillance among MSM in Europe continues.

Introduction

In many European countries men who have sex with men (MSM) are at increased risk for HIV and other sexually transmitted infections (STI) such as syphilis or gonorrhoea. Even though there has been an increase in the number of new HIV diagnoses among heterosexual men and women in some European countries in recent years, MSM still remain at greatest risk of acquiring HIV in Europe [1]. As a consequence, a number of European countries have conducted behavioural surveys among MSM to monitor HIV and STI risk in this population [2]. In some countries these surveys are part of a well established behavioural surveillance programme while in others they are conducted on an ad hoc basis.

Behavioural surveillance allows us to monitor, at a population level, risks related to HIV and STI transmission. Trends in risk behaviour can provide a valuable insight into corresponding trends in disease incidence over time. In addition, behavioural surveillance provides information for planning and evaluating prevention interventions.

In 2008, a study was conducted to map HIV and STI behavioural surveillance activities in European Union (EU) Member States and European Free Trade Association (EFTA) countries, focusing on the methods and indicators used for behavioural surveillance. Information was collected on behavioural surveillance in eight different populations, specifically the general population, young people, MSM, injecting drug users (IDU), people living with HIV or AIDS (PLWHA), sex workers, people attending STI clinics, migrants and ethnic minorities. In this paper we describe the key findings from the mapping exercise concerning behavioural surveillance among MSM in Europe.

Methods

In 2008, questionnaires were sent to all EU Member States and EFTA countries concerning behavioural surveillance activities in each country (see Table 1 for list of countries). Each country received nine separate questionnaires. One questionnaire concerned national behavioural surveillance and second generation surveillance systems. The remaining eight questionnaires addressed each of the specific subpopulations. It was emphasised on each questionnaire that the focus was behavioural, as opposed to biological surveillance. Behavioural surveillance was defined as "the collection and use of data from different sources and/or different time points to globally ascertain the state and evolution of the HIV/AIDS and/or STI epidemics at the behavioural, as opposed to biological, level".

In the population-specific questionnaires we asked whether a behavioural surveillance system was currently in place for that population. If so, each country was asked to provide information about their methodology for conducting behavioural surveillance in that population. In particular, they were asked to provide information on the year(s) when they had conducted behavioural surveys since 1985 in that group, the sampling method, data collection and the main topics covered. The main topics were grouped under the following headings: knowledge and attitudes, sexual relationships and sexual partners, sexual activity and lifestyle, exposure to risk of infection, HIV and STI, drugs and substance use. Information was

also requested on the main indicators currently used for behavioural surveillance.

The questionnaires were sent by email to the person responsible for national HIV surveillance in that country with the option of consulting other colleagues with specialist knowledge to help them complete the questionnaires. The key contact in each country then returned the completed questionnaires, and these were loaded into a password-protected database. The data for each population were analysed separately by an expert member of the project team (see list at the end of the article).

Results

Behavioural surveillance

Thirty-one countries were invited to take part in the survey and 27 returned a questionnaire on MSM. Of these 27 countries, 14 reported that there was a system of behavioural surveillance among the MSM population in their country: Belgium, Denmark, Estonia, France, Germany, Ireland, Lithuania, the Netherlands, Norway, Slovenia, Spain, Sweden, Switzerland and the United Kingdom (Table 1).

An additional four countries did not consider that they had such a system but nonetheless had conducted behavioural surveys among

Table 1

HIV and STI behavioural surveillance among men who have sex with men (MSM) in 31 European countries

Country	BS* among MSM	Year of survey			Frequency of surveys (years)	Sampling and recruitment			Data collection		Coverage	Sample size each year
		First survey	Last survey**	Next survey		Internet	Gay venues	Gay press	Internet	Pen & paper		
Austria	N	-	-	-	-	-	-	-	-	-	-	-
Belgium	Y	1992	2005	?	Irregular	Y	Y	Y	Y	Y	Regional	500-1100
Bulgaria+	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	N	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	N	-	-	-	-	-	-	-	-	-	-	-
Denmark	Y	2000	2006	2009	1-4	Y	Y	-	Y	Y	National	2000
Estonia	Y	2004	2007	?	3	Y	Y	-	Y	Y	National	300
Finland***	N	2006	2006	?	NA	-	-	Y	-	Y	National	400
France	Y	1985	2007	2009	2-3	Y	Y	Y	Y	Y	National	3000-15000
Germany	Y	1987	2007	?	2-3	Y	Y	Y	Y	Y	National	200-6000
Greece***	N	2007	2007	?	NA	Y	-	-	Y	-	National	200
Hungary	N	-	-	-	-	-	-	-	-	-	-	-
Iceland	N	-	-	-	-	-	-	-	-	-	-	-
Ireland	Y	2000	2008	2009	Annually	Y	Y	-	Y	Y	National	900-1300
Italy+	-	-	-	-	-	-	-	-	-	-	-	-
Latvia***	N	2001	2001	?	NA	-	Y	-	-	Y	National	100
Lichtenstein	N	-	-	-	-	-	-	-	-	-	-	-
Lithuania	Y	2003	2007	?	1-3	Y	Y	-	Y	Y	Regional	100-200
Luxembourg	N	-	-	-	-	-	-	-	-	-	-	-
Malta	N	-	-	-	-	-	-	-	-	-	-	-
Netherlands	Y	2000	2008	2009	1-3	Y	Y	-	Y	Y	National	800-4500
Norway	Y	2007	2007	2009	2	Y	-	-	Y	-	National	2300
Poland***	N	2004	2004	?	NA	-	Y	-	-	Y	National	?
Portugal+	-	-	-	-	-	-	-	-	-	-	-	-
Romania+	-	-	-	-	-	-	-	-	-	-	-	-
Slovakia	N	-	-	-	-	-	-	-	-	-	-	-
Slovenia	Y	2000	2007	2009	Annually	-	Y	-	-	Y	Regional	100
Spain	Y	1995	2004	?	2-3	Y	Y	-	Y	Y	National	95-900
Sweden	Y	2006	2008	2012	2-4	Y	-	-	Y	-	National	3000
Switzerland	Y	1987	2008	2009	2-3	Y	Y	Y	Y	Y	National	500-1244
UK	Y	1993	2008	2010	1-3	Y	Y	-	Y	Y	National	800-15000

*BS: Behavioural surveillance
** As of September 2008
*** Four countries stated they did not have a system of behavioural surveillance among MSM but nonetheless had conducted behavioural surveys in this subpopulation
+ Four countries did not return a questionnaire concerning MSM (Bulgaria, Italy, Portugal, Romania)

MSM (Finland, Greece, Latvia and Poland). Latvia has conducted repeat surveys among MSM while Finland, Greece and Poland have only conducted one survey to date.

For simplicity these 18 countries are all described as conducting behavioural surveillance since 15 countries have done repeat surveys, while Finland, Greece and Poland have done only one but may do another one in the future.

The remaining nine countries reported that there was no system of behavioural surveillance among MSM in their country, nor had they conducted behavioural surveys among this population: Austria, Cyprus, Czech Republic, Hungary, Iceland, Liechtenstein, Luxembourg, Malta and Slovakia. No information was available for Bulgaria, Italy, Portugal and Romania since they did not return a questionnaire for MSM (Table 1).

In general, Western European countries established behavioural surveillance among MSM before Central or Eastern European countries. France was the first country to introduce behavioural surveillance among MSM in 1985, followed by Switzerland and Germany (1987), Belgium (1992), United Kingdom (1993) and Spain (1995). Other Western European countries started later: Denmark, Ireland and the Netherlands in 2000, followed by Finland, Sweden (2006), Norway and Greece (2007). Behavioural surveillance among MSM in Central and Eastern Europe was established from the mid 1990s. The first Central/Eastern European country to conduct a behavioural survey among MSM was Latvia (1997), followed by Slovenia (2000), Lithuania (2003), Poland and Estonia (2004) (Table 1).

Sampling and recruitment

All countries used convenience samples for behavioural surveillance among MSM. Fourteen of the 18 countries recruited MSM from community venues such as gay bars, clubs and saunas, or had done so in the past (Table 1). In the United Kingdom, men were also recruited through gyms. Five countries used the gay press for recruitment (Belgium, Finland, France, Germany and Switzerland).

Fourteen of the 18 countries recruited men through the Internet, reflecting increased use of the Internet by MSM for meeting sexual

Table 2

Topics most frequently covered in behavioural surveillance among men who have sex with men (MSM) in European countries

	Number of countries where this topic is covered*
Knowledge and attitudes	
Knowledge about HIV/AIDS infection and/or treatments	14
Knowledge of post-exposure prophylaxis (PEP)	10
Awareness of prevention activities	14
Sexual relationships and sexual partners	
Types of partners/relationships, such as regular partner, casual partners	15
Sexual activity and lifestyle	
Sexual activity, such as number of partners, frequency of sexual contacts	16
Sexual orientation	16
Sexual practices	15
How and where partners are met	12
Exposure to risk of infection	
Condom use at last intercourse	14
Condom use with different types of partners	16
Condom use in different types of sexual practice (e.g. vaginal, anal, oral sex)	12
Risk reduction strategies (such as negotiated safety, serosorting, positioning)	11
HIV and other STI	
HIV testing	15
Current or past STI other than HIV and hepatitis	14
Result of last HIV test (self-reported)	15
Result of last HIV test (measured)	7
Drugs and substance use	
Types of drugs consumed	12
Use of psycho-active substances (including alcohol) and intercourse	10
Injecting drug use	7
Socio-demographic characteristics	
Education	15
Employment	12
Nationality and/or ethnic origin	10

*Information on topics covered was provided by 16 countries.

partners [3] (Table 1). Only Finland, Latvia, Poland and Slovenia have not yet recruited MSM through the Internet. The first country to use the Internet for recruiting MSM was Belgium in 1998.

Respondent driven sampling (RDS) has been used in two countries only (Estonia and Greece). In Estonia this approach was reportedly not successful. Only 60 men were recruited using this method.

In most countries (n=15), national samples were recruited although "local" samples were often included too. In the other three countries (Belgium, Lithuania, Slovenia) only local samples were recruited. The local samples were often recruited in cities with large MSM populations such as London, Paris, Geneva or Ljubljana.

TABLE 3

Specific indicators currently used for behavioural surveillance among men who have sex with men (MSM) in European countries

Indicator
Unprotected anal intercourse (UAI)*
UAI with any partner
UAI with a casual partner
UAI with a main partner
UAI with a partner of unknown or opposite status
UAI with a partner of unknown status
UAI with a casual partner of unknown or discordant HIV status
UAI with a main partner of unknown or discordant status
Number of UAI partners
Frequency of UAI
UAI at last sexual encounter
UAI at last sexual encounter with a man of unknown HIV status
Condom use
Used condom during last anal intercourse (AI)
Used condom during most recent AI with casual partner
Used condom during last AI with partner of unknown or discordant HIV status
Always used condom in last 12 months
Always used condom with casual partner in last 12 months
Always used condoms with main partner in last 12 months
Number of partners*
Number of anal sex partners
Number of steady and casual partners
Number of partners for anal or oral sex
Number of men reporting more than 10 partners
HIV testing
Ever tested for HIV
Tested for HIV in the last 12 months
Tested for HIV in the last 12 months and knows the results
Percentage with undiagnosed HIV
Percentage who tested HIV-positive
Percentage of HIV-positive MSM who are on treatment
Percentage of HIV-positive men with a detectable viral load

* For UAI and the number of sexual partners, most countries used a 12-month time period but some used a three- or six-month period

Local samples can act as sentinel populations for monitoring time trends in sexual behaviour in metropolitan areas.

Sample size varied between countries. This is not surprising, since the size of the general population, and therefore the MSM population, also varies between countries. But an additional factor was the sampling method. Samples recruited through the Internet were generally larger than those recruited in the community (e.g. in bars, clubs and other venues). For community samples, sample size ranged from 100 (Slovenia, Latvia, Lithuania) to 2,000 (London), while for Internet samples it ranged from 900 (Ireland, Spain) to 15,000 (France).

Data collection

Surveys conducted in community venues (e.g. bars, clubs, gyms, saunas) or through the gay press used pen-and paper questionnaires for data collection (n=15 countries), but increasing use of the Internet for recruitment has led to the use of web surveys completed online. In the last five years, 14 countries have conducted behavioural surveillance among MSM using web surveys (Table 1). Of these 14 countries, three (Greece, Norway, Sweden) used exclusively online surveys for data collection while 11 also used pen-and-paper questionnaires for their community samples. Greece, Norway and Sweden all introduced behavioural surveillance after 2000.

Thirteen countries reported collecting behavioural surveillance data regularly, while five did not (Belgium, Finland, Greece, Latvia, Poland). In those five countries, the cross-sectional surveys were conducted on an ad hoc basis.

In the thirteen countries that conducted surveys regularly, the interval between surveys varied widely. Some countries (e.g. United Kingdom) conducted cross-sectional surveys annually among MSM while others conducted their surveys every 3-5 years.

Nine countries reported they would repeat the survey between 2009 and 2012. In the remaining nine countries, a decision has yet to be made about future surveys.

Topics currently covered

Sixteen of the 18 countries provided information on the range of topics covered in their behavioural surveys. The topics most commonly covered among MSM are presented in Table 2. Most of these topics were surveyed regularly as part of a country's behavioural surveillance programme. The exceptions were 'Risk reduction strategies' and 'How and where men met their sexual partners'. About half the countries covered these regularly, while the other half did so irregularly.

Current behavioural surveillance indicators

Ten of the 18 countries provided information on their current behavioural surveillance indicators, (Belgium, Denmark, France, Lithuania, the Netherlands, Slovenia, Spain, Sweden, Switzerland, the United Kingdom).

Four main indicators are in current use in most of these countries. These are:

- Unprotected anal intercourse
- Condom use
- Number of partners
- HIV testing

However, there was considerable diversity between countries in the specific indicators as can be seen in Table 3.

Discussion

This study, mapping HIV and STI behavioural surveillance in Europe, identified 14 countries with a system of behavioural surveillance among MSM and another four that had conducted behavioural surveys in this population. Nine countries did not have a system of behavioural surveillance among MSM and a further four countries did not provide any information.

The study revealed considerable diversity between countries in when behavioural surveillance began, the range of indicators used and how frequently surveys are repeated. For example, Western European countries generally introduced behavioural surveillance among MSM before Central or Eastern Europe, but this was not always the case. On the other hand, since there is no sampling frame for MSM, all European countries have used "convenience samples" for behavioural surveillance in this population, often recruited through the Internet.

Indicators

Although a wide range of behavioural surveillance indicators is currently used, these can be grouped under four main headings: unprotected anal intercourse, condom use, number of partners and HIV testing. A consensus appears to have emerged across Europe as to which are the most important indicators for behavioural surveillance among MSM [4,5]. However, there is also enormous variation between countries in the specific indicators used which makes direct comparison between countries problematic.

One way forward would be for all countries to incorporate a core set of indicators for behavioural surveillance among MSM. The suggested set of indicators is summarised below.

Suggested set of indicators for behavioural surveillance among MSM

- Unprotected anal intercourse (UAI) with a partner of unknown or discordant HIV status in the last 12 months (overall and separately for casual and main partners)
- Unprotected anal intercourse (UAI) with a casual partner of the same HIV status in the last 12 months
- Diagnosed with an STI in the last 12 months
- Tested for HIV in last 12 months
- Percentage who are HIV-positive
- Number of sexual partners in last 6 or 12 months (male and female)
- Used condom at last anal intercourse (distinguishing between casual and main partners)
- Where men met their sexual partners in the last 12 months (saunas, bars, clubs, Internet, etc.)

The suggested UAI indicators need to differentiate: (i) between main and casual partners and (ii) between a partner of unknown or discordant HIV status and a partner of the same HIV status ("serosorting").

Main and casual partners

It is important to differentiate between main and casual UAI partners of unknown or discordant HIV status. This differentiation is important since, in some European countries, HIV transmission among MSM is more likely to occur within a regular relationship [6] while in other countries it is more likely to occur with a casual partner [7]. Collecting data on UAI with main as well as casual partners of unknown or discordant HIV status, will allow us to identify the context in which HIV transmission occurs among MSM in Europe.

Partners of the same HIV status

An increasing number of HIV-positive men report 'serosorting' with casual partners, i.e. only having UAI with casual partners who are also HIV-positive [8,9]. In principle, this does not present a risk of HIV transmission to someone who is uninfected, but it does present a risk for STI transmission among HIV-positive MSM [10,11]. Serosorting has undoubtedly contributed to the recent increase in STI among HIV-positive MSM in Western Europe and therefore needs to be monitored [12]. In addition, some HIV-negative men report serosorting with casual partners as a risk reduction strategy [13,14]. Since it is extremely difficult for HIV-negative men to establish seroconcordance reliably in a casual encounter, serosorting with casual partners among HIV-negative men presents a risk for HIV transmission.

The suggested set of indicators could provide a template for behavioural surveillance in European countries. The suggested indicators incorporate those recommended by the United Nations General Assembly Special Session (UNGASS) but in some respects they are more precise. For example, our suggested set of indicators differentiates between main and casual partners.

The Joint United Nations Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) recommend that behavioural surveillance and biological surveillance be combined as part of a second generation surveillance system. In this way, behavioural and biological data can be used to validate one another. "Two sets of data pointing in the same direction make a more convincing case than just behavioural data or HIV prevalence alone" [2].

Sampling

One of the challenges for conducting behavioural surveillance among MSM is that there is no sampling frame from which to draw a probability sample [15]. To date, it has been impossible to assess the size of the MSM population in any one country since questions on sexual identity or sexual behaviour are not routinely included in national censuses. Questions on sexual behaviour or identity may be included in some national probability surveys, but these studies usually recruit relatively small numbers of MSM [16]. As a consequence, behavioural surveillance among MSM in all European countries relies on 'convenience samples'.

In Europe 18 countries have conducted cross-sectional surveys in convenience samples of MSM recruited through a number of channels including the gay press, bars and gyms. An increasing number of countries now recruit men through the Internet. In the last five years, fourteen of the eighteen countries conducting behavioural surveillance or surveys among MSM have used the Internet for recruitment and data collection. This reflects the well established trend for MSM to meet sexual partners through the Internet via dating sites [17-19]. Three of the four countries that have not yet used the Internet for behavioural surveillance were in Central or Eastern Europe (Latvia, Poland, Slovenia).

An advantage of using convenience samples is that it is possible to recruit large numbers of MSM who may be at risk for HIV and STI, at relatively low cost. This is especially true for Internet samples. On the other hand, the disadvantage is that convenience samples are not representative of the overall MSM population [15].

While it is possible to recruit quasi-probability samples of MSM using time-location sampling in venues [20,21], this can be costly when compared with recruiting men through the Internet. Since behavioural surveillance requires cross-sectional surveys to be repeated at regular intervals, keeping the cost down is a priority for many countries. In general, convenience samples, including those recruited through the Internet, tend to overestimate the true level of HIV or STI risk in the MSM population [22,23]. However, if sampling bias remains constant from one cross-sectional survey to the next, then for surveillance purposes it is possible to monitor time trends in risk behaviour using convenience samples with some degree of reliability.

Two countries used respondent driven sampling (RDS) to recruit MSM for behavioural surveillance. In Estonia only 60 men were recruited using RDS; they had hoped to recruit 400 men using this method. It seems that RDS reached a less diverse group of MSM in Estonia than recruitment through the Internet. There was a number of reasons why RDS did not work in Estonia [24]. Because employment rates are high in Estonia, there was relatively little interest in the financial reward for taking part in the RDS survey. Also, the opportunity to have a free HIV/STI test was not hugely attractive in a country where testing is widely available. In addition, married men or men with girlfriends were afraid of taking part in an RDS survey for MSM, whereas they were more willing to take part in an Internet survey. The Estonian experience highlights the importance of examining context when using RDS for recruiting MSM for behavioural surveillance [24].

Gaps, opportunities and limitations

Several important gaps have emerged from this mapping exercise. The most striking is that nine European countries have not introduced behavioural surveillance among MSM (and another four did not provide any information) even though MSM remain the group most at risk of acquiring HIV in many European countries [1]. Some of these countries have too small a population to justify conducting behavioural surveillance among MSM. It is important to recognise that in some European countries MSM may be harder to reach than in others because of cultural or religious barriers.

Behavioural surveillance among gay men provides an opportunity to collect detailed information about the behaviour of HIV-positive gay men (as well as those who are HIV negative or untested). Very few European countries have established a programme of behavioural surveillance among people living with HIV. Consequently, behavioural surveys in population groups where the prevalence of HIV is relatively high (e.g. gay men) allows trends in behaviour to be monitored specifically among gay men living with HIV.

Although the majority of European countries now recruit gay men online for behavioural surveillance (i.e. via the Internet), little is known about the websites used in those countries. Do different websites attract different kinds of men? If so, selection bias could vary from one country to another which could affect comparisons of behavioural data between countries.

A limitation of this analysis is that it depends on the accuracy and completeness of the data provided by Member States concerning behavioural surveillance in each country. Nonetheless, as can be seen in the full report (see table 8.3 p. 90-6) those countries that returned a questionnaire provided comprehensive and detailed information. An additional point is that four countries did not return the MSM questionnaire although a review of the literature suggests that behavioural research has been conducted in some of those countries [4].

Conclusion

In conclusion, this study mapping behavioural surveillance among MSM in Europe has revealed both similarities and differences between countries. In a number of European countries behavioural surveillance among MSM has developed along similar lines without formal coordination. On the other hand, the diversity of behavioural indicators limits the extent to which direct comparisons can be made between countries. As part of its mandate to coordinate surveillance of communicable disease in the EU, the European Centre for Disease Prevention and Control (ECDC) will support and encourage harmonisation of behavioural surveillance among MSM in EU Member States.

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- Helen Ward, Imperial College, London, United Kingdom (sex workers);
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- Marita van de Laar, ECDC, Stockholm, Sweden (coordinator).

The full report is available at:

http://www.ecdc.europa.eu/en/publications/Publications/0909_TER_Mapping_of_HIV_STI_Behavioural_Surveillance_in_Europe.pdf

References

1. European Centre for Disease Prevention and Control / WHO Regional Office for Europe: HIV/AIDS Surveillance in Europe 2007. Stockholm: European Centre for Disease Prevention and Control; 2008. Available from: http://ecdc.europa.eu/en/publications/Publications/0812_SUR_HIV_AIDS_surveillance_in_Europe.pdf
2. World Health Organization (WHO) and Joint United Nations Programme on HIV/AIDS (UNAIDS). Guidelines for second generation surveillance. Geneva: WHO; 2000. Available from: http://www.emro.who.int/gfatm/guide/tools/unaidssurveillance/unaidssurveillance.pdf
3. Elford J. Changing patterns of sexual behaviour in the era of highly active antiretroviral therapy. Curr Opin Infect Dis. 2006;19(1):26-32.

4. Bochow M, Chiarotti F, Davies P, Dubois-Arber F, Dür W, Fouchard J, et al. Sexual behaviour of gay and bisexual men in eight European countries. AIDS Care. 1994;6(5):533-49.
5. Hubert M. Studying and comparing sexual behaviour and HIV/AIDS in Europe. In: Hubert M, Bajos N, Sandfort TGM. Editors. Sexual behaviour and HIV/AIDS in Europe. London: UCL Press; 1998.
6. Davidovich U, de Wit J, Albrecht N, Geskus R, Stroebe W, Coutinho R. Increase in the share of steady partners as a source of HIV infection: a 17-year study of seroconversion among gay men. AIDS. 2001;15(10):1303-8.
7. Elford J, Bolding G, Davis M, Sherr L, Hart G. Trends in sexual behaviour among London gay men 1998-2003: implications for STI/HIV prevention and sexual health promotion. Sex Transm Infect. 2004;80(6):451-4.
8. Halkitis PN, Green KA, Remien RH, Stirratt MJ, Hoff CC, Wolitski RJ, Parsons JT. Seroconcordant sexual partnerings of HIV-seropositive men who have sex with men. AIDS. 2005;19 Suppl 1:S77-86.
9. Parsons J, Schrimshaw E, Wolitski R, Halkitis P, Purcell D, Hoff C, et al. Sexual harm reduction practices of HIV-seropositive gay and bisexual men: serosorting, strategic positioning and withdrawal before ejaculation. AIDS. 2005 Apr;19 Suppl 1:S13-25.
10. Gotz H, van Doornum G, Niesters H, den Hollander J, Thio H, de Zwart O. A cluster of acute hepatitis C virus infection among men who have sex with men - results from contact tracing and public health implications. AIDS 2005; 19(9):969-74.
11. Urbanus AT, van de Laar TJ, Stolte IG, Schinkel J, Heijman T, Coutinho RA, et al. Hepatitis C virus infections among HIV-infected men who have sex with men: an expanding epidemic. AIDS. 2009;23(12):F1-7.
12. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.
13. Mao L, Crawford J, Hospers H, Prestage G, Grulich A, Kaldor J, et al. "Serosorting" in casual anal sex of HIV-negative gay men is noteworthy and is increasing in Sydney, Australia. AIDS 2006;20(8):1204-6.
14. Elford J, Bolding G, Sherr L, Hart G. No evidence of an increase in serosorting with casual partners among HIV-negative gay men in London, 1998-2005. AIDS. 2007;21(2):243-5.
15. McGarrigle C, Fenton K, Gill O, Hughes G, Morgan D, Evans B. Behavioural surveillance: the value of national coordination. Sex Transm Infect. 2002;78(6):398-405.
16. Mercer C, Fenton KA, Copas A, Wellings K, Erens B, McManus S, et al. Increasing prevalence of male homosexual partnerships and practices in Britain 1990-2000; evidence from national probability surveys. AIDS. 2004;18(10):1453-8.
17. Hospers H, Kok G, Harterink P, de Zwart O. A new meeting place: chatting on the Internet, e-dating and sexual risk behaviour among Dutch men who have sex with men. AIDS. 2005 Jul 1;19(10):1097-101.
18. Bolding G, Davis M, Hart G, Sherr L, Elford J. Gay men who look for sex on the Internet: is there more HIV/STI risk with online partners? AIDS. 2005;19(9):961-8.
19. McFarlane M, Bull SS, Rietmeijer CA. The Internet as a newly emerging risk environment for sexually transmitted diseases. JAMA. 2000;284(4):443-6.
20. MacKellar DA, Gallagher KM, Finlayson T, Sanchez T, Lansky A, Sullivan PS. Surveillance of HIV risk and prevention behaviors of men who have sex with men--a national application of venue-based, time-space sampling. Public Health Rep. 2007;122 Suppl 1:39-47.
21. Gallagher KM, Sullivan PS, Lansky A, Onorato IM. Behavioral surveillance among people at risk for HIV infection in the U.S.: the National HIV Behavioral Surveillance Public Health Rep. 2007;122 Suppl 1:32-8.
22. Dodds JP, Mercer CH, Mercey DE, Copas AJ, Johnson AM. Men who have sex with men: a comparison of a probability sample survey and a community based study. Sex Transm Infect. 2006;82(1):86-7.
23. Evans AR, Wiggins RD, Mercer CH, Bolding GJ, Elford J. Men who have sex with men in Great Britain: comparison of a self-selected internet sample with a national probability sample. Sex Transm Infect. 2007;83(3):200-5.
24. Johnston LG, Trummal A, Lohmus L, Ravalepik A. Efficacy of convenience sampling through the Internet versus respondent driven sampling among males who have sex with males in Tallinn and Harju County, Estonia: challenges reaching a hidden population. AIDS Care. 2009;21:1195-202.
25. Malekinejad M, Johnston LG, Kendall C, Kerr LR, Rifkin MR, Rutherford GW. Using respondent-driven sampling methodology for HIV biological and behavioral surveillance in international settings: a systematic review. AIDS Behav. 2008;12(4 Suppl):S105-30.

Sexual risk behaviour and its determinants among men who have sex with men in Catalonia, Spain

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To evaluate the prevalence of sexual risk behaviours among men who have sex with men (MSM) in Catalonia and to identify sociodemographic, psychosocial, and behavioural factors associated with unprotected anal intercourse (UAI) with casual partners a convenience sample of 850 MSM was recruited in 2006. An anonymous questionnaire was used to explore risk behaviours during the previous 12 months. Logistic regression models were used to examine the variables associated with UAI. Mean age was 41 years and 20.4% were immigrants. Among those with casual partners (91.7% of all respondents), 31.4% had UAI. The multivariate analysis revealed that the likelihood of UAI was higher in men who were HIV-positive (OR: 1.77), used more than four drugs before sex (OR: 4.90 for +6), were not from Spain (OR: 2.10 for Latin American; OR: 1.86 for other immigrants), had more than 20 sexual partners (OR: 1.56), met casual sex partners on the Internet (OR:1.45) and presented a high level of internalised homophobia (OR: 2.40). HIV/STI prevention programmes for MSM in Catalonia should incorporate activities that strengthen self-esteem, take into account the impact of internalised homophobia, and adapt to the sociocultural reality of immigrants. Furthermore, these programmes should also address substance abuse and alert HIV-positive men about the risk of HIV re-infection and transmission of other STI.

Introduction

In Europe, we have recently witnessed an increase in the number of new diagnoses of HIV infection in men who have sex with men (MSM) [1,2] and in the number of other sexually transmitted infections (STI) [3] in particular among HIV-positive MSM [4].

In Catalonia, voluntary reporting of newly diagnosed HIV infections was implemented in January 2001 and a total of 4,082 cases were reported between January 2001 and December 2006. Of these, MSM accounted for 43.4% of male HIV cases in 2001-2006 [5]. Although there are no recent data on the true incidence of HIV in this group, a study on recently acquired infections in Spain found that MSM constituted 62.5% among the recent infections identified with the STARHS technique during 2003-2005, which seems to indicate that we may be seeing an increase in the number of new infections in this group [6].

The resurgence of syphilis and other STI in Barcelona reflects a trend of increasing risk behaviour in MSM, a notable proportion of whom are HIV-positive [7,8]. Recently, an outbreak of lymphogranuloma venereum was reported among MSM in Barcelona [9]. Moreover, a significant growth in the HIV prevalence among MSM (from 14.2% in 1995 to 19.8% in 2006) has been observed in the sentinel surveillance system in Catalonia [5].

These increases in the prevalence of HIV infection and other STI are consistent with the increase in risk behaviours observed in MSM in other European cities [10,11]. For example, data from different surveys carried out in London in 1998 and 2003 showed an increase in the percentage of men reporting high risk sexual behaviour with a casual partner from 6.7% to 16.1% [12]. Studies in Catalonia have also shown a growing trend in reported sexual risk behaviours such as high number of sexual partners and unprotected anal intercourse (UAI) [5,13]. Among the reasons some authors give for these increases, particularly noteworthy are the use of alcohol and drugs before and during sexual intercourse [14,15] and the use of Internet to search for and meet partners [16,17]. Furthermore, psychosocial factors such as externalised and internalised homophobia and discrimination can lead to low self-esteem that can in turn lead to an increase in risk behaviours, difficulties when negotiating safe sex, and substance abuse [18-20].

A more in-depth analysis of the factors responsible for high-risk sexual practices is necessary in order to improve the design of preventive interventions aimed at reducing transmission of HIV and other STI in this group. The objectives of this study were to estimate the prevalence of reported sexual risk behaviours among MSM recruited in 2006 in Catalonia and to identify possible sociodemographic, psychosocial, and behavioural factors associated with UAI with casual partners.

Methods

HIV/STI behavioural surveillance among MSM began in Catalonia in 1993 as part of the Integrated HIV/STI Surveillance System (SIVES) [5]. To date, seven cross-sectional studies have been

carried out in collaboration with the association Stop Sida. For the purpose of the present study, we analysed data from the most recent survey carried out in 2006. Given the difficulty in obtaining a representative sample of MSM, and with the aim of maximising the diversity of the group studied, we took a convenience sample from three saunas, two sex-shops, seven bars, and a public park that is frequented by gay men. These sites were selected from a larger list of gay venues screened prior to the survey and considered to represent a wide cross-section of MSM in Barcelona. Over a six-week period, four volunteers from Stop Sida handed out 2,735 questionnaires at the different sites. In addition, during the last weeks of recruitment, further 1,166 questionnaires were sent to all the members of the Coordinadora Gay-Lesbiana de Cataluña (Gay-Lesbian Coordination Organization of Catalonia). It was possible to distinguish the questionnaires returned from the gay venues from those sent to the mailing list. The questionnaires were anonymous and self-administered and were accompanied by a prepaid envelope to be sent by post.

The questionnaire used was adapted from the one that had been developed and validated by the University Institute of Social and Preventive Medicine in Lausanne, Switzerland [21]. Questions on sexual behaviour referred to the period of 12 months preceding the survey. The information collected included sociodemographic characteristics such as age, educational level, and country of origin. Respondents were also asked about their sexual orientation and whether they had experienced insults or aggression. The level of internalised homophobia, that is the negative attitude men have about their homo/bisexuality, was estimated using seven statements on acceptance of their sexuality in which the replies went from 1 (totally agree) to 4 (do not agree) [22]. Once the internal consistency of the replies was calculated (Cronbach alfa, 0.823), the variable was calculated for each individual as the mean of

Table 1

Sociodemographic and psychosocial characteristics and prevalence of HIV infection and other STI in a convenience sample of men who have sex with men in Catalonia, 2006 (n=850)

	n	%
Recruitment site		
Sauna	243	28.6
Sex-shop	204	24.0
Park	82	9.6
Bar	107	12.6
Coordinadora Gay-Lesbiana	214	25.2
Age (years)		
19-30	106	12.7
>30	728	87.3
University education	446	53.2
Immigrant	173	20.4
Sexual orientation		
Homosexual	756	89.2
Bisexual	72	8.5
Heterosexual	4	0.5
Not resolved or does not know	16	1.8
Degree of internalised homophobia[1]		
1-2.5	63	7.5
>2.5-4	774	92.5
Insults and/or attacks (previous 12 months)	93	11.0
HIV test (at any time)	737	86.8
Self-reported prevalence of HIV[2]	139	19.7
STI (at any time)	535	64.5
STI (previous 12 months)[3]		
Syphilis	27	3.3
Gonorrhoea	40	4.8
Urethritis	21	2.5
Herpes	14	1.7
Pubic lice	64	7.7
Genital warts	20	2.4

[1]Heterosexuals excluded;
[2]Among those who had the HIV test and reported the results;
[3]Non-exclusive categories.

Table 2

Sexual behaviour and use of alcohol and drugs before or during sexual intercourse in the previous 12 months in a convenience sample of men who have sex with men in Catalonia, 2006 (n=850)

	n	%
Use of alcohol	533	63.8
Use of drugs[1]		
Cannabis	217	26.0
Cocaine	157	18.8
Amphetamine	38	4.6
Poppers	341	40.8
Viagra	110	13.2
Ketamine	42	5.0
Methamphetamine	25	3.0
Number of drugs used		
0	365	44.3
1-3	378	45.9
4-6	65	7.9
More than 6 drugs	15	1.8
Number of male sexual partners		
1-10	296	35.8
11-20	160	19.3
More than 20	371	44.9
Sex with a stable partner	453	55.4
Sex with a casual partner	776	91.7
UAI with a casual partner[2]	233	31.4
Meet casual partners on the Internet	353	42.4
Has charged for sex	34	4.1

[1]Non-exclusive categories;
[2]Among those who reported having a casual partner;
UAI: unprotected anal intercourse

Table 3

Factors associated with unprotected anal intercourse with casual partners (previous 12 months) in a convenience sample of men who have sex with men in Catalonia, 2006. Univariate logistic regression analysis.

	UAI %	OR	95% CI	p
Age (years)				
19-30	35.6	1.00		
>30	31.2	0.82	0.51-1.31	0.400
Recruitment site				
Gay venues	32.2	1.00		
Mailing list: Coordinadora Gay- Lesbiana	28.4	0.83	0.57-1.22	0.346
Country of origin				*0.002*
Spain	26.4	1.00		
Immigrant (Latin America)	45.1	2.28	1.43-3.64	0.001
Immigrant (other)	40.9	1.93	1.13-3.29	0.017
No answer	32.4	1.33	0.90-1.96	0.149
Educational level				
Non-university	32.2	1.00		
University	30.5	0.92	0.68-1.27	0.629
Sexual orientation				
Homosexual	30.5	1.00		
Other[1]	39.0	1.46	0.91-2.35	0.116
Insults and/or attacks[2]				
No	30.3	1.00		
Yes	41.3	1.61	1.00-2.60	0.048
Internalised homophobia[3]				
>2.5-4	30.1	1.00		
1-2.5 (high)	45.5	1.94	1.13-3.34	0.016
Use of alcohol[2]				
No	32.7	1.00		
Yes	31.1	0.93	0.67-1.29	0.667
Number of drugs used[2]				*<0.001*
No	26.6	1.00		
1-3	31.5	1.27	0.90-1.79	0.172
4-6	46.8	2.43	1.39-4.25	0.002
More than 6 drugs	76.9	9.21	2.47-34.31	0.001
Sex with a stable partner[2]				
No	32.5	1.00		
Yes	28.8	0.84	0.61-1.16	0.294
Number of male sexual partners[2]				*<0.001*
1-10	24.7	1.00		
11-20	23.7	0.95	0.58-1.54	0.831
More than 20	39.1	1.96	1.35-2.86	0.000
Met casual partners on the Internet[2]				
No	27.5	1.00		
Yes	35.7	1.46	1.07-2.00	0.017
Have you charged for sex[2]				
No	30.6	1.00		
Yes	45.5	1.89	0.93-3.82	0.076
STI[2]				
No	30.4	1.00		
Yes	35.2	0.81	0.55-1.18	0.271
Self-reported HIV result				
Negative/unknown	28.6	1.00		
Positive	43.8	1.95	1.32-2.89	0.001

[1]Bisexual, heterosexual, not resolved, or does not know;
[2]Previous 12 months;
[3]Heterosexuals excluded;
OR: Odds ratio

responses to the seven statements using values ranging from 1 (high internalised homophobia) to 4 (no internalised homophobia). Furthermore the questionnaire collected data on the use of Internet to make contact with sexual partners, sexual practices with stable and casual partners, use of condoms, number of sexual partners, use of alcohol and drugs before or during sexual intercourse, self-reported HIV serostatus, and previous STI. UAI with casual partners was defined as inconsistent use of condoms during anal intercourse with these partners in the previous 12 months.

Univariate and multivariate logistic regression models were used to evaluate the sociodemographic, psychosocial, and behavioural variables associated with UAI. A final multivariate model was performed with inclusion of all variables that were significantly associated with UAI in univariate models (p value <0.10) and remained significantly associated in the final multivariate model. Adjusted odds ratio (AOR) and their respective 95% confidence intervals (CI) were calculated. The calibration of the models was tested using the Hosmer-Lemeshow goodness-of-fit test. Statistical significance was set at 0.05.

Results

Of the 3,901 questionnaires distributed, 877 were returned, giving the response rate of 22.5% (23.9% for questionnaires handed out at gay venues and 19% for those sent to the mailing list). The analysis was carried out among men who reported having had sexual relations with men during the previous 12 months (n=850). Of the men included in the study, the mean age of the respondents was 41 years (range19-76), more than half had a university education, and 20.4% were immigrants, mainly from Latin America (11.5%). Most men reported that their sexual orientation was homosexual (89.2%), further 8.5% characterised themselves as bisexual; and 11.0% of the respondents had experienced insults and/or attacks in the previous year because of their sexual orientation. We found that 7.5% of homo/bisexuals had a high degree of internalised homophobia with values lower than 2.5 (Table 1).

The self-reported prevalence of HIV infection among those who had been tested for HIV and gave their result was 19.7%. As for STI, 64.5% reported having had an infection in their lifetime, and 4.8% and 3.3% reported having been diagnosed with respectively gonorrhoea and syphilis during the previous year (Table 1). Among HIV-positive men these percentages were higher – 8.8% and 9.5%, respectively.

Table 4

Factors associated with unprotected anal intercourse with casual partners (previous 12 months) in a convenience sample of men who have sex with men in Catalonia, 2006. Final multivariate logistic regression model*

	AOR	95% CI	p
Country of origin			*0.014*
Spain	1.00		
Immigrant (Latin America)	2.10	1.24-3.56	0.006
Immigrant (other)	1.86	1.04-3.32	0.036
No answer	1.37	0.88-2.12	0.161
Internalised homophobia[1]			
>2.5-4	1.00		
1-2.5 (high)	2.40	1.25-4.64	0.009
Number of drugs used[2]			*0.05*
No	1.00		
1-3	1.11	0.76-1.62	0.590
4-6	1.76	0.95-3.25	0.071
More than 6 drugs	4.90	1.23-19.5	0.024
Number of male sexual partners[2]			*0.002*
1-10	1.00		
11-20	0.71	0.42-1.21	0.208
More than 20	1.56	1.03-2.38	0.036
Met casual partners on the Internet[2]			
No	1.00		
Yes	1.45	1.10-2.06	0.042
Self-reported HIV result			
Negative/unknown	1.00		
Positive	1.77	1.14-2.74	0.011

AOR: adjusted odds ratio;
1Heterosexuals excluded;
2Previous 12 months;
*Hosmer-Lemeshow test: 0.303

There was a high prevalence of drug use before or during sexual intercourse in the previous 12 months. The most widely used were poppers, cannabis, and cocaine (40.8%, 26%, and 18.8%, respectively); 28.6% consumed two or more different drugs (Table 2).

Almost half (44.9%) of those surveyed reported having had sexual relations with more than 20 male partners and 55.4% reported having had a stable partner in the previous 12 months. Among those who had sexual relations with at least one casual partner in the past 12 months (91.7%), 31.4% had UAI. Of those who had UAI with casual partners, 66.7% never asked the casual partners about their HIV serostatus. Internet had been the medium for finding a casual partner for 42.4% of all respondents, and 4.1% had received money in exchange for sexual relations with other men during the last 12 months (Table 2).

Table 3 shows the univariate logistic regression model for the variables associated with UAI. The final multivariate model showed a significant relationship between country of origin and UAI (Table 4). Immigrants, particularly from Latin America, were more likely to have had UAI with casual partners in the previous 12 months (OR: 1.86 and OR, 2.10, respectively). Furthermore, men who found it difficult to live with their homo/bisexuality and had a high level of internalised homophobia were also more likely to have unprotected sex with casual partners (OR: 2.40). Consuming several drugs (OR, 4.90 for > 6 drugs), the number of sexual partners (OR:1.56 for > 20) and finding casual partners on the Internet (OR: 1.45) were also significantly associated with UAI in the multivariate analysis. Finally, being HIV-positive was associated with a greater probability of having unprotected sex (OR: 1.77).

Discussion

Our results reveal a high prevalence of sexual risk behaviour among MSM in Catalonia, since almost half of the participants reported having had sex with more than 20 partners during the previous year, and 31.4% of those who reported having had casual partners had unprotected sex with these partners. Both these proportions were higher than in previous surveys [5]. These data are consistent with those of other studies [10-12]. Strategies aimed at reducing the risk of HIV transmission, such as serosorting (i.e. looking for partners with the same serostatus in order to maintain unprotected sexual relations), have been described [23-25]. However, these strategies carry an important risk of transmission since in many cases the serostatus is assumed [26,27]. In our study, 66.7% of men who had UAI with casual partners never asked about the serostatus of their partner, although a proportion of the reported UAI could have involved partners with the same serostatus, by chance only. This finding agrees with those of another study in Barcelona in which most of the MSM interviewed reported not having known the serostatus of their partner before engaging in sexual relations [26].

One of the factors associated with UAI is country of origin, as immigrants — particularly those from Latin America — have been described to be at greater risk of HIV infection [28]. In studies carried out among MSM in the United States, Latin Americans reported higher rates of UAI, even in comparison with other minority groups [29]. The racism, homophobia, and poverty these men experience often make it difficult to adopt safe practices and hence increase their vulnerability to HIV/STI.

Psychosocial factors also play a role in protecting oneself from HIV/STI. Our results indicate that those who find it more difficult to live with their sexual orientation and who have negative reactions and attitudes toward their own homo/bisexuality are more likely to engage in sexual risk practices. This is the first time we have analysed in our setting the association among the internalised homophobia and sexual risk behaviours described by other authors [18,19]. On the one hand, internalised homophobia has been reported to be an obstacle to prevention campaigns [18], and, on the other, it has been associated with low self-esteem and greater consumption of alcohol and drugs, which do not favour the practice of safe sex [19]. Future studies should therefore analyse psychosocial aspects in more detail, since they are important risk factors that must be incorporated in prevention messages.

Having a larger number of sexual partners was associated with a greater probability of sexual practices involving a greater risk of HIV/STI. This finding is consistent with those of other European studies [10,30]. Therefore, the increasingly widespread use of Internet as a means of making contact with sexual partners that has been observed in recent years [16,17,31] should be borne in mind, since this medium makes it easier to meet more sexual partners, thus increasing the vulnerability of MSM to HIV/STI. Indeed in our study, MSM who met sexual partners on the Internet were more likely to report UAI with casual partners, and this has also been observed in other studies [16,17]. The association between risky sexual behaviours and meeting partners online needs to be further explored. Online HIV/STI prevention campaigns could prove extremely useful in this group in the future.

Prevention in HIV-positive MSM continues to be a challenge, since this group are more likely than HIV-negative men or men whose serostatus is unknown to engage in sexual risk practices with casual partners, as reported by other authors [28,32]. Some authors stress that HIV-positive men sometimes use serosorting as a risk reduction strategy, although this has not proven efficient for reducing the risk of re-infection by HIV [33] or other STI [4]. Furthermore, a recent study of HIV-positive MSM in the UK highlighted that very few men exclusively practiced serosorting [34]. The reasons for the high prevalence of sexual risk behaviours in HIV-positive MSM include the availability of highly active antiretroviral therapy (HAART), access to Internet, increased substance use, and the stigma or discrimination MSM experience [34].

Finally, in line with other published studies [14,15,35], we found that the use of alcohol and drugs by MSM before and during sex shows a clear association with unprotected sexual relation, which stresses the need to include substance use in future prevention messages.

The main limitation of our study is that we are unable to generalise our results, as the sample was a non-probability sample and, therefore, does not represent all MSM in Catalonia. However, we did try to diversify as much as possible the places and times of the questionnaire distribution in order to minimise this bias. Furthermore, we cannot rule out bias caused by memory or bias caused by underreporting of some risk practices or the self-reported result of an HIV test. Nevertheless, the fact that the questionnaire was self-completed with no identifying personal information could have helped to reduce these types of bias. Another limitation of the study is the low return rate, although this was greater than in other similar studies [31,36]. Lastly, this is a cross-sectional study and

so it is not possible to establish the direction of any association between risk factors and sexual risk practices.

Despite these limitations, we believe that the results of our study provide a valid indication of a high prevalence of sexual risk practices among MSM in Catalonia. This prevalence has increased with respect to previous surveys, which stresses the need to intensify interventions aimed at preventing transmission of HIV/STI in this group. It seems that current prevention campaigns based on spreading information about safe sex are insufficient and fail to address other factors that influence the use of condoms, such as internalised homophobia or social and cultural background. These campaigns should incorporate activities that take into account the impact of internalised homophobia and strengthen self-esteem of gay people, as well as adapt to the sociocultural reality of immigrants. Furthermore, these programmes should also include information on the effects of mixing drugs and sex. Preventive interventions aimed specifically at HIV-positive MSM must be reinforced by insisting on the possibility of HIV re-infection and transmission of other STI and taking into account factors such as stigma and discrimination which often hinder HIV-positive men from taking protective measures against infection. Similarly, new technologies, such as Internet, will play a key role in developing and spreading messages aimed at preventing the transmission of HIV/STI in the future.

Finally, we should attempt to encourage a shift in preventive strategies, from those based only on information campaigns to those based on the implementation of services aimed specifically at MSM which can integrate both preventive and clinical interventions at community level. New diagnostic technologies, such as rapid testing, not only for HIV but also for other STI, provide a good opportunity to expand access to testing, and therefore to counselling and other preventive interventions. Knowledge gained during recent years on network analysis and the role of sexual networks in the spread of HIV should be applied to Internet to deliver preventive interventions to MSM. Bio-behavioural monitoring will continue to be a basic tool to evaluate such approaches.

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References

1. Likatavicius G, Klavs I, Devaux I, Alix J, Nardone A. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000-6: implications for a European public health strategy. Sex Transm Inf. 2008;84(6):499-505.
2. Herida M, Alix J, Devaux I, Likatavicius G, Desenclos JC, Matic S, et al. HIV/AIDS in Europe: epidemiological situation in 2006 and a new framework for surveillance. Euro Surveill. 2007;12(47):pii=3312. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3312
3. Fenton KA, Lowndes CM. Recent trends in the epidemiology of sexually transmitted infections in the European Union. Sex Transm Infect. 2004;80(4):255-63.
4. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.
5. Centre for Sexually Transmitted Infection and AIDS Epidemiological Studies of Catalonia (CEEISCAT). Sistema integrat de vigilància epidemiològica de Sida/VIH/ITS a Catalunya (SIVES) [Integrated system of epidemiological surveillance of AIDS/HIV/STI in Catalonia]. Technical document 18. Barcelona: Generalitat de Catalunya, Departament de Salut; 2006. Catalonian. Available from: http://www.ceescat.org/Index_Ing.htm
6. Romero A, González V, Granell M, Matas L, Esteve A, Martró E, et al. Recently acquired HIV infection in Spain (2003–2005): introduction of the serological testing algorithm for recent HIV seroconversion. Sex Transm Infect. 2009;85(2):106-10.
7. Vall-Mayans M, Casals M, Vives A, Loureiro E, Armengol P, Sanz B. Reemergence of infectious syphilis among homosexual men and HIV coinfection in Barcelona, 2002-2003. Med Clin (Barc). 2006;126(3):94-6. Spanish.
8. Tortajada C, de Olalla PG, Pinto RM, Bosch A, Caylà J. Outbreak of hepatitis A among men who have sex with men in Barcelona, Spain, September 2008 – March 2009. Euro Surveill. 2009;14(15):pii=19175. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19175
9. Vall Mayans M, Caballero E, Garcia de Olalla P, Armengol P, Codina M, Barberà M, et al. Outbreak of lymphogranuloma venereum among men who have sex with men in Barcelona 2007/08 – an opportunity to debate sexual health at the EuroGames 2008. Euro Surveill. 2008;13(25):pii=18908. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=18908
10. Cowan SA, Haff J. HIV and risk behaviour among men who have sex with men in Denmark – the 2006 Sex Life Survey. Euro Surveill. 2008;13(48):pii=19050. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19050
11. Hart G, Williamson L. Increase in HIV sexual risk behaviour in homosexual men in Scotland, 1996-2002: prevention failure? Sex Transm Infect. 2005;81(5):367-2.
12. Elford J, Bolding G, Davis M, Sherr L, Hart G. Trends in sexual behaviour among London homosexual men 1998–2003: implications for HIV prevention and sexual health promotion. Sex Transm Infect. 2004;80(6):451-4.
13. Folch C, Casabona J, Muñoz R, González V, Zaragoza K. Incremento en la prevalencia del VIH y en las conductas de riesgo en hombres que tienen sexo con hombres: 12 años de encuestas de vigilancia conductual en Cataluña [Increase in the prevalence of HIV and sexual risk behaviour in men who have sex with men: 12 years of behavioural surveillance in Catalonia]. Gac Sanit. Forthcoming.
14. Drumright LN, Little SJ, Strathdee SA, Slymen DJ, Araneta MR, Malcarne VL, et al. Unprotected anal intercourse and substance use among men who have sex with men with recent HIV infection. J Acquir Immune Defic Syndr. 2006;43(3):344-50.
15. Operario D, Choi KH, Chu PL, McFarland W, Secura GM, Behel S, et al. Prevalence and correlates of substance use among young Asian Pacific Islander men who have sex with men. Prev Sci. 2006;7(1):19-29.
16. Garofalo R, Herrick A, Mustanski BS, Donenberg GR. Tip of the iceberg: young men who have sex with men, the Internet, and HIV risk. Am J Public Health. 2007;97(6):1113-7.
17. Ogilvie GS, Taylor DL, Trussler T, Marchand R, Gilbert M, Moniruzzaman A, et al. Seeking sexual partners on the Internet: A marker for risky sexual behaviour in men who have sex with men. Can J Public Health. 2008;99(3):185-8.
18. Huebner DM, Davis MC, Nemeroff CJ, Aiken LS. The impact of internalized homophobia on HIV preventive interventions. Am J Community Psychol. 2002;30(3):327-48.
19. Williamson IR. Internalized homophobia and health issues affecting lesbians and gay men. Health Educ Res. 2000;15(1):97-107.
20. Jarama S, Kennamer J, Poppen P, Hendricks M, Bradford J. Psychosocial, behavioral, and cultural predictors of sexual risk for HIV infection among Latino men who have sex with men. AIDS Behav. 2005;9(4):513-23.
21. Moreau-Gruet F, Dubois-Arber F. Evaluation de la stratégie de prévention du Sida en Suisse: Phase 6: 1993-1995. Les hommes aimant d'autres hommes. Etude 1994. [Evaluation of the AIDS prevention strategy in Switzerland, phase 6: 1993-1995. Men who have sex with men. 1994 study.]. Lausanne: Institut Universitaire de Médecine Sociale et Préventive; 1995.
22. Herek GM, Cogan JC, Gillis JR, Glunt EK. Correlates of internalized homophobia in a community sample of lesbians and gay men. J Gay Lesbian Med Assoc. 1997;2:17-25.
23. Mao L, Crawford JM, Hospers HJ, Prestage GP, Grulich AE, Kaldor JM, et al. "Serosorting" in casual anal sex of HIV-negative gay men is noteworthy and is increasing in Sydney, Australia. AIDS. 2006;20(8):1204-6.
24. Parsons JT, Schrimshaw EW, Wolitski RJ, Halkitis PN, Purcell DW, Hoff CC, et al. Sexual harm reduction practices of HIV-seropositive gay and bisexual men: serosorting, strategic positioning, and withdrawal before ejaculation. AIDS. 2005;19 Suppl 1:S13-S25.
25. Truong HM, Kellogg T, Klausner JD, Katz MH, Dilley J, Knapper K, et al. Increases in sexually transmitted infections and sexual risk behaviour without a concurrent increase in HIV incidence among men who have sex with men in San Francisco: a suggestion of HIV serosorting? Sex Transm Infect. 2006;82(6):461-6.

26. Fernández-Dávila P. Amigos con derecho a roce: una oportunidad para contraer la infección por el virus de la inmunodeficiencia humana en hombres homo/bisexuales con prácticas sexuales de alto riesgo ["Sex buddies": a high risk behavior for contracting HIV among homo/bisexual men]. Gac Sanit. 2007;21(6):471-8. Spanish.

27. Butler DM, Smith DM. Serosorting can potentially increase HIV transmissions. AIDS. 2007;21(9):1218-20.

28. Schwarcz S, Scheer S, McFarland W, Katz M, Valleroy L, Chen S, et al. Prevalence of HIV infection and predictors of high-transmission sexual risk behaviors among men who have sex with men. Am J Public Health. 2007;97(6):1067-75.

29. Díaz RM, Ayala G. Social discrimination and health: The case of latino gay men and HIV risk. Washington: The Policy Institute of the National Gay and Lesbian Task Force; 2001. Available from: http://www.thetaskforce.org/downloads/reports/reports/SocialDiscriminationAndHealth.pdf

30. Hichson F, Weatherburn P, Reid D, Jessup K, Hammond G. Consuming passions: findings from the United Kingdom Gay Men's Sex Survey 2005. London: Sigma research; 2007. Available from: http://www.sigmaresearch.org.uk/downloads/report07c.pdf

31. Fernández-Dávila P, Zaragoza Lorca K. Internet y riesgo sexual en hombres que tienen sexo con hombres [Internet and sexual risk in men who have sex with men]. Gac Sanit. 2009;23(5):380-7. Spanish.

32. Holtgrave DR, Crosby R, Shouse RL. Correlates of unprotected anal sex with casual partners: a study of gay men living in the southern United States. AIDS Behav. 2006;10(5):575-8.

33. Campbell MS, Gottlieb GS, Hawes SE, Nickle DC, Wong KG, Deng W, et al. HIV-1 superinfection in the antiretroviral therapy era: are seroconcordant sexual partners at risk? PLoS One. 2009:4(5):e5690.

34. Bourne A, Dodds C, Keogh P, Weatherburn P, Hammond G. Relative Safety II: risk and unprotected anal intercourse among gay men with diagnosed HIV. London: Sigma research; 2009. Available from: http://www.sigmaresearch.org.uk/files/report2009d.pdf

35. Folch C, Marks G, Esteve A, Zaragoza K, Muñoz R, Casabona J. Factors associated with unprotected sexual intercourse with steady male, casual male, and female partners among men who have sex with men in Barcelona, Spain. AIDS Educ Prev. 2006;18(3):227-42.

36. Dubois-Arber F, Moreau-Gruet F. Men having sex with men and HIV/AIDS prevention in Switzerland: 1987-2000. Euro Surveill. 2002;7(2):pii=347. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=347

Do men who have sex with men use serosorting with casual partners in France? Results of a nationwide survey (ANRS-EN17-Presse Gay 2004)

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We examined whether men who have sex with men (MSM) in France have adopted serosorting with their casual partners, serosorting being one strategy to reduce the risk of HIV transmission. We expected to see the same predictors of this practice with casual partners in France as in other similar MSM communities (HIV-seropositive, Internet dating). Data from a cross-sectional survey was used, based on a self-administered questionnaire conducted among readers of the gay press and users of gay websites in 2004. The study population consisted of MSM who reported their HIV status, as well as the practice of unprotected anal intercourse (UAI) with a casual partner at least once during the previous 12 months. Among 881 respondents included in the analysis, 195 (22%) had practiced serosorting: 14% among HIV-seropositive men and 26% among HIV-seronegative men. Serosorting was independently associated with the use of cruising venues (AOR 0.28, p=0.001) and Internet dating (AOR 2.16, p=0.051) among HIV-seropositive men, whereas it was independently associated with the use of cruising venues (AOR 0.59, p=0.013) and the fact of having less partners (AOR 1.50, p=0.046) among HIV-seronegative men. Serosorting requires an up-to-date knowledge of HIV serostatus for MSM and their UAI casual partners, and does not prevent from acquiring other sexually transmitted infections. Prevention campaigns are needed to underline the risks associated with serosorting.

Introduction

Since 2003, an increase in new HIV diagnoses among men who have sex with men (MSM) has been observed by the mandatory notification system for HIV infection in France [1] as well as in many European countries [2]. During the same period, it was reported that half of MSM diagnosed with syphilis were also HIV-seropositive [3]. More recently, cases of rectal lymphogranuloma venereum (LGV) have been diagnosed exclusively among MSM, most of whom were HIV-seropositive [3]. In 2000, for the first time since its inception in 1985, the French Gay Press Survey (EPG) showed an increase in sexual risk behaviours among MSM [4]. This trend was confirmed by the results of the latest EPG survey, conducted in 2004, in which 33% of respondents reported unprotected anal intercourse (UAI) with casual partners [5] . Among men who had at least one casual partner, UAI was reported by 56% of HIV-positive respondents and 28% of HIV-negative respondents [5]. Similar patterns have been documented since 1996 in the United States [6], Australia [7] and, slightly later, in Europe [8,9].

Recently, sexual behaviours aiming at reducing the risk of HIV transmission have been reported: serosorting with casual partners, negotiated safety with regular partners, strategic positioning, withdrawal before ejaculation [10-13]. The first, serosorting, consists of engaging in unprotected anal sex only with partners of the same HIV serostatus as oneself. This strategy has been described as being used by MSM in several cities in industrialised countries [14-17]. It is mainly employed by HIV-seropositive MSM who use the Internet to find sexual partners [14,16,18]. Osmond et al. showed that this strategy was used most frequently by the 18-29-year-olds [17]. This practice has also been described among HIV-negative men [11,19-22]. To date, serosorting with casual partners has never been studied in France.

The aim of this study was to determine whether MSM who did not use condoms for anal sex with casual partners adopted the strategy of serosorting, and to describe the men thus identified. We expected to see the same predictors of this practice with casual partners in France as in other similar MSM communities worldwide (HIV-seropositive, Internet dating). The study was based on our nationwide gay press and gay website survey carried out in late 2004.

Methods

Survey

The French Gay Press Survey (EPG) was first conducted in 1985. It was repeated each year until 1993, and subsequently every three or four years. The recruitment protocol has been unchanged since 1985. It consists in placing a questionnaire inside gay magazines with large readerships, and inviting readers to complete it on a voluntary basis. Questionnaires are returned to the French Institute for Public Health Surveillance (Institut de veille sanitaire, InVS). During the last survey in 2004, for the first time, the questionnaire was also posted on gay websites. The magazines and websites could be of a general or pornographic, national or regional character. Sixteen gay magazines and ten gay websites made available the questionnaire between July and October 2004, and responses were collected until February 2005.

The self-administered questionnaire comprised 100 wide-ranging questions on the respondent's sociodemographic characteristics, social and sexual life, sexual practices, history of sexually transmitted infection (STI), and self-reported HIV serostatus. Specifically, some questions addressed the respondent's sexual behaviour in the previous 12 months, including the number of male sexual partners, the type of sexual practices (e.g. anal sex), and the number of UAI; further questions focussed on the respondent's sexual risk behaviours, if any, with regular or casual partners. Respondents who had had at least one casual partner during the previous 12 months were asked about their sexual practices with those casual partner(s), and their knowledge of the HIV serostatus of UAI partners.

For 20 years, this survey has aimed at monitoring preventive sexual behaviours, lifestyles and sociability among MSM. The EPG survey constitutes one part of the French sexual behavioural MSM surveillance program; some questions are kept similar in each

Figure

Number of respondents meeting the inclusion criteria for the analysis of serosorting, France (ANRS-EN17-Presse Gay 2004)

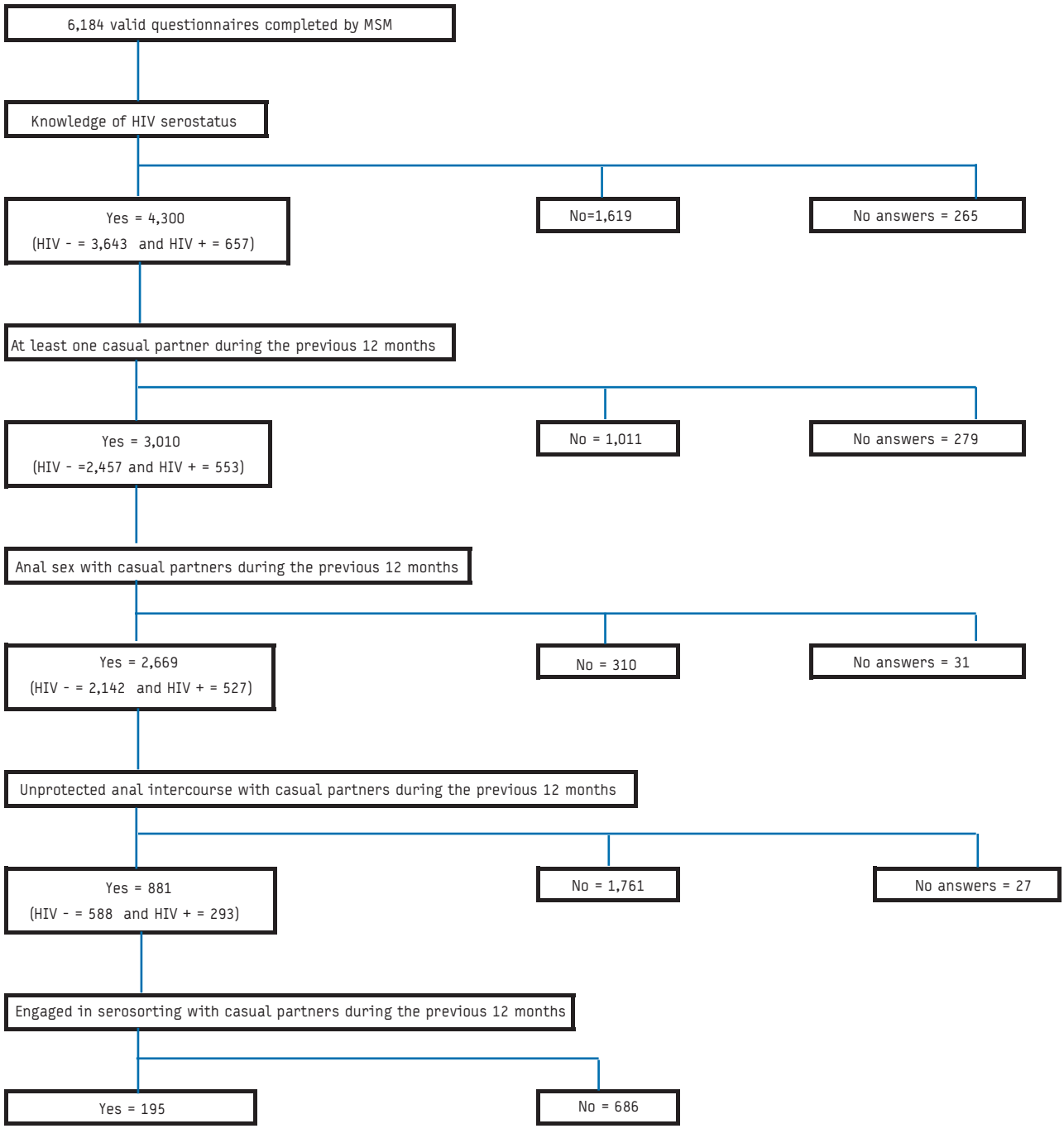

Table 1

Sociodemographic characteristics, sexual practices and HIV testing history of respondents who had unprotected anal intercourse with a casual partner at least once in the previous 12 months, according to the use of serosorting, France (ANRS-EN17-Presse Gay 2004)

	Serosorting					
	Yes			No		
	N	%		n	%	
	195	22.1		686	77.9	
Categorical variables	N	%		n	%	p
Type of questionnaires						
Pen and paper questionnaires	139	71.3		494	72.0	0.842
Online questionnaires	56	28.7		192	28.0	
Education						
High school or lower	77	39.9		261	38.3	0.682
University	116	60.1		421	61.7	
Residence						
Paris region	80	46.0		254	41.2	0.257
Other regions of France	94	54.0		363	58.8	
Living						
Alone	108	56.0		375	54.9	0.893
With a man (couple)	56	29.0		210	30.8	
Other	29	15.0		98	14.3	
Sexual orientation						
Gay / homosexual	172	89.6		609	89.6	0.992
Other	20	10.4		71	10.4	
Looking for sexual partners in backrooms						
Yes	72	37.7		320	47.1	0.022
No	119	62.3		360	52.9	
Looking for sexual partners in saunas						
Yes	70	36.6		330	48.5	0.004
No	121	63.4		350	51.5	
Looking for sexual partners in cruising venues						
Yes	58	30.4		343	50.4	<0 .001
No	133	69.6		337	49.6	
Looking for sexual partners on websites						
Yes	111	58.1		347	51.0	0.083
No	80	41.9		333	49.0	
Drinking over five glasses of alcohol, on consumption days						
Yes	30	18.4		119	21.2	0.435
No	133	81.6		442	78.8	
Drug use (at least one product except cannabis)						
Yes	46	24.1		214	31.4	0.051
No	145	75.9		468	68.6	
Oral sex with casual partners (previous 12 months)						
No oral sex	1	0.6		2	0.3	0.969
Always protected oral sex	5	2.8		19	3.0	
No sperm exposure during unprotected oral sex	58	32.4		209	32.6	
Sperm exposure during oral sex	115	64.2		411	64.1	
At least one STI (previous 12 months)						
Yes	33	17.0		155	22.8	0.085
No	161	83.0		526	77.2	
Self-reported HIV serostatus						
Negative	155	79.5		433	63.1	<0 .001
Positive	40	20.5		253	36.9	
Continuous variables	Median	Range		Median	Range	k-s
Age	35.5	17-72		37	19-64	0.300
Years of sex with male partners	19	1-55		19	2-48	0.164
Number of sexual partners (previous 12 months)	12	1-400		20	1-900	0.003
Number of HIV tests (previous 2 years)	2	0-24		2	0-30	0.699

As not all questions were answered by all respondents, the total numbers for each variable can be different.

Table 2

Factors associated with serosorting among HIV-seronegative respondents reporting unprotected anal sex with casual partners during the previous 12 months, France (ANRS-EN17-Presse Gay 2004) – final multivariate model (n=576)

	N	%	OR	Adjusted OR	95% CI	p
Looking for sexual partners in cruising venues						
No	103	31.4	1	1		
Yes	48	19.0	0.51	0.59	0.39 to 0.89	0.013
Looking for sexual partners on websites						
No	70	23.9	1			
Yes	81	28.2	1.25			
Drug use (at least one product except cannabis)						
No	117	26.9	1			
Yes	35	23.5	0.83			
Number of sexual partners						
Over 10 partners	65	21.0	1	1		
1 to 10 partners	89	32.5	1.81	1.50	1.00 to 2.23	0.046
Looking for sexual partners in backrooms						
No	107	27,6	1			
Yes	44	22.9	0.78			
Looking for sexual partners in saunas						
No	102	29.7	1			
Yes	49	20.7	0.62			
Younger than 30 years						
No	113	27.5	1			
Yes	39	26.2	0.94			

Hosmer-Lemeshow test: chi-squared = 1.36; p = 0.506

Table 3

Factors associated with serosorting among HIV-seropositive respondents reporting unprotected anal sex with casual partners during the previous 12 months, France (ANRS-EN17-Presse Gay 2004) – final multivariate model (n=291)

	n	%	OR	Adjusted OR	95% CI	p
Looking for sexual partners in cruising venues						
No	30	21.1	1	1		
Yes	10	6.7	0.27	0.28	0.13 to 0.60	0.001
Looking for sexual partners on websites						
No	10	8.3	1	1		
Yes	30	17.5	2.34	2.16	1.00 to 4.67	0.051
Drug use (at least one product except cannabis)						
No	28	15.7	1			
Yes	11	9.9	0.59			
Number of sexual partners						
Over 10 partners	33	14.4	1			
1 to 10 partners	7	11.9	0.80			
Looking for sexual partners in backrooms						
No	12	13.2	1			
Yes	28	14.0	1.07			
Looking for sexual partners in saunas						
No	19	14.8	1			
Yes	21	12.9	0.85			
Younger than 30 years						
No	36	13.8	1			
Yes	0	0	0			

Hosmer-Lemeshow test: chi-squared = 0.6; p = 0.743

survey in order to follow trends in key sexual behavioural indicators. This survey was not originally designed to study serosorting. Only the most recent survey of 2004 collected data suitable for interpretation regarding serosorting.

Data collection

HIV serostatus at the time of the questionnaire was self-reported by those respondents who stated that they had had at least one HIV test during their lifetime. Respondents were asked if they had UAI with casual partner(s) during the last 12 months. When this was the case, the HIV serostatus of their casual partner(s) was then investigated using the three following questions: "If you had unprotected anal sex with one or more casual partner(s): were there any whom you knew to be seronegative (yes/no)? Were there any you knew to be seropositive (with or without AIDS) (yes/no)? Where there any whose HIV serostatus you did not know (yes/no)?" The answers were then combined in order to deduce whether respondents practiced serosorting with casual partners or not, as the term "serosorting" itself was not used in the questionnaire.

Respondents were considered to have practiced serosorting with casual partners when they stated that they knew their own HIV serostatus (negative or positive) and that, during the previous 12 months, they had had UAI with one or more casual partners exclusively of the same HIV serostatus as themselves. Respondents who knew their HIV-serostatus and who had had UAI with a casual partner of different or unknown HIV serostatus at least once in the previous 12 months were considered not to practice serosorting. We used these restrictive criteria for serosorting because in the questionnaire no information was collected on the notion of intention or on the HIV serostatus of casual partners with whom condoms were used.

Information on where respondents met their casual partners, such as bars, venues with anonymous sex (saunas, backrooms, cruising venues) or Internet, was collected through a multiple-choice question "Where did you meet your male partners in the previous 12 months?". Drug use was investigated through questions on the consumption of poppers, ecstasy, cocaine, heroin, amphetamines, and hallucinogens during the previous 12 months. All answers were combined in order to have information on the use or not of at least one of these substances.

Participants

Among the 6,184 MSM who completed the questionnaire during the 2004 survey, self-reported HIV prevalence was 13% (n=657). The serosorting analysis was restricted to respondents who reported their HIV serostatus (positive, with or without AIDS, or negative), and who reported having UAI with a casual partner at least once during the previous 12 months. The algorithm used to detect serosorting is shown in the Figure.

Accordingly, 1,884 (27%) respondents were excluded, because they did not know or report their HIV serostatus. Subsequently, those who reported no casual partner (n=1,290), no anal sex with casual partners (n=341) and no unprotected anal sex with casual partners (n=1,788) were also excluded. In the end we analysed data from a sample of 881 respondents.

Statistical analysis

Descriptive statistics were used to compare the sociodemographic characteristics and sexual behaviour of men who did and did not practise serosorting. Univariate analysis was used to identify factors associated with serosorting and to select variables for inclusion in multivariate analysis (Pearson's test or the non parametric chi-squared test). The threshold for statistical significance was set at 0.10. To identify factors independently associated with serosorting according to HIV status, two stepwise descending multivariate regression analyses were used, eliminating variables with no significant effect at the 5% level.

The Wald test was used for categorical variables. The Hosmer-Lemeshow test was used to assess the goodness-of-fit of the resulting models. All analyses were carried out with STATATM software version 8.

Results

The final analysis focused on 881 respondents who stated their HIV serostatus and reported having had UAI with a casual partner at least once during the previous 12 months. The average age of these respondents was 37.3 years. The educational level was high: 61% of the sample had attended university. The majority (63%) lived in urban areas of more than 100,000 inhabitants. HIV-positive status was self-reported by 33% of respondents. Half of respondents used traditional gay meeting places such as bars, saunas, backrooms, cruising venues; the same proportion looked for sexual partners through websites. The use of psychoactive substances was frequent (30%). The median number of sexual partners in the previous 12 months was significant: 20 (range: 1-400). Of these respondents, 195 (22%) practiced serosorting when engaging in UAI with casual partners, while the remaining 686 respondents (78%) did not.

Univariate analysis

The respondents who did and did not practice serosorting with casual partners were not significantly different with respect to age (35 and 37 years), educational level, or area of residence (Table 1). Men in both groups had an equally marked gay community lifestyle with strong self-definition of their homosexual identity and a long history of sex with men (19 years in both groups). The frequency of HIV serotesting did not differ between the groups, including the HIV-seronegative subpopulation (median 2 tests). A history of at least one STI in the previous 12 months was similarly frequent in both groups.

In contrast, the two groups differed significantly in terms of their HIV serostatus distribution, the number of male partners during the previous 12 months, the use of anonymous gay venues to meet sexual partners, and drug use. Among HIV-seropositive respondents, 14% practiced serosorting whereas among HIV-seronegative men this proportion was 26%. Respondents who practiced serosorting had fewer male sexual partners during the previous 12 months than respondents who did not practice serosorting (median 12 vs 20 partners) and were less likely to meet sexual partners in venues where sex is generally anonymous (backrooms, saunas and cruising venues). Respondents who practiced serosorting were slightly more likely than other respondents to use the Internet to meet sexual partners. Recreational use of psychoactive substances was less frequent among respondents who practiced serosorting than among other respondents (respectively 24% and 31%).

Multivariate analysis

In the multivariate analysis on HIV-negative respondents, 2.0% of the data were missing. In the final multivariate model (Table 2), serosorting of casual partners during the previous 12 months was associated with the use of cruising venues and the number of partners. For HIV-negative men, having 10 or less sexual partners was positively associated with serosorting (AOR 1.50), whereas the use of cruising venues was negatively associated with serosorting

(AOR 0.59). No other variables were independently associated with serosorting. The final model had a good fit (Hosmer and Lemeshow test, p>0.05).

In the multivariate analysis on HIV-positive respondents, less than 1% of the data was missing. In this final multivariate model (Table 3), serosorting of casual partners during the previous 12 months was associated with the use of cruising venues and Internet dating. For HIV-positive men, Internet dating was positively associated with serosorting (AOR 2.16), whereas the use of cruising venues was negatively associated with serosorting (AOR 0.28). No other variables were independently associated with serosorting. The final model had a good fit (Hosmer and Lemeshow test, p>0.05).

Discussion

This study represents the first attempt to explore the practice of serosorting with casual partners by MSM in France, as data from previous surveys were not suitable for this investigation. Among the respondents who stated they had had UAI with a casual partner on at least one occasion during the previous 12 months, 22% (n=195) were considered to have engaged in serosorting with casual partners.

In our study, the characteristics of MSM who practiced serosorting with casual partners were very similar to those of MSM who did not, although serosorters represented 26% of HIV-seronegative MSM and 14% of HIV-seropositive MSM. The multivariate analyses identified variables independently associated with serosorting: HIV-seronegative MSM were far more likely to serosort when they had less partners, and HIV-seropositive MSM practiced serosorting more frequently when they used Internet dating, whereas MSM who attended cruising venues were less likely than other MSM to serosort regardless of their HIV-status.

Our findings are similar to those found in other studies carried out in industrialised countries, where HIV-seropositive MSM who serosort are more likely to look for sexual partners on websites [14,16,18]. However, our study did not find that HIV-seropositive MSM were more likely than HIV-seronegative MSM to serosort [10,13,16].

This cross-sectional survey was based on a convenience sample, a method widely used for surveys related to MSM [23]. This is mainly due to the difficulties of recruiting a sufficiently large sample of MSM through representative general-population-based surveys. It has been suggested that respondents recruited through the press have a more established sexual identity and sex life, and tend to be exclusively homosexual. They also tend to have confident attitudes and an interest in questions relating to HIV prevention, at least enough to answer a long questionnaire on sexual risk behaviours [24]. This selection bias probably results in an underestimation of sexual risk behaviours among MSM. A social desirability bias may compound this problem, although it should be limited by the use of a self-administered questionnaire.

In this study, the serosorting indicator was constructed retrospectively, based on answers to three questions relating to the HIV serostatus of casual partners with whom respondents had UAI. Only respondents who indicated that they had had UAI with casual partners whose HIV serostatus was identical to theirs were considered to have practiced serosorting. In other words, MSM who reported having also had partners of unknown or discordant HIV serostatus were classified as not using serosorting.

The definition of serosorting used in this study is restrictive, mainly because of the constraints imposed by initial material collected through the questionnaire. No information was collected concerning casual partners' HIV status when condoms were used. The term "serosorting" was not used in the questionnaire, and respondents were not asked about their intention of choosing casual partners according to their HIV status. Hence it was impossible to assess whether those who were considered to have practiced serosorting did so deliberately or not. Likewise, no data contributed to evaluate whether the knowledge of partners' serostatus was the respondent's assumption or the result of direct discussion between partners. Similarly to some other researchers, the implementation of negotiated safety practices in regular partnerships, especially by HIV-negative men, was not taken into account in our definition of serosorting [21,22,25].

Serosorting is a recent concept, its definition is still being developed and no consensus has been reached in literature so far [13,15,21]. This explains why the comparison of our results with those of other studies is difficult. Taking into account all the limitations due to the nature of our data, our outcome may be considered an estimation of casual seroconcordance rather than serosorting.

The frequency of serosorting may either be overestimated or underestimated, depending on whether a sub-sample or the total sample is taken into account. Indeed, the rate of serosorting may be expressed as a proportion of UAI respondents with a given HIV serostatus only [25], but it may also be evaluated by a ranking of sexual risks behaviours which is applied to all respondents [15,17,19,21]. Nonetheless, in our study, intentional serosorting and seroconcordance by chance could not be distinguished and measured. If the whole sample of respondents had been selected for analysis, it would have meant that the implementation of a risk reduction strategy was intentionally adopted when deciding to have sexual intercourse; this hypothesis being an overstatement.

Our findings show that a large proportion of HIV-seronegative respondents had seroconcordant UAI with casual partners. This is not surprising given that the probability of finding HIV-seronegative partners is much higher than the probability of finding HIV-seropositive partners. Nevertheless, our results highlight at-risk behaviours. Indeed, we focused on MSM who practiced UAI with casual partners, and our results may therefore suggest that serosorting was practiced instead of condom use by some HIV-seronegative MSM. For HIV-seronegative MSM, the practice of serosorting implies the need for an up-to-date knowledge of their own HIV serostatus obtained through regular screening. However, we found no difference in the frequency of HIV testing in the previous two years between MSM who practiced serosorting and those who did not. Therefore, our findings, consistent with those reported in other research work, suggest that a fraction of MSM who believe themselves to be HIV seronegative could in fact be infected [26]. Recently, Williamson et al. reported that 41% of men who tested HIV-seropositive were unaware of their status, although less than half of them reported having had a negative test in the previous 12 months [27]. This highlights one major problem related to serosorting, namely the difficulty of being certain of one's own HIV seronegativity. The practice of serosorting by HIV-seronegative individuals as an alternative to condom use for preventing HIV infection has been addressed in previous studies [11,28]. In populations with a high incidence of HIV infection, incorrect HIV serostatus assumptions are not that rare, even among individuals

who have had frequent HIV screening tests during the previous year. Recent studies have raised the possibility that serosorting could in fact increase the risk of HIV transmission [19,29]. In contrast, in the specific case of HIV-negative regular partnerships, the negotiated safety has been confirmed to be protective from HIV infection [20].

The rationale of serosorting is also based on the knowledge of a casual partner's serostatus, as stated during preliminary conversation. It requires for users of this strategy to obtain accurate information on the HIV serostatus of each casual partner before engaging in unprotected sex, without assuming serological concordance from the outlook or seroguessing [22]. This issue may be relatively simple to discuss with partners in established relationships, but direct discussion may be more problematic with casual partners encountered in anonymous venues. In fact, we found that participants who attended cruising venues were less likely to serosort, probably because this type of venues tend to encourage immediate anonymous sex, making it more difficult to broach the subject of HIV/AIDS [30].

The use of Internet to meet sexual partners was associated with serosorting for HIV-seropositive respondents, as reported in some studies [15,17,31]. Indeed, it may be easier to disclose one's HIV seropositivity to potential sexual partners during online encounters, especially on "positive-seeking-positive" websites [18]. However, for HIV-seronegative MSM, the HIV-seronegativity of potential sexual partners is as uncertain on the Internet as in other venues. A great deal of sincerity from both partners is required to disclose a person's HIV serostatus, whatever it is.

If the use of psychoactive substances was not independently associated with serosorting, having less partners was predictive of using serosorting among HIV-negative men. Just like in the beginning of the HIV pandemic, MSM who serosorted tended to use other sexual harm-reduction practices [32], which were a smaller number of sexual partners and a lower level of drug use; these are consistent with the time necessary to discuss serostatus and the fact that serosorting requires a high degree of self-control [30].

In our study, serosorting was constructed retrospectively from a behavioural survey. As mentioned, the definition we used did not include notions of intention nor discussions on HIV status, hence limiting interpretations. These new questions will be added to the next EPG survey.

In a context of increasing sexual risk behaviours in France, particularly among HIV-seropositive MSM, the proportion of MSM who practice UAI seroconcordance with casual partners (22%) can be considered relatively large. On the other hand, 78% of MSM practiced UAI with casual partners of unknown or discordant HIV serostatus. Moreover, among all respondents of the EPG survey, a large proportion was unaware of their own HIV serostatus (27%). All these events are consistent with the increase of the number of new HIV diagnoses among MSM in France. HIV prevention campaigns promoting screening and condom use must be pursued. An important limitation of serosorting as a risk reduction strategy is the fact that it exposes both HIV-seronegative and HIV-seropositive men to a high risk of STI [15,33]. Our results call for the implementation of additional programs to alert HIV-seronegative MSM to the limitations of serosorting casual partners, with respect to the risk of all STI, including HIV/AIDS. HIV-seropositive MSM also need to be more aware that serosorting does not prevent STI transmission.

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References

1. Velter A, Semaille C, Bouyssou-Michel A. Les hommes ayant des rapports sexuels avec des hommes [Men who have sex with men]. In: Safar-Semaille C, Lot F. Lutte contre le VIH/sida et les infections sexuellement transmissibles en France. 10 ans de surveillance, 1996-2005. [Fighting HIV/AIDS and sexually transmitted infections in France. 10 years of surveillance, 1996-2005] Saint-Maurice: Institut de veille sanitaire; 2007. p. 82-94. French.
2. Likatavicius G, Klavs I, Devaux I, Alix J, Nardone A. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000-6: implications for a European public health strategy. Sex Transm Infect. 2008;84(6):499-505.
3. Herida M, Michel A, Goulet V, Janier M, Sednaoui P, Dupin N, et al. Epidemiology of sexually transmitted infections in France. Med Mal Infect. 2005;35(5):281-9.
4. Adam P, Hauet E, Caron C. Recrudescence des prises de risque et des MST parmi les gays. Résultats préliminaires de l'Enquête Presse Gay 2000. [Increase of sexual risk behaviour and sexually transmitted diseases among gay men. Preliminary results of the French Gay Press Survey 2000] Saint-Maurice: Institut de veille sanitaire; 2001. French.
5. Velter A. Rapport Enquête Presse Gay 2004 (ANRS-EN17-Presse Gay 2004) [Report on French Gay Press Survey 2004]. Saint Maurice: Institut de veille sanitaire; 2007. French. Available from: http://www.invs.sante.fr/publications/2007/epg_2004/epg_2004.pdf
6. Chen SY, Gibson S, Katz MH, Klausner JD, Dilley JW, Schwarcz SK, et al. Continuing increases in sexual risk behavior and sexually transmitted diseases among men who have sex with men: San Francisco, Calif, 1999-2001, USA. Am J Public Health. 2002;92(9):1387-8.
7. Van de Ven P, Prestage G, Crawford J, Grulich A, Kippax S. Sexual risk behaviour increases and is associated with HIV optimism among HIV-negative and HIV-positive gay men in Sydney over the 4 years period to February 2000. AIDS. 2000;14(18):2951-3.
8. Balthasar H, Jeannin A, Dubois-Arber F. [Surveillance of HIV/AIDS-related behaviors among men who have sex with men – Switzerland, 1992-2004]. Int J Public Health. 2007;52(1):27-38. French.
9. Elford J, Bolding G, Davis M, Sherr L, Hart G. Trends in sexual behaviour among London homosexual men 1998-2003: implications for HIV prevention and sexual health promotion. Sex Transm Infect. 2004;80(6):451-4.
10. Elford J, Bolding G, Sherr L, Hart G. High-risk sexual behaviour among London gay men: no longer increasing. AIDS. 2005;19(18):2171-4.
11. Mao L, Crawford JM, Hospers HJ, Prestage GP, Grulich AE, Kaldor JM, et al. "Serosorting" in casual anal sex of HIV-negative gay men is noteworthy and is increasing in Sydney, Australia. AIDS. 2006;20(8):1204-6.
12. Parsons JT, Schrimshaw EW, Wolitski RJ, Halkitis PN, Purcell DW, Hoff CC, et al. Sexual harm reduction practices of HIV-seropositive gay and bisexual men: serosorting, strategic positioning, and withdrawal before ejaculation. AIDS. 2005;19 Suppl 1:S13-S25.
13. Truong HM, Kellogg T, Klausner JD, Katz MH, Dilley J, Knapper K, et al. Increases in sexually transmitted infections and sexual risk behaviour without a concurrent increase in HIV incidence among men who have sex with men in San Francisco: a suggestion of HIV serosorting? Sex Transm Infect. 2006;82(6):461-6.
14. Bolding G, Davis M, Hart G, Sherr L, Elford J. Gay men who look for sex on the Internet: is there more HIV/STI risk with online partners? AIDS. 2005;19(9):961-8.
15. Elford J. Changing patterns of sexual behaviour in the era of highly active antiretroviral therapy. Curr Opin Infect Dis. 2006;19(1):26-32.
16. Hospers HJ, Kok G, Harterink P, de Zwart O. A new meeting place: chatting on the Internet, e-dating and sexual risk behaviour among Dutch men who have sex with men. AIDS. 2005;19(10):1097-101.
17. Osmond DH, Pollack LM, Paul JP, Catania JA. Changes in prevalence of HIV infection and sexual risk behavior in men who have sex with men in San Francisco: 1997 2002. Am J Public Health. 2007;97(9):1677-83.

18. Berry M, Raymond HF, Kellogg T, McFarland W. The Internet, HIV serosorting and transmission risk among men who have sex with men, San Francisco. AIDS. 2008;22(6):787-9.
19. Golden MR, Stekler J, Hughes JP, Wood RW. HIV serosorting in men who have sex with men: is it safe? J Acquir Immune Defic Syndr. 2008.
20. Jin F, Crawford J, Prestage GP, Zablotska I, Imrie J, Kippax SC, et al. Unprotected anal intercourse, risk reduction behaviours, and subsequent HIV infection in a cohort of homosexual men. AIDS. 2009;23(2):243-52.
21. Snowden J, Raymond HF, McFarland W. Prevalence of seroadaptive behaviors of men who have sex with men, San Francisco, 2004. Sex Transm Infect. 2009;85(6):469-76.
22. Zablotska IB, Imrie J, Prestage G, Crawford J, Rawstorne P, Grulich A, et al. Gay men's current practice of HIV seroconcordant unprotected anal intercourse: serosorting or seroguessing? AIDS Care. 2009;21(4):501-10.
23. Bochow M, Chiarotti F, Davies P, Dubois-Arber F, Dur W, Fouchard J, et al. Sexual behaviour of gay and bisexual men in eight European countries. AIDS Care. 1994;6(5):533-49.
24. Sandfort TGM. Sampling male homosexuality. In: Bancrofs J. Ed. Researching sexual behavior: methodological issues. Bloomington: Indiana University Press; 1997. p. 261-75.
25. Elford J, Bolding G, Sherr L, Hart G. No evidence of an increase in serosorting with casual partners among HIV-negative gay men in London, 1998-2005. AIDS. 2007;21(2):243-5.
26. Centers for Disease Control and Prevention. HIV prevalence, unrecognized infection, and HIV testing among men who have sex with men – five U.S. cities, June 2004-April 2005. MMWR Morb Mortal Wkly Rep. 2005;54(24):597-601.
27. Williamson LM, Dodds JP, Mercey DE, Hart GJ, Johnson AM. Sexual risk behaviour and knowledge of HIV status among community samples of gay men in the UK. AIDS. 2008;22(9):1063-70.
28. Eaton LA, Kalichman SC, Cain DN, Cherry C, Stearns HL, Amaral CM, et al. Serosorting Sexual Partners and Risk for HIV Among Men Who Have Sex with Men. Am J Prev Med. 2007;33(6):479-85.
29. Butler DM, Smith DM. Serosorting can potentially increase HIV transmissions. AIDS. 2007;21(9):1218-20.
30. Rietmeijer CA, Lloyd LV, McLean C. Discussing HIV serostatus with prospective sex partners: a potential HIV prevention strategy among high-risk men who have sex with men. Sex Transm Dis. 2007;34(4):215-9.
31. Chiasson MA, Parsons JT, Tesoriero JM, Carballo-Dieguez A, Hirshfield S, Remien RH. HIV behavioral research online. J Urban Health. 2006;83(1):73-85.
32. Bochow M, Jauffret-Roustide M, Michel A, Schiltz MA. Les évolutions des comportements sexuels et les modes de vie à travers les enquêtes réalisées dans la presse gay en France (1985-2000) [The evolution of sexual behaviour and lifestyle seen through the surveys conducted by the gay press in France (1985-2000)]. In: Broqua C, Lert F, Souteyrand Y. Homosexualités au temps du sida. Tensions sociales et identitaires. [Homosexuality in times of AIDS. Social and identity tensions].Paris: ANRS; 2003. p. 35-54. French.
33. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.

Epidemiology of herpes simplex virus types 2 and 1 amongst men who have sex with men attending sexual health clinics in England and Wales: implications for HIV prevention and management

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The objective was to investigate herpes simplex virus (HSV) epidemiology amongst HIV-positive and HIV-negative men who have sex with men (MSM) in England and Wales. Unlinked anonymous sera from 3,968 MSM attending 12 sexual health clinics in 2003 were tested for HIV, HSV-2 and HSV-1 antibodies. Fifty-five percent of HIV-positive MSM were HSV-2-seropositive, compared to 17% of HIV-negative MSM (Adj RR: 2.14 [CI: 1.92-2.37]). Amongst HIV-positive individuals, there was no significant difference in HSV-2 seroprevalence by knowledge of HIV status or whether the HIV infection was recently acquired (determined through STARHS). HIV infection was also independently associated with HSV-1 serostatus (Adj RR 1.19 [CI: 1.14-1.24)]). Four of the twelve attendees who received a diagnosis of recurrent anogenital herpes at the clinic visit were HSV-1-seropositive but not HSV-2-seropositive at the time, although no cultures or PCR results were available to type the cause of the ano-genital presenting disease. It is of concern that one in two HIV-positive MSM and one in six HIV-negative MSM may be infected with HSV-2, given increasing evidence of its impact on HIV progression, onward transmission and acquisition. To date results have been disappointing from trials aimed at reducing HIV onward transmission and HIV acquisition using HSV antiviral medication. However, recent research in an African context demonstrates the efficacy of HSV antivirals in delaying HIV progression. The high prevalence of HSV-2 amongst HIV-positive MSM suggests that an increased focus on HSV control in the management of HIV amongst MSM in the United Kingdom (UK) may be warranted. Given this and existing research on the high prevalence of genitally acquired HSV-1 amongst MSM in the UK, further research is also warranted into the role of HSV-1 in the HIV epidemic in this context.

Introduction

Genital herpes is caused by infection with herpes simplex types 2 and 1 (HSV-2 and HSV-1). There is increasing evidence from biological and epidemiological studies of the link between HSV-2 and the HIV epidemic. Research has shown that for HIV-positive individuals, frequent asymptomatic HSV-2 reactivations are associated with increased HIV viral load and genital shedding. In addition, HSV-2 suppression using antivirals reduces HIV viral load and genital shedding [1-3]. Whilst trials to date have failed to find evidence that HSV antivirals can reduce onward HIV transmission [1,2,4], the recent Partners In Prevention (PIP) trial has demonstrated that HSV antivirals can significantly reduce HIV progression according to key indicators amongst HIV-positive HSV-2-positive African men and women [4]. For HIV-negative individuals, HSV-2 infection increases the risk of HIV acquisition more than two-fold [1,3,5,6], although trials to date have failed to show an impact of HSV medication on HIV acquisition [1-3]. The impact of HSV-1 on HIV is less researched, possibly as it causes genital herpes with less severe symptoms and less frequent recurrences [7] and because it is primarily acquired orally early on in childhood in most countries with a high HIV incidence [7,8]. However, 50% of diagnoses of first attacks of ano-genital herpes amongst MSM in the United Kingdom (UK) are now caused by HSV-1 [5,7,9,10].

The prevalence of HSV type 2 and 1 varies widely between and within countries [8,11]. In the UK as elsewhere in Western Europe, there are high rates of sexually transmitted infections (STI) (other than HSV) amongst MSM, particularly HIV-positive MSM [12,13], and there have been increasing diagnoses of anogenital herpes reported by sexual health clinics [9]. However, information on the prevalence of HSV amongst HIV-positive and HIV-negative MSM in the UK is not available: the infection is primarily asymptomatic or unrecognised and serological screening is not routinely performed [3,5]. Furthermore, mandatory reports from STI clinics do not currently include the HIV status of the person diagnosed. Previous prevalence surveys in the UK included small numbers of MSM [14] or combined HIV-positive and HIV-negative MSM [15]. This study was carried out to measure the seroprevalence of HSV amongst HIV-positive and HIV-negative MSM in England and Wales to inform our understanding of the role of HSV in the HIV epidemic amongst MSM in the UK and the potential of HSV interventions to contribute to HIV prevention and management in this context.

Methods

Samples were drawn from the National Unlinked Anonymous Survey of Genito-Urinary Medicine Clinic Attendees (GUM Anon) [16] serum archive, which includes unlinked anonymous

residual blood specimens collected for routine syphilis serology at representative sentinel sexual health clinics across England and Wales. For each serum limited information was available, including prevention group, prior knowledge of HIV status and diagnoses received at the visit. All specimens were screened for anti-HIV-1/-2 antibodies using an immunometric ('third generation') enzyme immunoassay (Murex HIV-1.2.0 EIA (GE95), Abbott Diagnostics) [17]; reactive specimens were further examined to establish their true HIV status by a 2nd generation indirect EIA based on oligopeptide antigens (Clonesystems HIV-1/HIV-2 EIA (851403), BioChem ImmunoSystems Inc)[17] and by an in-house IgG class-specific capture assay which distinguishes HIV-1 from HIV-2 infection (GACPAT HIV 1+2) [18]. Specimens whose HIV status was still ambiguous were also examined by Western Blot. Sera from individuals with a previously undiagnosed HIV infection were further examined by the Serological Testing Algorithm for Recent HIV Seroconversion (STARHS) using the 'detuned' Vironostika HIV-1 microelisa test (bioMérieux). The mean time since seroconversion for sera testing positive for recently acquired HIV infection by the detuned test is six months [19].

The study included a randomised age-stratified sample of 3,968 specimens from a total of 8,463 specimens obtained from MSM attending twelve sentinel sexual health clinics (seven in London and five elsewhere across England and Wales) during 2003. All sera were tested for HSV-2 and HSV-1 antibodies using a pair of enzyme immunoassays that distinguish the type-specific antibody response against HSV-2 and HSV-1 [20]. They utilise type-specific murine monoclonal antibodies whose binding to the homologous HSV antigen is blocked when the specimen under test also contains the homologous antibody type. Specimens that inhibit the binding of the monoclonal antibody by ≥50% are considered to be positive for that HSV type-specific antibody. The performance of these assays has been established and validated against independent typing methods [21,22].

Point prevalence estimates of HSV-2 and HSV-1 serostatus were calculated. These were weighted to adjust for age-group stratification. Associations of HSV serostatus with HIV infection and other risk factors were analysed using prevalence risk ratios (RR) at the univariate and multivariate level, through applying

Table 1

Seroprevalence of herpes simplex virus type 2 (HSV-2) and prevalence risk ratios amongst men who have sex with men (MSM) attending sentinel sexual health clinics in England and Wales, by selected clinical and demographic characteristics, 2003

	n	HSV-2 seroprevalence# (95% CI)	Univariate risk ratio (95% CI)	Multivariate risk ratio** (95% CI)
Unlinked anonymous HIV serostatus				
HIV-seronegative	3,363	17% (CI: 15%-18%)	1	1
HIV-seropositive	605	55% (CI: 51%-59%)	3.29 (2.94-3.68)*	2.14 (1.92-2.37)*
World region of birth				
United Kingdom	2,416	18% (CI: 16%-19%)	1	1
Other European country or United States	477	31% (CI: 27%-35%)	1.75 (1.48-2.08)*	1.27 (1.08-1.49)*
Caribbean	31	46% (CI: 28%-64%)	2.59 (1.69-3.95)*	1.94 (1.33-2.84)*
Sub-Saharan Africa	102	17% (CI: 10%-26%)	0.94 (0.59-1.51)	0.79 (0.52-1.21)
Central and South America	115	43% (CI: 34%-53%)	2.44 (1.92-3.11)*	1.93 (1.55-2.39)*
Elsewhere	206	16% (CI: 11%-21%)	0.89 (0.64-1.24)	0.97 (0.74-1.27)
Not recorded	621	34% (CI: 30%-38%)	1.93 (1.67-2.24)*	1.13 (1.00-1.29)
Age-group (in years)				
<25	1,283	7% (CI: 5%-8%)	1	1
25-34	889	18% (CI: 16%-21%)	2.71 (2.12-3.47)*	1.92 (1.560-2.45)*
35-44	895	33% (CI: 30%-36%)	4.98 (3.99-6.23)*	3.24 (2.59-4.07)*
>=45	901	42% (CI: 40%-46%)	6.41 (5.16-7.96)*	4.55 (3.65-5.68)*
Clinic location				
Outside London	1,304	10% (CI: 9%-12%)	1	1
London	2,664	28% (CI: 26%-30%)	2.75 (2.28-3.31)*	1.71 (1.43-2.05)*
Unlinked anonymous HSV-1 serostatus				
HSV-1-seronegative	1,159	17% (CI: 15%-20%)	1	1
HSV-1-seropositive	2,809	25% (CI: 23%-27%)	1.46 (1.26-1.71)*	1.00 (0.88-1.14)
Diagnosis of acute STI at clinic visit $				
No	2,620	24% (CI: 22%-26%)	1	1
Yes	1,348	20% (CI: 18%-23%)	0.84 (0.74-0.96)*	1.04 (0.93-1.16)
Total	**3,968**	**23% (CI: 21%-24%)**	**n/a**	**n/a**

Weighted to adjust for age-group stratification in the sampling
*Chi-squared test shows this to be a statistically significant difference at the 95% level
**All risk factors included in multivariate analysis
$ Acute sexually transmitted infection (STI) defined as presenting at the clinic visit with one of the following: infectious syphilis, gonorrhoea, chlamydia, non-specific urethritis (NSU), trichomoniasis, scabies/pediculosis, human papillomavirus (HPV) first attack or molluscum contagiosum. Excludes ano-genital herpes diagnoses.

a modified Poisson Regression method [23]. Risk ratios were used rather than odds ratios, as the seroprevalence of HSV was high. Among HIV-positive individuals, the association of HSV-2 and HSV-1 serostatus with knowledge of HIV serostatus, recently acquired HIV infection (derived through STARHS) and other characteristics was investigated. HSV-2 and HSV-1 serostatus was also determined for individuals who received diagnoses of clinical first attack and recurrent genital herpes at the visit. All confidence intervals (CI) were calculated at the 95% level. STATA 10 was used for analysis.

The legal and ethical basis for unlinked anonymous HIV testing was established before the programme began and is consistent with the Human Tissue Act 2004 and other guidelines [24]. Approval was received from local ethics committees covering each site where the GUM Anon survey was underway. Approval for HSV testing was also given by a Multi-Centre Research Ethics Committee (REC: 05/MRE02/4).

Results

The study population

Sixteen percent (CI: 15%-17%) of the study population were HIV-positive according to unlinked anonymous HIV antibody testing. Of these 83% (CI: 80%-86%) already knew their status on attending the clinic, 8% (CI: 6%-11%) were diagnosed at the visit and 9% (CI: 6%-11%) remained undiagnosed on leaving the clinic. Overall, 59% (CI: 57%-60%) of the study population were UK-born, 59% were under the age of 35 years, and 70% (CI: 69%-71%) attended a clinic in London. Forty-seven individuals (1%, CI: 1%-2%) received an ano-genital herpes diagnosis at

Table 2

Seroprevalence of herpes simplex virus type 2 (HSV-2) amongst HIV-positive and HIV-negative men who have sex with men (MSM) attending sentinel sexual health clinics in England and Wales, by world region of birth and age-group, 2003

	HIV-positive MSM		HIV-negative MSM	
	n	HSV-2 prevalence# (95% CI)	N	HSV-2 prevalence# (95% CI)
World region of birth				
United Kingdom	257	52% (CI: 45%-58%)	2,159	13% (CI: 12%-15%)
Other European country or United States	104	57% (CI: 47%-66%)	373	23% (CI: 19%-28%)
Caribbean	8	82% (CI: 47%-96%)	23	33% (CI: 16%-56%)
Sub-Saharan Africa	21	28% (CI: 12%-51%)	81	14% (CI: 7%-24%)
Central and South America	23	79% (CI: 56%-92%)	92	33% (CI: 24%-44%)
Elsewhere	23	38% (CI: 20%-59%)	183	13% (CI: 9%-18%)
Not known	160	60% (CI: 52%-68%)	461	25% (CI: 21%-30%)
Age group (in years)				
<25	47	28% (CI: 17%-43%)	1,236	6% (CI: 5%-7%)
25-34	138	39% (CI: 32%-48%)	751	14% (CI: 12%-17%)
35-44	217	65% (CI: 58%-71%)	678	23% (CI: 20%-27%)
>=45	194	70% (CI: 64%-76%)	707	35% (CI: 32%-39%)

Weighted to adjust for age-group stratification in the sampling

Table 3

Seroprevalence of herpes simplex virus type 2 (HSV-2) amongst men who have sex with men (MSM) attending sentinel sexual health clinics in England and Wales, 2003, by knowledge of HIV status and recently acquired HIV infection

	n	HSV-2 seroprevalence (95% CI)#	Univariate risk ratio (95% CI)	Multivariate risk ratio** (95% CI)
Knowledge of HIV status				
HIV-negative	3,363	17% (CI: 15%-18%)	1	1
Diagnosed HIV-positive at the visit	46	49% (CI: 34%-63%)	2.91 (CI: 2.11-4.02)*	2.57 (CI: 1.92-3.43)*
Remained undiagnosed HIV-positive after visit	46	52% (CI: 37%-66%)	3.12 (CI: 2.31-4.22)*	2.45 (CI: 1.86-3.23)*
Diagnosed HIV-positive before visit	513	56% (CI: 51%-60%)	3.34 (CI: 2.98-3.76)*	2.08 (CI: 1.87-2.32)*
Recently acquired HIV infection (determined through STARHS)^				
HIV-negative	3,363	17% (CI: 15%-18%)		
Recently acquired HIV infection	20	39% (CI: 20%-62%)	2.34(CI: 1.31-4.18)*	1.95 (CI: 1.16-3.28)*
Non-recently acquired HIV infection	62	53% (CI: 41%-66%)	3.2 (CI: 2.49-4.15)*	2.61 (CI: 2.06-3.32)*

* Chi-squared test shows this to be a statistically significant difference at the 95% level
** Multivariate analysis is adjusted by world region of birth, age-group, clinic location, HSV-1 serostatus diagnosis with acute STI
^ derived through the Serological Testing Algorithm for Recent HIV Seroconversion (STARHS) which was applied to all 'previously undiagnosed' HIV positive sera. The mean time since seroconversion for those testing positive for recently acquired HIV infection is six months. and diagnosis with acute STI

the visit, including 12 (24% (CI: 13%-39%) that were recurrent infections. Thirty-four percent of the study population (CI: 33%-36%) received a diagnosis with another 'acute STI' diagnosis at the visit (infectious syphilis, gonorrhoea, chlamydia, non-specific urethritis (NSU), trichomoniasis, scabies/pediculosis, human papilloma virus (HPV) first attack or molluscum contagiosum). Of the 92 sera with a previously undiagnosed HIV infection 82 had STARHS results available. Of these, 23% (CI: 15%-33%) were classified as a 'recent' infection.

HSV-2 seroprevalence amongst HIV-positive and HIV-negative MSM

Of HIV-positive men, 55% (CI: 51%-59%) were HSV-2-seropositive, compared to 17% (CI: 15%-18%) of HIV-negative men. The unadjusted risk ratio for HSV-2 infection was 3.29 (CI: 2.94-3.68, p<0.001), over three-fold higher amongst HIV-positive men than HIV-negative men, and this association remained highly significant in multivariate analysis (RR=2.14 [CI: 1.92-2.37], p<0.001) (Table 1).

HSV-2 seroprevalence was higher amongst men born outside the UK (28% [CI: 25%-31%], vs 18% [CI: 16%-19%]), even after adjusting for HIV status and other cofactors (adj RR 1.25 [CI: 1.09-1.42]. The prevalence of HSV-2 was particularly high amongst those born in the Caribbean and in Central and South America. There was no statistical difference in HSV-2 seroprevalence between men born in sub-Saharan Africa and those born in the UK, even after adjusting for other variables, p=0.285). HSV-2 seroprevalence increased with age-group (Table 1). These trends were similar for HIV-positive and HIV-negative MSM (Table 2).

Amongst HIV-positive men, there was no statistical evidence for a difference in HSV-2 seroprevalence between those diagnosed with HIV prior to the sexual health clinic attendance, those diagnosed at the visit and those that remained undiagnosed. Prevalence in each of these sub-groups of HIV-positive men was more than two-fold higher than the 17% prevalence (CI: 15%-18%) found amongst HIVnegative men (Table 3).

Table 4

Seroprevalence of herpes simplex virus type 1 (HSV-1) and prevalence risk ratios amongst men who have sex with men (MSM) attending sentinel sexual health clinics in England and Wales, by selected clinical and demographic characteristics, 2003

	n	Seroprevalence (95% CI) #	Univariate risk ratio (95% CI)	Multivariate risk ratio** (95% CI)
Unlinked anonymous HIV serostatus				
HIV-seronegative	3372	69% (67%-71%)	1	1
HIV-seropositive	596	88% (85%-90%)	1.27 (1.22-1.33)*	1.19 (1.14-1.24)*
World region of birth				
United Kingdom	2,416	68% (66%-70%)	1	1
Other European country or United States	477	77% (73%-81%)	1.14 (1.08-1.21)*	1.09 (1.03-1.16)*
Caribbean	31	81% (61%-92%)	1.21 (1.01-1.44)*	1.22 (1.03-1.45)*
Sub-Saharan Africa	102	79% (70%-89%)	1.20 (1.09-1.33)*	1.19 (1.07-1.32)*
Central and South America	115	89% (81%-93%)	1.33 (1.24-1.43)*	1.30 (1.20-1.41)*
Elsewhere	206	71% (64%-77%)	1.03 (0.94-1.14)	1.03 (0.93-1.13)
Not recorded	621	79% (75%-82%)	1.17 (1.11-1.23)*	1.05 (1.00-1.11)
Age-group (in years)				
<25	1283	56% (53%-59%)	1	1
25-34	889	74% (71%-77%)	1.32 (1.24-1.40)*	1.25 (1.18-1.34)*
35-44	895	81% (78%-83%)	1.44 (1.36-1.52)*	1.37 (1.29-1.46)*
>=45	901	78% (75%-81%)	1.39 (1.31-1.48)*	1.35 (1.27-1.44)*
Clinic location				
Outside London	1304	66% (63%-69%)		
London	2664	75% (73%-76%)	1.13 (1.08-1.19)	0.99 (0.94-1.04)
Unlinked anonymous HSV-2 serostatus				
No	3,034	70% (68%-72%)	1	1
Yes	934	79% (76%-82%)	1.13 (1.08-1.17)*	0.98 (0.94-1.03)*
Diagnosis of STI at clinic visit $				
No	2620	71% (69%-73%)	1	1
Yes	1348	74% (71%-76%)	1.04 (0.99-1.08)	1.06 (1.02-1.11)*
Total	**3,968**	**72% (70%-74%)**	**n/a**	**n/a**

Weighted to adjust for age-group stratification in the sampling
*Chi-squared test shows this to be a statistically significant difference at the 95% level
**All risk factors included in multivariate analysis
$ Acute STI defined as presenting at the clinic visit with one of the following diagnoses: infectious syphilis, gonorrhoea, chlamydia, non-specific urethritis (NSU), trichomoniasis, scabies/pediculosis and human papillomavirus (HPV) first attack or molluscum contagiosum. Excludes ano-genital herpes diagnoses.

Similarly, there was also no statistical evidence for a difference in HSV-2 seroprevalence between MSM with recently acquired HIV infection and those with 'non-recent' HIV infection (p-value=0.269). Both groups had a higher seroprevalence of HSV-2 than HIV-negative men.

HSV-1 seroprevalence

Overall, seven in 10 men were HSV-1 seropositive. As with HSV-2, HSV-1 seroprevalence was higher amongst HIV-positive men (88% [CI: 85%-90%]) than HIV-negative men (69% [CI: 67%-71%]), although the risk ratio was smaller than for HSV-2 (Adj RR: 1.19 [CI: 1.14-1.24]) (Table 4). As with HSV-2, the seroprevalence of HSV-1 increased with age, although it was much higher in the youngest age-group than the seroprevalence of HSV-2 (56% [CI: 53%-59%]) vs 7% [CI: 5%-8%]).

There were 47 (1%, CI: 1%-2%) episodes of ano-genital herpes diagnosed clinically among the 3,968 attendees. Of the 35 diagnoses of first attack ano-genital herpes, 15 (43%) were HSV-1 seropositive and HSV-2 seronegative at the time of clinical diagnosis. The same was true for four (33%) of the 12 diagnoses with recurrent ano-genital herpes (Figure).

Discussion

To our knowledge this is the first published study of the seroprevalence of HSV-2 and HSV-1 amongst MSM in the UK where it has been possible to differentiate between HIV-positive and HIV-negative MSM. More than one in two HIV-positive MSM and nearly one in six HIV-negative MSM attending sexual health clinics in 2003 were HSV-2-seropositive. This is of concern, given the increasing evidence for the role of HSV-2 in HIV progression, onward transmission and acquisition [1-3]. The prevalence rates may be an underestimate of current rates amongst MSM attending sexual health clinics, as the annual number of ano-genital herpes diagnoses in sexual health clinics and the prevalence of HIV and other STI have increased since 2003 [9]. It should be borne in mind that in general prevalence rates of STI amongst MSM attending sexual health services are likely to be higher than amongst other MSM.

The prevalence of HSV-2 in this study is similar or lower than those found amongst HIV-positive and HIV-negative MSM in studies elsewhere in Europe, the Americas and Australia [8]. This is consistent with the global epidemiology: whilst there is considerable variation in HSV-2 prevalence worldwide, in general, HSV-2 prevalence is lower in Europe than in Africa and the Americas [8,11]. In our study, the prevalence of HSV-2 amongst MSM born in sub-Saharan Africa was not different to that amongst UK-born MSM, even after adjusting for age and other factors. Additional information such as ethnicity and sexual behaviour would be needed to understand how MSM born in sub-Saharan Africa attending sexual health clinics in England and Wales differ from the overall population in their region of birth. As would be expected, the prevalence of HSV-2 increased with age [8,15]. Whether or not the men knew their HIV status and whether or not they had been recently infected with HIV made little difference to the prevalence of HSV-2 amongst HIV-positive MSM. It was not possible with this study design to identify whether the HSV-2 infection took place before, after or concurrently with the HIV infection.

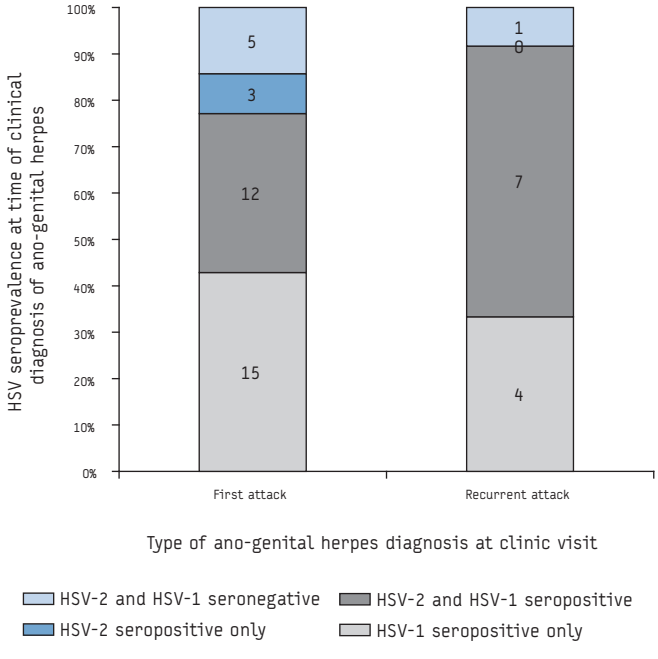
This study also showed that seven in 10 MSM were HSV-1-positive, a rate similar to that found in other high-risk groups in Europe [8]. As with HSV-2, the prevalence was disproportionately high amongst HIV-positive MSM and this association remained significant at the multivariate level. In our study, almost one in two men diagnosed clinically with a first attack of ano-genital herpes and one in three men diagnosed with a recurrent attack of ano-genital herpes had only HSV-1 antibodies at the time of the clinical diagnosis. Unfortunately, no culture or PCR result was available from the genital ulcers to determine the type causing the presenting ano-genital disease. Most of those diagnosed with a first attack of ano-genital herpes who were HSV-1 seropositive only may have been infected with HSV-2 as well but had not yet seroconverted. However, the high proportion of those with a clinical diagnosis of a recurrent attack who were HSV-1 seropositive only is in line with existing data showing that HSV-1 is increasingly acquired genitally in many developed countries. HSV-1 now accounts for approximately half of first episodes of ano-genital herpes amongst MSM in the UK [5,7]. Given this and the association between HSV-1 serostatus and HIV, more research is merited on the role of HSV-1 in the HIV epidemic among MSM in England and Wales.

Implications for HIV prevention and management

Despite several trials demonstrating that HSV antivirals can reduce HIV viral load and viral shedding [25,27], no trials to date have demonstrated the efficacy of HSV antivirals in reducing HIV onward transmission [1,2,4]. Similarly, despite trials showing that HSV-2-seropositive individuals are more than twice as likely to acquire HIV, no trials have demonstrated that antivirals can reduce HIV acquisition [1-3]. Research is ongoing as to whether different antivirals, or an HSV vaccine or other interventions, may yet prove to be successful at using HSV control for HIV prevention (2).

Figure

Herpes simplex virus type 2 and 1 (HSV-2 and HSV-1) serostatus of patients at time of receiving clinical diagnosis of ano-genital herpes, men who have sex with men (MSM) attending sentinel sexual health clinics in England and Wales, 2003 (n=47)



Note: No data from culture or PCR from the genital area was available

Results have been more promising in terms of HSV control in the context of HIV management. The recent Partners in Prevention trial showed that HSV antivirals significantly slowed the rate of HIV progression to a CD4 cells count <200 mm3, need for antiviral treatment and death amongst dually infected African men and women [4]. This is supported by pre-HAART trials showing that HSV antivirals offered a significant survival benefit for HIV-positive individuals [28]. Currently, clinics in England and Wales do not routinely carry out asymptomatic serological screening for HSV amongst HIV-positive MSM, although they do administer antivirals to symptomatic herpes patients [1]. While the UK context is very different to many African countries, these recent PIP trial results together with the high prevalence of HSV-2 amongst HIV-positive MSM in England and Wales suggest a review of HSV control in the management of HIV amongst MSM is warranted.

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References

1. Barton S, Celum C, Shacker TW. The role of anti-HSV therapeutics in the HIV-infected host and in controlling the HIV epidemic. Herpes. 2005;12(1):15-22.
2. Padian NS, Buve A, Balkus J, Serwadda D, Cates W Jr. Biomedical interventions to prevent HIV infection: evidence, challenges, and way forward. Lancet. 2008;372(9638):585-99.
3. Corey L, Wald A, Celum CL, Quinn TC. The effects of herpes simplex virus-2 on HIV-1 acquisition and transmission: a review of two overlapping epidemics. J Acquir Immune Defic Syndr 2004;35(5):435-45.
4. Lingappa JR, Baeten JM, Wald A, et al. Daily acyclovir delays HIV-1 disease progression among HIV-1/HSV-2 dually-infected persons: a randomized trial. 5th IAS conference on HIV pathogenesis, treatment and prevention (IAS 2009). 19 July 2009.
5. Gupta R, Warren T, Wald A. Genital herpes. Lancet. 2007;370(9605):2127-37.
6. Freeman EE, Weiss HA, Glynn JR, Cross PL, Whitworth JA, Hayes RJ. Herpes simplex virus 2 infection increases HIV acquisition in men and women: systematic review and meta-analysis of longitudinal studies. AIDS. 2006;20(1):73-83.
7. Engelberg R, Carrell D, Krantz E, Corey L, Wald A. Natural history of genital herpes simplex virus type 1 infection. Sex Transm Dis. 2003;30(2):174-7.
8. Smith JS, Robinson NJ. Age-specific prevalence of infection with herpes simplex virus types 2 and 1: a global review. J Infect Dis. 2002;186 Suppl 1:S3-28.
9. Health Protection Agency (HPA). Annual STI data. London: HPA. [Accessed 24 Nov 2009]. Available from: http://www.hpa.org.uk/web/HPAweb&HPAwebStandard/HPAweb_C/1203348026613
10. Health Protection Agency (HPA). The UK Collaborative Group for HIV and STI Surveillance. Testing Times. HIV and other Sexually Transmitted Infections in the United Kingdom: 2007. London: HPA. Centre for Infections. 2007. Available from: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1203496897276
11. Malkin JE. Epidemiology of genital herpes simplex virus infection in developed countries. Herpes. 2004;11 Suppl 1:2A-23A.
12. Health Protection Agency (HPA). Sexually Transmitted Infections and Men who have Sex with Men in the UK: 2008 Report. London: HPA. 2008. Available from: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1227515298225
13. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.
14. Narouz N, Allan PS, Wade AH, Wagstaffe S. Genital herpes serotesting: a study of the epidemiology and patients' knowledge and attitude among STD clinic attenders in Coventry, UK. Sex Transm Infect. 2003;79(1):35-41.
15. Cowan FM, Johnson AM, Ashley R, Corey L, Mindel A. Antibody to herpes simplex virus type 2 as serological marker of sexual lifestyle in populations. BMJ. 1994;309(6965):1325-9.
16. Nicoll A, Gill ON, Peckham CS, Ades AE, Parry J, Mortimer P, et al. The public health applications of unlinked anonymous seroprevalence monitoring for HIV in the United Kingdom. Int J Epidemiol. 2000;29(1):1-10.
17. Perry KR, Ramskill S, Eglin RP, Barbara JA, Parry JV. Improvement in the performance of HIV screening kits. Transfus Med. 2008;18(4):228-40.
18. Parry JV, Connell JA, Reinbott P, Garcia AB, Avillez F, Mortimer PP. GACPAT HIV 1 + 2: a simple, inexpensive assay to screen for, and discriminate between, anti-HIV 1 and anti-HIV 2. J Med Virol. 1995;45(1):10-6.
19. Murphy G, Charlett A, Jordan LF, Osner N, Gill ON, Parry JV. HIV incidence appears constant in men who have sex with men despite widespread use of effective antiretroviral therapy. AIDS. 2004;18(2):265-72.
20. Slomka MJ, Ashley RL, Cowan FM, Cross A, Brown DW. Monoclonal antibody blocking tests for the detection of HSV-1- and HSV-2-specific humoral responses: comparison with western blot assay. J Virol Methods. 1995;55(1):27-35.
21. Van Dyck E, Buve A, Weiss HA, Glynn JR, Brown DW, Deken B, et al. Performance of Commercially Available Enzyme Immunoassays for Detection of Antibodies against Herpes Simplex Virus Type 2 in African Populations. J Clin Microbiol. 2004;42(7):2961-5.
22. Gopal R, Gibbs T, Slomka MJ, Whitworth J, Carpenter LM, Vyse A, et al. A monoclonal blocking EIA for herpes simplex virus type 2 antibody: validation for seroepidemiological studies in Africa. J Virol Methods. 2000;87(1-2):71-80.
23. Zou G. A modified poisson regression approach to prospective studies with binary data. Am J Epidemiol. 2004;159(7):702-6.
24. Medical Research Council (MRC). Human tissue and biological samples for use in research: Operational and ethical guidelines. London: MRC. 2001. Available from: http://www.mrc.ac.uk/Utilities/Documentrecord/index.htm?d=MRC002420
25. Nagot N, Ouedraogo A, Foulongne V, Konate I, Weiss HA, Vergne L, et al. Reduction of HIV-1 RNA levels with therapy to suppress herpes simplex virus. N Engl J Med. 2007;356(8):790-9.
26. Zuckerman RA, Lucchetti A, Whittington WL, Sanchez J, Coombs RW, Zuniga R, et al. Herpes simplex virus (HSV) suppression with valacyclovir reduces rectal and blood plasma HIV-1 levels in HIV-1/HSV-2-seropositive men: a randomized, double-blind, placebo-controlled crossover trial. J Infect Dis. 2007;196(10):1500-8.
27. Delany S, Mlaba N, Clayton T, Akpomiemie G, Capovilla A, Legoff J, et al. Impact of aciclovir on genital and plasma HIV-1 RNA in HSV-2/HIV-1 co-infected women: a randomized placebo-controlled trial in South Africa. AIDS. 2009;23(4):461-9.
28. Ioannidis JP, Collier AC, Cooper DA, Corey L, Fiddian AP, Gazzard BG, et al. Clinical efficacy of high-dose acyclovir in patients with human immunodeficiency virus infection: a meta-analysis of randomized individual patient data. J Infect Dis. 1998;178(2):349-59.

HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009

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Data from 23 European countries show that the annual number of HIV diagnoses in men who have sex with men (MSM) increased by 86% between 2000 and 2006. This paper reports the main preliminary results of a bio-behavioural survey in MSM with a specific focus on HIV prevalence and use of United Nations General Assembly Special Session (UNGASS) indicators in six cities in Southern and Eastern Europe. Time-location sampling (TLS) was used. A total number of 2,356 questionnaires and 2,241 oral fluid samples were collected (invalid samples 4.1%). The data show different socio-demographic patterns across countries regarding age, level of education, living conditions, living area and self-identity. Southern European cities had the highest percentage of people who had tested for HIV and collected the result. More than 50% of respondents in the sample from Barcelona reported having used a condom last time they had anal sex (57.2%), whilst in all other cities this proportion was below 50%. The cities with the highest HIV prevalence in MSM were Barcelona (17.0%) and Verona (11.8%) whilst lower percentages were reported in Bratislava (6.1%), Bucharest (4.6%), Ljubljana (5.1%) and Prague (2.6%). The low prevalence in Eastern European cities is encouraging. However, with the level of high-risk sexual behaviour documented and the lower frequency of HIV test seeking behaviour, there is a clear risk of an increase in HIV transmission.

Introduction

HIV infection remains an important public health issue in Europe, with evidence of continuing transmission in many countries. Accounting for almost one third (7,693) of all reported newly diagnosed HIV infections reported in 2006 in European Union (EU) and European Free Trade Association (EFTA) countries, Men who have sex with men (MSM) continue to represent a population at high risk of HIV infection [1,2]. Data from 23 European countries show that the annual number of HIV diagnoses in MSM increased by 86% between 2000 and 2006 [2]. The results of some seroprevalence studies in gay community settings or healthcare services suggest levels of HIV prevalence between 10 and 20% among MSM, and available data suggest a possible hidden HIV epidemic in this population group [2,3].

In addition to the spread of HIV, an increase of high risk sexual behaviour among MSM is reported throughout Europe [1,2]. In this context, HIV testing has become a key surveillance activity for monitoring the HIV epidemic especially in hard-to-reach MSM. Since the introduction of highly active antiretroviral therapy (HAART), AIDS has become less indicative of the underlying trends in HIV infection. Another important factor linked to risk behaviour and risk of HIV transmission is the use of alcohol and other psychoactive drugs. According to the literature, alcohol and illicit drug consumption significantly increase the odds of having sex and have a significant positive association with the sexual risk.

Several studies, both in Europe and the United States (US), show a high percentage of MSM who use alcohol and drugs before and during sex and an association between these substances and sexual risk behaviour [4-6]. Additionally other studies suggest that even intermittent, recreational use of these drugs before or during sexual intercourse may lead to high-risk sexual behaviour (e.g. unprotected anal intercourse, UAI), especially with casual partners [7,8]. Recent studies of the sexual risk behaviour of MSM have also described a range of changes in sexual risk-taking behaviour in MSM in recent years, with an increased number of partners in some countries. The number of partners proved to be one of the strongest predictors of unsafe sex; according to the literature, the probability of having had unsafe sex ranged from 17% in men with one partner to 58% in men with more than 20 partners [9-11].

Despite these findings, few studies targeted MSM using outreach methods collecting behavioural and biological data in line with

Second Generation Surveillance System (SGSS) criteria [12,13] and United Nations General Assembly Special Session (UNGASS) indicators [3,14]. The Second Generation Surveillance System combines monitoring of newly diagnosed HIV cases and indicators of sexual behaviour among persons in groups at highest risk for infection.

Previous community-based surveys targeting MSM in Scotland, which included both questionnaires and anonymous oral fluid testing for HIV, found high levels of HIV prevalence and risk behaviour and low uptake of HIV testing [15]. The advantage of oral fluid collection for testing of infection is evident as it is a minimally invasive method for serological monitoring which is easy and safe. It has proven to be acceptable for various target audiences and it does not require trained staff [16,17]. Therefore, the use of oral fluid as a means for biological testing is of crucial importance in order to gather valid and reliable information about the spread of HIV among hard to reach populations such as MSM.

Taking these factors into account, the 2008-2009 study was designed to gather reliable information on HIV prevalence among MSM in Southern and Eastern Europe.

This paper reports preliminary results of the SIALON project Capacity building in HIV/Syphilis prevalence estimation using non-invasive methods among MSM in Southern and Eastern Europe, with a specific focus on HIV prevalence and use of UNGASS indicators.

Methods

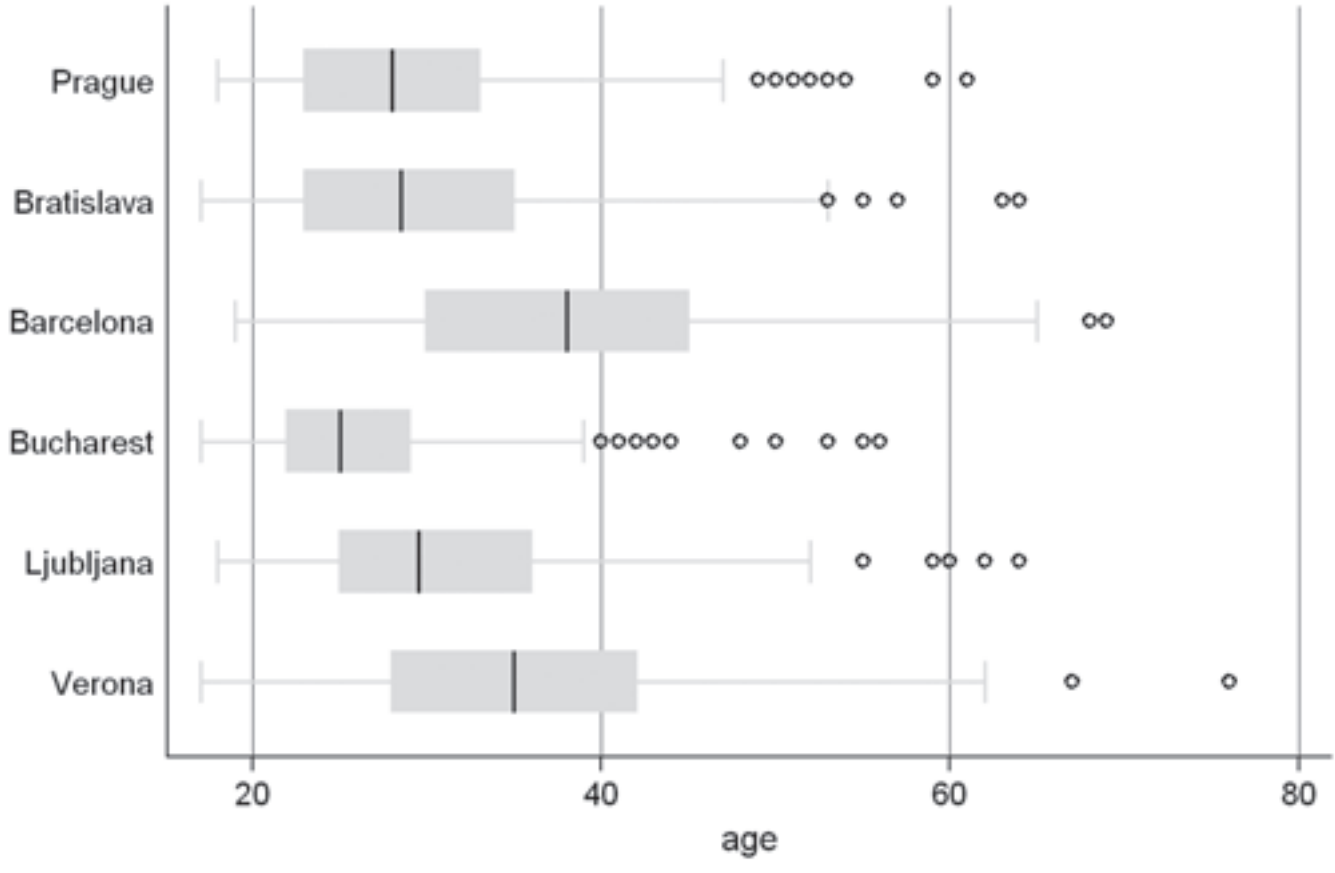
Study design

The study was a descriptive multi-centre biological and behavioural cross-sectional survey and was carried out in seven cities of Southern and Eastern European countries: Athens, Greece; Barcelona, Spain; Bratislava, Slovakia; Bucharest, Romania; Ljubljana, Slovenia; Prague, Czech Republic; Verona, Italy. In this report Bratislava, Bucharest, Ljubljana and Prague were defined as Eastern European cities. The survey was designed to obtain an estimate of the prevalence of HIV in the study population, MSM attending gay venues.

Ethics Committee approval was obtained in each participating country and an informed consent form was collected for each respondent. The questionnaires and the oral fluid samples were collected anonymously. In order to make the test result available to interested individuals, a barcode was used to link the respondents to the test result via a card with the same barcode given to the respondents when oral fluid was collected. To comply with all ethical and legal aspects and minimise the risks of diagnostic mistakes, respondents interested in getting their test results were informed that the test result was not meant to be diagnostic and for this reason they should be tested again in line with international/

Figure 1

Age distribution of participants of an HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009



national guidelines. In case of a confirmed positive HIV test, the person was directed to the infectious disease department for further checks of their clinical situation and start antiretroviral treatment if needed.

Study population

Participants were recruited according to the following four inclusion criteria: having had sex (any kind of sex: oral and anal, penetrative or not) at least once with another man during the last 12 months before the study; having signed a written informed consent form; having agreed to answer the study questionnaire; having accepted to donate an oral fluid sample. Three exclusion criteria were adopted: age below 18 years; currently active injecting drug use (IDU) and having already participated in the study.

Sampling

Time-location (or time-space) sampling (TLS) was used to recruit representative samples of men visiting the gay scene in each city. The method used was consistent with the approach adopted in previous studies [15-21]. In the TLS, spaces (or locations) are venues attended by the target population; times refer to specific days and time periods when the target population congregates in each space. This method allows a sample with known properties to be identified and enables statistical inferences to be made to the larger population of venue visitors. Formative research was conducted in each collection location in order to identify the list of potential TLS units, the attendance time frame, opening days and hours of each venue. Bars, discos, saunas, cruising venues, sex-shops, sex-clubs were identified in all cities. All venues were mapped and visited when information on attendance patterns was not sufficient to prepare a TLS units list. The spaces and their associated days were divided into standardised time segments (four-hour periods). Subjects were enrolled over the entire TLS unit time period. Information on the number of refusals per TLS unit was collected. Furthermore, settings or special gay events that did not occur frequently were identified. A "special events" category was created and included in the sampling list because such occasions may attract members of the target population. The list of TLS units obtained with this process for each collection site included the primary sampling units (PSU). PSU were randomly selected from complete list of eligible TLS list in each city. The sample size estimation for a prevalence study was calculated on

Figure 2

Percentage of men who have sex with men (MSM) who self-identified themselves as gay/homosexual, bisexual and heterosexual; HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009

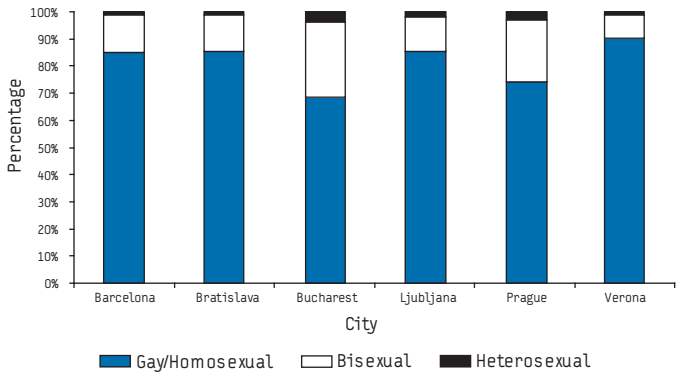


Table 1

United Nations General Assembly Special Session (UNGASS) indicators by city; HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009

	UNGASS 8 HIV testing n=2,356	95%CI[a]	UNGASS 19 Condom use n=1,925	95%CI	UNGASS 23 HIV prevalence n=2,243	95%CI
Barcelona	56.2	±4.9	57.2	±5.1	17.0	±3.7
Bratislava	32.1	±4.9	30.8	±5.3	6.1	±2.5
Bucharest	43.2	±4.9	42.7	±5.3	4.6	±2.2
Ljubljana	38.2	±4.8	43.0	±5.6	5.1	±2.2
Prague	41.5	±4.8	29.8	±5.2	2.6	±1.6
Verona	53.0	±4.9	45.6	±5.2	11.8	±3.2

[a] Confidence interval

Table 2

Percentage of respondents who consistently used a condom in the last six months with steady and casual partners, separately for anal and oral sex; HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009

	Condom use during anal sex with steady partner		Condom use during anal sex with casual partner		Condom use during oral sex with steady partner		Condom use during oral sex with casual partner	
Total	N=1,402		N=1,383		N=1,517		N=1,567	
	%	95%CI[a]	%	95%CI	%	95%CI	%	95%CI
Barcelona	43,0	±7,0	65,4	±5,5	9,3	±4,0	13,1	±3,8
Bratislava	19,9	±5,2	41,7	±6,9	1,2	±1,4	6,2	±3,1
Bucharest	43,1	±6,0	51,8	±6,2	8,6	±3,3	15,1	±4,3
Ljubljana	36,6	±6,1	58,8	±7,2	5,5	±2,7	10,4	±4,0
Prague	25,6	±5,4	36,3	±6,8	5,8	±2,8	9,6	±3,7
Verona	40,2	±6,4	56,1	±5,9	5,8	±3,0	8,1	±3,0

[a]Confidence interval

the basis of previous prevalence estimation studies when available [22]. A total of 2,800 persons (400 per city) were included in the planned survey.

Data collection

Questionnaire

A self-administered pen-and-paper questionnaire was used to obtain information on the social/cultural/environmental context of respondents, access and barriers to voluntary counseling and testing (VCT), behavioural data on sex practices, risk-reducing strategies, condom use), STI history, self-reported/perceived serostatus and type of partner. A steady partner was defined in the questionnaire as "a person who you are committed to and have sex with, not meaning that, you are exclusively monogamous"; casual partner as "person you have sex with, occasionally without a steady partnership". In addition, UNGASS indicators were taken into account when designing the questionnaire [3,14]. The preliminary version of the questionnaire was piloted among MSM attending gay venues to check on the time needed to complete it and to ensure the questions were not ambiguous or confusing. The English version of the questionnaire was translated into the languages of the participating countries and then translated back into English.

A questionnaire manual and a training module were developed in order to guarantee uniform data collection. Specific training of data collectors was held in each country in a one day session by a data collection coordinator. The same coordinator was in charge of monitoring the local data collection and coaching the data collectors during the task. An ongoing evaluation process was organised through regular meetings with data collectors.

Oral Fluid sampling and testing

To collect oral fluids, Oracol oral fluid collection kits (Malvern Medical Developments, Worcester, UK) were used. The main advantages for replacing serum with oral fluid were easy access and non-invasive collection. After collection, oral fluid samples were kept refrigerated and sent to the national reference laboratory for HIV/AIDS in the respective countries no more than 72 hours after collection.

Laboratory testing

The oral fluid samples were sent for the analysis by each national reference laboratory to the Teaching Hospital-University of Verona, Immunology Unit, Verona, Italy. EIA testing GENSCREEN HIV 1/2 version 2, BIO-RAD on oral fluid sample was performed according to the manufacture's instructions [23]. All positive samples were confirmed with a Western Blot test. As quality control, for each oral fluid sample, a total IgG antibodies ELISA test was performed in order to assess the sample suitability for testing. Samples below 3.5 titre (cut-off) were excluded from the study as invalid. A validation study of Bio-Rad OF testing comparing serological testing involving 37 HIV positive patients and 35 controls per country was carried out according to commission decision of 7 May 2002 on common technical specifications for in vitro medical devices. Validation, with 504 paired oral fluid and serum samples, yielded a 99% sensibility and 99% specificity, which gives PPV of 94.6% and NPV of 99.8% for a prevalence of 15%. For a prevalence of 5% these figures are 83.9% and 99.9% respectively.

Enrolment

According to the data collection calendar, trained field workers from gay associations distributed anonymous self-complete questionnaires and Oracol oral fluid collection kits. Both self-complete questionnaire (behavioural data) and oral fluid samples (biological data) were collected for each subject. A barcode was used to link behavioural and biological information. The enrolment period varied between cities. The data collection calendar varied from two months in Barcelona and Verona to nine months Bratislava and Bucharest.

Table 3

Number of steady and casual partners in the last six months; HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009

		Barcelona	Bratislava	Bucharest	Ljubljana	Prague	Verona
Steady partner		n=161	n=238	n=256	n=258	n=242	n=221
	Mean	1,6	2,0	3,3	2,1	2,7	2,6
	SD[a]	1,7	2,2	4,5	2,5	3,6	3,6
	P25	1	1	1	1	1	1
	Median	1	1	2	1	1	1
	P75[b]	1	2	3	2	3	3
	IQR[c]	0	1	2	1	2	2
Casual partner		n=269	n=232	n=249	n=219	n=205	n=293
	Mean	16,3	6,1	7,1	5,7	7,5	12,0
	SD	20,5	8,6	9,4	8,9	10,5	16,1
	P25	4	2	2	2	2	3
	Median	10	3	3	3	4	6
	P75	20	6	7	6	10	12
	IQR	16	4	5	4	8	9

[a]SD: standard deviation
[b]P: percentile
[c]IQR: inter-quartile range

Statistical Analysis

As the focus of the study was descriptive, mean, median, standard deviation, quartiles and inter-quartiles were used and proportions with 95% confidence intervals (CI) were calculated for all variables and indicators. STATA 11 survey commands suite was used.

Results

A total of 2,362 questionnaires and 2,365 oral fluid samples were collected in six of the seven cities. The total number of valid questionnaires was 2,356 (99.7%) whilst for the valid oral fluid samples it was 2,241 (94.8%) The proportion of valid oral fluid samples over valid questionnaires by city was respectively: Barcelona 97% (388/400), Bratislava 98% (342/349), Bucharest 86.7% (345/398), Ljubljana 97.7% (389/398), Prague 95.1% (387/407), Verona 96.5% (390/404). Athens, Greece was not included in the analysis as data was not available at the time of this paper.

The time of questionnaire completion ranged from 10 to 20 minutes. The time length was related to age and the type of venues.

Study population

The median age and 1st and 3rd quartile by city are presented in Figure 1. Respondents in Barcelona and Verona had a similar age distribution and were older, (38 and 35 years respectively) than those in the Eastern European cities; in Bucharest the median age of respondents was 25 years, followed by Prague and Bratislava (28 years). In Ljubljana the median age was 29.5 years.

As regards education level, MSM in Barcelona had the highest proportion of university degrees (53.6%) and MSM in Prague the lowest (27.4%).

In most of the cities the largest group of respondents lived alone (living conditions): 41.8% in Prague, 40.8% in Verona, 37.4% in Barcelona and 36.9% in Ljubljana. Exceptions were Bucharest and Bratislava, where respondents lived mostly with their parents (34.1% and 30.2% respectively). In Verona, a high proportion of MSM lived with their parents (30.1%), although a larger number lived alone. Barcelona had the highest proportion of respondents living with friends (22.9%), while the highest proportion living with male partners were in Prague (27.5%) and Bratislava (27.6%) followed by Ljubljana (23.4%). The percentage of respondents living with a heterosexual family (female partner and/or offspring) was generally lower than 8%, ranging from 4.9% in Bratislava to 7.7% in Verona.

In almost all cities the majority of respondents lived in areas with more than 100,000 inhabitants, ranging from 61.4% in Bratislava to 82.9% in Bucharest, with the only exception of Verona, where the majority of respondents lived in a village with less than 10,000 inhabitants (32.7%) or in a small town with 10,000 to 100,000 inhabitants (25.3%).

The data for self-identified sexual orientation are presented in Figure 2. More than 80% of the respondents self-identified themselves as homosexual in Barcelona, Bratislava, Ljubljana and Verona. The highest proportion of bisexuals and heterosexuals was found in Bucharest (27.6% and 3.9% respectively) and in Prague (22.6% and 3% respectively), while the lowest was in Verona (8.7% and 1% respectively). In the remaining cities the percentage of bisexuals was similar, ranging from 12.7% in Ljubljana to 14.4% in Bratislava.

HIV prevalence and testing

Table 1 presents the prevalence of HIV infection among MSM based on the oral fluid tests. The cities with the highest HIV prevalence were Barcelona (17.0%) and Verona (11.8%); lower percentages were reported in Bratislava (6.1%), Bucharest (4.6%) and Ljubljana (5.1%). Prague had the lowest HIV prevalence (2.6%).

In order to monitor HIV testing uptake, UNGASS indicator number eight was used. This indicator comprises the percentage of MSM tested for HIV over the last 12 months who also collected the result. Table 1 presents the UNGASS 8 estimate by city.

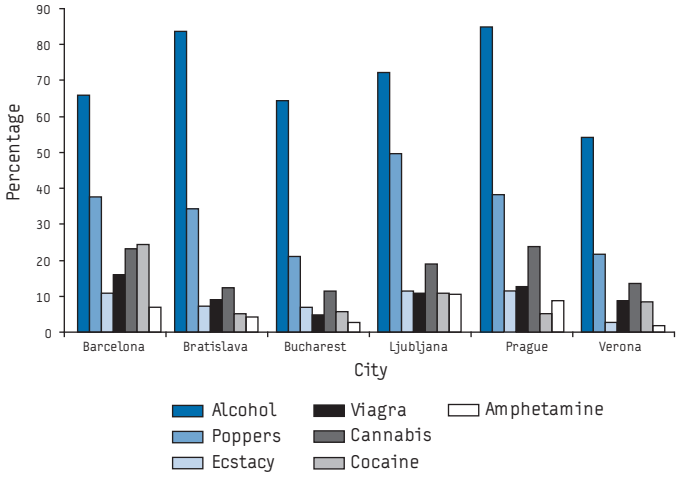
Southern European cities had the highest percentage of tested people who received their HIV test result (56.2% in Barcelona and 53% in Verona), while the Eastern European cities had the lowest percentages, ranging from 32.1% in Bratislava to 43.2% in Bucharest. Among the respondents who had taken an HIV test over the last 12 months, the percentage of subjects who decided to collect the test result was over 90% in Verona and Barcelona (93.9% and 92.6% respectively) while in Prague it was 85.9%, in Bratislava 83.6% and 78.3% in Ljubljana. The lowest percentage was in Bucharest (74.9%).

Condom use

In order to estimate the risk reduction strategies of MSM during the most at-risk sexual behaviour, namely anal sex, UNGASS indicator number 19 was used. This indicator describes the percentage of men reporting the use of a condom during their last anal sex episode with a male partner in the previous six months. Table 1 presents the UNGASS 19 estimate by city. More than 50% of respondents in the sample from Barcelona reported using a condom the last time they had anal sex (57.2%), while in all other cities this percentage was below 50%. In three cities percentages were above 40% (Verona: 45.6%, Ljubljana: 43%, Bucharest:

Figure 3

Percentage of respondents reporting use of alcohol, poppers, ecstacy, Viagra, cannabis, cocaine and amphetamine before or during sex over the last six months; HIV bio-behavioural survey among men who have sex with men in Barcelona, Bratislava, Bucharest, Ljubljana, Prague and Verona, 2008-2009



42.7%), while percentages were lowest in Prague (29.8 %) and Bratislava (30,8%).

Consistent condom use

Respondents were asked to indicate the frequency of protected anal and oral sex both with a steady and a casual partner over the last six months. Consistent condom use is defined as the use of a condom (often or always) in the last six months during sexual intercourse, both receptive and insertive. Sexual behaviour was analysed separately for anal sex and oral sex. Table 2 shows the percentage of consistent condom use by type of partner and city. As far as anal sex is concerned, condom use with a steady partner was declared by 43.1% of respondents in Bucharest and 43% in Barcelona, followed by Verona (40.2%) and Ljubljana (36.6%), while the lowest condom use was reported in Prague (25.6%) and Bratislava (19.9%). Condom use with a casual partner for anal sex is in general more likely to be reported than with a steady partner. The highest level of consistent condom use with a casual partner was reported by MSM in Barcelona (65.4%), whilst the lowest was in Prague (36.3%). In Ljubljana consistent condom use was reported by 58.8% of respondents who had anal sex with a casual partner, followed by MSM in Verona (56.1%), in Bucharest (51.8%) and in Bratislava (41.7%).

As far as consistent condom use in oral sex over the last six months is concerned, the level was dramatically lower compared with anal sex. In Barcelona, 9.3% of respondents reported condom use with a steady partner followed by Bucharest (8.6%); a virtually identical level was reported in Prague (5.8%), Verona (5.8%) and Ljubljana (5.5%). The lowest level of condom use in oral sex with a steady partner was reported in Bratislava (1.2%). For casual partners, consistent condom use in oral sex was reported by 15.1% of respondents in Bucharest, 13.1% in Barcelona and 10.4% in Ljubljana, whilst the lowest proportion was found in Verona (9.1%) and Bratislava (6.2%).

Number of partners

The highest average number of steady partners over the last six months reported by respondents was in Bucharest (3.3) and the lowest in Barcelona (1.6), although the medians show a more similar distribution between the cities, with two partners in Bucharest and one partner elsewhere (Table 2). For casual partners, the highest mean and median were reported in Barcelona (mean 16.3, median 10), followed by Verona (mean 12, median 6) and Eastern European cities (mean ranging from 5.7 to 7.5 and median from 3 to 4).

Psychoactive and recreational drug use over the last six months

Substance use before or during sex over the last six months is demonstrated in Figure 4. As expected, alcohol proved the substance with the highest rate of consumption in each city. The highest percentages were reported in Prague and Bratislava (85% and 83.7% respectively), whilst the lowest level was in Verona (54.2%).Poppers are one of the most popular substances in the gay scene and some authors refer to it as a gay drug [4]. The highest rate of poppers use was found in Ljubljana (49.8%) whilst lower use was reported in Prague, Bucharest and Barcelona (38.1%, 34.2% and 37.6% respectively). The lowest percentages were reported in Verona (21.6%) and Bucharest (21%). For ecstacy, the percentages of consumption were 11.4% in Prague, 11.3% in Ljubljana and 10.9% in Barcelona. Sixteen per cent MSM in Barcelona reported use of viagra, 12.7% in Prague. Lower levels of consumption were reported in Bucharest (4.7%), Verona (8.6%) and Bratislava (9.1%).High levels of Cannabis use were reported in Prague, Barcelona and Ljubljana (23.8%, 23.2% and 19.1% respectively), while lower rates were reported in Verona (13.4%), Bratislava (12.5%) and Bucharest (11.5%). A high consumption of Cocaine was found in Barcelona (24.5%). Similar levels of consumption were found in the MSM samples in Prague (5.1%), Bratislava (5.2%), Bucharest (5.8%) and Verona (8.3%). The rate of amphetamine use ranged between 1.9% in Verona and 10.4% in Ljubljana.

Discussion and conclusion

Valid and comparable data on HIV prevalence related to HIV risk behaviour in a hard to reach population are lacking. However, such information is important for development of effective prevention strategies. In order to respond to this limitation, the SIALON project, used three key elements of behavioural and prevalence studies among MSM for improving data comparability: time and location sampling (TLS) method, oral fluid testing in outreach settings and UNGASS indicators.

The use of TLS as a sampling method proved to be feasible and efficient in cities with highly developed gay scenes as well as in cities with less developed scenes. As previous studies among MSM have shown, TLS increases the possibility of involving a variety of participants, producing more valid results [15]. A generalisation of the estimates obtained with this method to the wider population of MSM attending sampled venues is also possible. TLS can be adopted on a larger scale and the method is easily applicable in cities with a considerable number of eligible gay venues. It is more difficult to implement in cities where the gay community is poorly organised and where there are few specific and easily accessible venues. Few venues means that the venues available are over-visited by data collectors, thus reducing the acceptance of the data collection process both to owners of venues and attendees. This aspect may impact the representativeness of the MSM sample of the whole MSM population and therefore reduce the efficiency of TLS. In addition, the TLS method does not take into account other ways of recruiting, such as the internet, gay magazines, chat room etc. However, as one of the main focuses of our study was to estimate HIV prevalence through the collection of biological samples, these alternative sources of recruitment were excluded.

For surveillance and epidemiological purposes, oral fluid testing has clear advantages over venopuncture in community settings and is an alternative screening tool in outreach settings among high-risk populations. Oral fluid testing simplifies the diagnostic process in specific populations in which drawing blood is difficult and dangerous. As previously demonstrated in other studies, the number of oral fluid collections in all sites confirmed the general acceptability of the study by MSM in outreach settings [16,24]. In our study, an info-pack containing a condom, a lubricant and information about STD prevention and screening centres available in the area was given to respondents in order to facilitate the enrolment and to promote safer sex and testing practice, during the data collection.

The introduction of UNGASS indicators is a key measure for the basic monitoring of HIV across countries with comparable indicators. According to UNAIDS, data from multiple countries collected following UNGASS procedures can supply critical information and comparative insights at the regional and the global level. Data can provide a snapshot as well as trend analysis of the epidemiology of HIV over time [3,14]. As far as our study results are concerned, the data shows a variety of socio-demographic patterns among the cities in relation to age, education, living conditions,

living area and self-identity. At this stage, the results presented in this paper are mainly descriptive and this is of course a limitation of the study. A multilevel, multivariate analysis will be carried out in the future to better understand the relationship between HIV prevalence and other factors.

HIV testing (UNGASS 8) is an important indicator of the healthcare system's ability to reach MSM and to efficiently provide access to screening. Verona and Barcelona had the highest percentages of tested people who collected the HIV test result. This finding reflects not only the lower access to HIV testing in Eastern European cities, but also how VCT is organised and might be an indicator of health practitioners' attitudes on health seeking behaviour. The high percentage of MSM seeking the test result in Verona and Barcelona seems to indicate better VCT practice. Differences in stigma, health service organisation and country specific barriers to accessing VCT could explain the gap between Southern and Eastern European cities. Data on condom use (UNGASS 19) seem to suggest that protected sex is more frequently performed in Southern European cities, particularly in Barcelona. Interestingly, HIV prevalence was highest in Barcelona and Verona, where condom use was also highest. This may reflect a different distribution of HIV prevention programmes. In more detail, data about the type of sexual partner, sexual intercourse and condom use confirm the findings of other studies. It is evident that the differentiation between steady and casual partners leads to different distribution of sexual practice. According to the literature, in some countries the number of sexual partners seems to have increased in recent years [25,26]. This may be a good proxy variable for unsafe sex [9]. As expected, throughout our sample, the number of casual partners was higher than the number of steady partners, although in some countries this difference was far more marked than in others. When considering different sexual behaviour (anal and oral sex) related to different types of sexual partners in the last six months, similar patterns occur. As already well-established by other studies, the rates of condom use differ in relation to the kind of partners and sexual practices: protected sex with casual partners is more frequent than with a steady partner, and protected anal sex is more frequent than protected oral sex [27].

As far as substance use is concerned, alcohol consumption is broadly reported in all cities, with the highest levels in Prague and Bratislava. These findings may be related to the younger age of respondents but also to some contextual variables in Eastern European cities. According to the international literature, poppers seems to be the main substance used in the MSM population [4]. Our findings confirm the high levels of poppers consumption, especially in Ljubljana, Prague and Barcelona. As far as the use of other illicit drugs is concerned, cannabis is widely used, but there are large differences between cities. With regard to cocaine consumption, in Barcelona, 24.5% of respondents reported they had used it sometimes or often during the last six months, before or during sex. Even though an overestimation of substance use could not be excluded, it seems that drug use was frequent in our sample. Taking into account the fact that even an intermittent recreational use of drugs before or during sexual intercourse may lead to high-risk sexual behaviour, the data seem to be relevant and suggest a need for prevention programmes targeting MSM, with particular attention to alcohol, poppers and drug use.

Despite possible biases in this prevalence study in some countries, the data emerging from the survey show varying levels of HIV infection among the recruited MSM. The highest prevalence was in Barcelona and Verona, while the prevalence in Eastern European countries was lower. Previous studies carried out in some of the cities participating in this study, came to different prevalence estimates. In Barcelona HIV prevalence found in a last previous study carried out in MSM venues (using a convenience sample) was slightly higher than the prevalence found in this study [28]. The lower figures found in Ljubjana and Bratislava in previous studies, may be partly related to a different sampling method and lower number of samples collected [29,30].

The low prevalence found in the four Eastern European cities is encouraging. However, with the level of unprotected anal sex in some of these cities, even with casual partners, and a generally low frequency of HIV test- seeking behaviour, the potential for further HIV transmission in Eastern European cities is evident.

Members of the SIALON network:

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References

1. European Centre for Disease Prevention and Control / WHO Regional Office for Europe. HIV/AIDS Surveillance in Europe 2007. Stockholm: European Centre for Disease Prevention and Control; 2008. Available from: http://ecdc.europa.eu/en/publications/Publications/0812_SUR_HIV_AIDS_surveillance_in_Europe.pdf
2. Likatavi ius G, Klavs I, Devaux I, Alix J, Nardone A. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000–6: implications for a European public health strategy. Sex Transm Inf. 2008;84(6):499-505
3. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). Monitoring the Declaration of Commitment on HIV/AIDS: guidelines on construction of core indicators: 2010 reporting. Geneva: UNAIDS 2009. Available from: http://www.unaids.org
4. Colfax G, Coates TJ, Husnik MJ, Huang Y, Buchbinder S, Koblin B, et al. Longitudinal patterns of methamphetamine, popper (amylnitrite), and cocaine use and high-risk sexual behavior among a cohort of San Francisco men who have sex with men. J Urban Health. 2005;82(1 Suppl 1):i62-70.
5. Mansergh G, Flores S, Koblin B, Hudson S, McKirnan D, Colfax GN, et al. Alcohol and drug use in the context of anal sex and other factors associated with sexually transmitted infections: results from a multi-city study of high-risk men who have sex with men in the USA. Sex Transm Infect. 2008;84(6):509-11
6. Folch C, Esteve A, Zaragoza K, Muñoz R, Casabona J. Correlates of intensive alcohol and drug use in men who have sex with men in Catalonia, Spain. Eur J Public Health. 2009 Jun 29.
7. Drumright LN, Strathdee SA, Little SJ, Araneta MR, Slymen DJ, Malcarne VL, et al. Unprotected anal intercourse and substance use before and after HIV diagnosis among recently HIV-Infected men who have sex with men. Sex Transm Dis. 2007;34(6):401-407
8. Bolding G, Hart G, Sherr L, Elford J. Use of crystal methamphetamine among gay men in London. Addiction. 2006;101(11):1622-30
9. Cowan SA, Haff J. HIV and risk behaviour among men who have sex with men in Denmark--the 2006 Sex Life Survey. Euro Surveill. 2008;13(48). pii=19050. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19050
10. Schwarcz S, Scheer S, McFarland W, Katz M, Valleroy L, Chen S, et al. Prevalence of HIV infection and predictors of high-transmission sexual risk behaviors among men who have sex with men. Am J Public Health. 2007;97(6):1067-75
11. Koblin BA, Husnik MJ, Colfax G, Huang Y, Madison M, Mayer K, et al.Risk factors for HIV infection among men who have sex with men. AIDS.2006;20(5):731-9
12. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). Initiating second generation HIV surveillance systems: practical guidelines. Available from: http://www.who.int/hiv/pub/surveillance/guidelines/en/index.html

13. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). The pre-surveillance assessment. Guidelines for planning serosurveillance of HIV, prevalence of sexually transmitted infections and behavioural components of second generation surveillance of HIV. Available from: http://www.who.int/hiv/pub/surveillance/sti/en/index.html

14. Joint United Nations Programme on HIV/AIDS (UNAIDS). Monitoring the Declaration of Commitment on HIVAIDS – guidelines on construction of core indicators – 2008 Reporting UNGASS. Available from: http://www.unaids.org

15. Williamson LM, Hart GJ. HIV prevalence and undiagnosed infection among a community sample of gay men in Scotland. J Acquir Immune Defic Syndr. 2007;45(2):224-30

16. Nokes DJ, Enquselassie F, Vyse A, Nigatu W, Cutts FT, Brown DW. An evaluation of oral-fluid collection devices for the determination of rubella antibody status in a rural Ethiopian community.Trans R Soc Trop Med Hyg. 1998;92(6):679-85

17. Ramsay M, Brugha R, Brown D. Surveillance of measles in England and Wales: implications of a national saliva testing programme. Bull World Health Organ. 1997;75(6):515-21.

18. Stueve A, O'Donnell LN, Duran R, San Doval A, Blome J. Time-space sampling in minority communities: results with young Latino men who have sex with men. Am J Public Health. 2001;91(6):922-6

19. MacKellar DA, Gallagher KM, Finlayson T, Sanchez T, Lansky A, Sullivan PS. Surveillance of HIV risk and prevention behaviors of men who have sex with men: a national application of venue-based, time-space sampling. Public Health Rep 2007;122 Suppl 1:39-47

20. Gallagher KM, Finlayson T, Sanchez T, Lansky A, Sullivan PS. Surveillance of HIV risk and prevention behaviors of men who have sex with men-a national application of venue-based, time-space sampling. Public Health Rep. 2007;122 Suppl 1:39-47

21. Muhib FB, Lin LS, Stueve A, Miller RL, Ford WL, Johnson WD, et al. A venue-based method for sampling hard-to-reach populations. Public Health Rep. 2001;116 Suppl 1:216-22

22. Folch C, Casabona J, Munoz R, Zaragoza K. [Trends in the prevalence of HIV infection and risk behaviors in homo- and bisexual men]. Gac. Sanit. 2005;19(4):294-301. Spanish.

23. Genscreen HIV-1|2 Assay Version 2 Bio-Rad Laboratories, Inc.1000 Alfred Nobel Drive Hercules CA 94547 United States 5107247000, http://www.bio-rad.com

24. Lambert NL, Fisher M, Imrie J, Watson R, Mercer CH, Parry JV, et al. Community based syphilis screening: feasibility, acceptability, and effectiveness in case finding. Sex Transm Infect. 2005;81(3):213-216

25. Pérez K, Rodes A, Casabona J. Monitoring HIV prevalence and behaviour of men who have sex with men in Barcelona, Spain. Euro Surveill. 2002;7(2):pii=345. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=345

26. Marcus U, Voss L, Kollan C, Hamouda. HIV incidence increasing in MSM in Germany: factors influencing infection dynamics. Euro Surveill. 2006;11(9):pii=645. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=645

27. Davidovich U, de Wit JB, Stroebe W. Assessing sexual risk behaviour of young gay men in primary relationships: the incorporation of negotiated safety and negotiated safety compliance. AIDS. 2000;14(6)701-6

28. Centre for Sexually Transmitted Infection and AIDS Epidemiological Studies of Catalonia (CEEISCAT). Integrated AIDS/HIV/STI Surveillance System of Catalonia (SIVES): biennial epidemiological report [Internet]. Barcelona: Generalitat de Catalunya, Departament de Salut; 2008 - Technical document 19. Available from: http://www.ceescat.org/Index_Ing.htm

29. Klavs I, Poljak M. Unlinked anonymous monitoring of human immunodeficiency virus prevalence in high- and low-risk groups in Slovenia, 1993–2002. Croatian Med J. 2003;44(5):545–9

30. Staneková D, Habeková M, Wimmerová S, Gramblickova I. HIV infection and sexual behaviour among homosexuals and bisexual men in Bratislava. Cent Eur J Public Health. 2000;8(3):172–5

HIV risk behaviour knowledge, substance use and unprotected sex in men who have sex with men in Tallinn, Estonia

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This study examines HIV risk behaviour knowledge, substance use and unprotected sex in a sample of 79 men who have sex with men (MSM) in Tallinn, Estonia. Median age of the study population was 30 years (range 18-62 years); 35 were bisexual; 56 answered correctly to at least 10 out of 13 questions about HIV risk behaviors; 23 consumed more than seven alcoholic drinks in the week before the survey; nearly half (n=34) of the participants reported some illicit drug use in the past 12 months; 40 did not use a condom regularly in the 12 months preceding the survey, and 41 did not use a condom during their last sexual intercourse. Alcohol consumption in the week before the survey was negatively associated with condom use during last intercourse (RR 0.48; 95% CI 0.41-0.56). Use of illicit drugs varied significantly by ethnicity (p-value = 0.02). Multivariable analysis showed that higher consumption of alcohol in the week before the survey could be predicted by education, age group and sexual orientation. In conclusion, socio-demographic factors such as education, age, ethnicity and sexual orientation may affect HIV risk behavior knowledge, sexual behavior and substance use among MSM in Estonia, and need to be taken into consideration for targeted HIV prevention.

Introduction

Since 2001, HIV prevalence has increased rapidly in Russia and Eastern Europe. Between 2001 and 2007, countries in Eastern Europe experienced a 150% increase in newly diagnosed HIV infections, a much larger increase than other European regions [1]. Of the former Soviet republics, Estonia has experienced the largest increase in the estimated HIV prevalence [2]. In 2008, Estonia had the highest number of newly diagnosed cases of HIV per million population (406/ million) among 28 out of 30 European Union (EU) and European Economic Area (EEA) countries [3]; and in 2007, the second highest estimated HIV prevalence, with over 1% of the adult population infected [4]. In Estonia, the HIV epidemic is mainly attributed to needle sharing among injecting drug users (IDU) and consequently, over the past decade, most research and HIV prevention has targeted IDU [5, 6].

In Eastern Europe the HIV epidemic is mainly concentrated among IDU and commercial sex workers and their respective sexual partners, whereas overall in EU/EEA, unprotected sex between men continues to remain the predominant mode of HIV transmission [3,7]. In recent years, newly diagnosed HIV cases among men who have sex with men (MSM) have increased in several Western European countries [3, 8, 9]. In Central Europe, the predominant mode of transmission is heterosexual contact, although reported HIV cases among MSM have increased rapidly over the past few years [10]. According to the European Center for Disease Prevention and Control (ECDC) and World Health Organization's (WHO) report on HIV/AIDS surveillance in Europe for 2007, more than half of the newly diagnosed cases of HIV infection were reported among MSM in Central European countries such as the Czech Republic, Slovenia, Slovakia, Croatia and Montenegro [2]. MSM are at risk of exposure to HIV for various reasons which may be facilitated by stigmatization [11,12]. In Eastern Europe, gay communities are newly established compared with their Western counterparts, which may be an impediment for peer-driven prevention strategies [13]. Limited research has been published on HIV risk behavior among MSM in Estonia [6]. To facilitate preventive policies towards maintaining lower HIV prevalence among MSM, there is a need to understand risk behavior in relation to socio-demographic and behavioural characteristics. Our study aims to explore the relationship of socio-demographic and behavioral characteristics with HIV risk behaviour knowledge, substance use and unprotected sex among MSM in Tallinn, Estonia.

Methods

Our study uses data collected from a larger project aimed to pilot HIV rapid testing in Tallinn, Estonia in 2008. The Tallinn Medical Research Ethics Committee approved this project. Data were collected by a self-administered 47-item study questionnaire, that was based on validated and widely used surveys of Family Health International (FHI), WHO and the United States Centers for Disease Control and Prevention (US CDC) for specific risk behaviour populations [6, 14-16]. The questionnaire was designed to collect data on three distinct domains: demographics, HIV risk behaviour knowledge and behavioral characteristics such as sexual orientation, substance use and condom use. Additionally, HIV rapid tests were conducted by study staff paid by the Estonian National Institute for Health Development. Anonymous results of the rapid HIV tests were linked to the questionnaire data using a unique identifier.

MSM were identified as men who self-identified their sexual orientation as either homosexual or bisexual. The study population of 79 MSM was recruited in Tallinn, Estonia, from AIDS counseling centers (n=13), a low threshold needle exchange center (n=5), a gay and lesbian information center (n=8), a gay sauna (n=22), and a gay bar (n=31). The use of a convenience sample was in consensus with other recently published studies [17,18]. HIV risk behaviour knowledge was assessed through 13 questions about

transmission, social perception and treatment (see Table 2). One point was awarded for each correct answer and the total knowledge score was calculated summing up the correct answers. Alcohol consumption was assessed by number of cans, bottles, glasses and shots of standard alcoholic drinks such as beer, cider, wine and strong alcoholic drinks, consumed by the participant in seven days prior to the survey. Participants also reported consumption of alcohol during four weeks preceding the survey, using the following categories: everyday, more than once per week, once per week or never. Characteristics of drug use were assessed by questions asking

Table 1

Characteristics of study participants, Tallinn, Estonia, 2008 (n = 79) [a, b]

	Data by age group			All
	18-25 years n (%)	26-35 years n (%)	> 35 years n (%)	
Ethnicity				
Estonian	16 (76)	18 (58)	19 (83)	53 (71)
Russian	5 (24)	9 (29)	2 (9)	16 (21)
Others	0	4 (13)	2 (9)	6 (8)
Level of education				
Less than secondary	4 (19)	2 (7)	3 (14)	9 (13)
Secondary	7 (33)	3 (10)	3 (14)	13 (18)
Vocational	3 (14)	7 (24)	3 (14)	13 (18)
Post-secondary	7 (33)	17 (59)	12 (57)	36 (51)
Income*				
≤ 7,500 EEK per year	13 (68)	6 (21)	4 (20)	23 (34)
> 7,501 EEK per year	6 (14)	23 (79)	16 (80)	45 (66)
Sexual orientation				
Homosexual	13 (62)	17 (55)	11 (48)	41 (55)
Bisexual	8 (38)	14 (45)	12 (52)	34 (45)
HIV knowledge score				
(13 points max.)	10.5 (±1.5)[c]	10.48 (±1.8)[c]	10.0 (±1.7)[c]	10.4 (±1.7)[c]
Standard alcohol drinks in last week				
	5.8 (±6.3)[c]	8.0 (±8.2)[c]	5.6 (±3.8)[c]	7.1 (±6.8)[c]
Alcoholic drinks in last month				
None	0	3 (10)	1 (4)	4 (6)
1 or less per week	11 (55)	13 (45)	11 (48)	35 (49)
> 1 per week	8 (40)	13 (45)	9 (39)	30 (42)
Everyday	1 (5)	0	2 (4)	3 (4)
Illicit drug use*				
No	9 (43)	15 (50)	18 (78)	42 (57)
Not regular	11 (52)	11 (37)	5 (22)	27 (37)
Frequent/regular	1 (5)	4 (13)	0	5 (7)
Condom used in last intercourse				
Yes	12 (57)	14 (48)	14 (64)	40 (56)
No	9 (43)	15 (52)	8 (36)	32 (44)
Condom use in last 12 months				
Regular	9 (47)	14 (45)	12 (63)	35 (51)
Sometimes	5 (26)	13 (42)	4 (21)	22 (32)
Never	5 (26)	4 (13)	3 (16)	12 (17)
Previous HIV test*				
No	13 (62)	5 (16)	6 (29)	24 (33)
Yes	8 (38)	26 (84)	15 (71)	49 (67)

EEK: Estonian Kroons; SD: standard deviation
[a] chi-squared test for categorical variables and Mann-Whitney test for continuous variable. Fisher's exact test was used if any individual cell in cross-tabulation had less than five observations
[b] numbers do not always add up to 79 due to missing values, only available data reported; percentages may not add up to 100% due to rounding
[c] mean (±SD)
* Indicate significant differences (p<0.05) among age groups

about the mode of drug use (pills, injecting, inhaling, smoking, mixed in food/drink), type of drugs used (amphetamine, heroin, cocaine, marijuana, ecstasy, China White and others), and frequency of drug use (every day, frequently, occasionally). Participants were asked about history of sexually transmitted infections (STI) in the past 12 months before the survey and whether they were previously tested for HIV and result from it. Demographic data were collected, such as age, sex, level of education, ethnicity and monthly income (Table 1).

Statistical Analyses

Descriptive and exploratory analyses were done by chi-squared test for categorical variables and Mann-Whitney test for continuous variables. Fisher's exact test was used if any individual cell in cross-tabulations had less than five observations. Preliminary data analysis detected one outlier: a respondent reporting consumption of 140 drinks in seven days prior to the survey, whereas rest of the data ranged between 0-33 drinks. This observation was removed in further analyses for alcohol consumption. Univariate analysis of alcohol consumption in seven days prior to the survey indicated significant association with various socio-demographic and behavioral characteristics. Therefore, we further explored these relationships with a multivariable Poisson regression model, where total number of drinks consumed in seven days prior to the survey (count data with satisfactory normal distribution) was the response variable and socio-demographic and behavioural characteristics such as sexual orientation were predictor variables. In order to control for potential bias due to site of recruitment, this variable was included in the Poisson regression equation. Goodness-of-fit indicated a significant model with a statistically good fit ($\chi 2$ = 240.7; $p < 0.001$). Statistical significance was set at $\alpha \leq 0.05$ and a two-sided p value or 95% confidence intervals (CI) are reported for the corresponding analysis. Stata 10.0 was used for statistical analyses (StataCorp LP. College Station, TX).

Results

Characteristics of participants

The mean age of the participants was 32 years (SD ±11), with most participants between 25 and 35 years of age (median age, 30, range 18-62). More than a quarter of the sample was of non-Estonian ethnicity: 16 (20%) were Russian and 7 (9%) were other (not defined). More than half of the participants (n=38) reported a higher than secondary level education and 48 (67%) reported a monthly income of more than 7,500 Estonian kroons (EEK). In Tallinn, according to the national statistics, 2008, the net average monthly wage was about 11,800 EEK (668 Euros) and median monthly income was about 7,500 EEK (480 Euros) [19]. Less than half of the men (n=35; 44%) reported bisexual orientation. There were no significant differences in sexual orientation by age group, ethnicity, level of education and monthly income. The mean age of anal or vaginal sexual debut in the sample was 17.6 (SD ±3.7) years. Mean age at sexual debut was statistically higher in homosexual men compared to bisexual men (18.4 vs. 16.3 years; p-value = 0.04). Table 1 presents participant characteristics by age group.

More than two-thirds of the participants (n= 52; 68%) were tested previously for HIV. Of these, eight men were aged 18-25 years, compared with 26 aged 26-35 years and 15 aged > 35 years (p-value < 0.01). Uptake of previous HIV testing did not show statistically significant differences by ethnicity, level of education, monthly income and sexual orientation. Of the 25 participants who were not tested previously, 12 reported not considering getting tested, seven reported not having had an opportunity, and seven stated that they had had no time for taking the test. Of the two men who tested HIV-positive from the rapid test, one was detected during the study rapid testing and the other was tested before our study. Six participants reported having had STI in the previous 12 months.

HIV risk behavior knowledge and socio-demographic characteristics

The median score for HIV related knowledge was 11 points. Only six men answered all 13 questions correctly. The total number of correct answers did not differ significantly by socio-demographic characteristics. The participant responses to HIV risk behavior questions are presented in Table 2. Least correctly answered statements were: "Does washing the genitals after sex protect from

Table 2

Assessment of HIV risk behavior knowledge, Tallinn, Estonia, 2008 (n=79)[a]

	Questions	Correct n (%)	Wrong n (%)	Not sure n (%)
1	Can using a condom correctly prevent HIV?	68 (88)	5 (7)	4 (5)
2	Can a person get HIV from mosquitoes?	64 (81)	7 (9)	8 (10)
3	Can a person get HIV from sharing a meal with someone with HIV?	75 (95)	2 (3)	2 (3)
4	Can a person get HIV from sharing a needle or works from someone with HIV?	78 (99)	1 (1)	0
5	Can you tell if a person has HIV by looking at them?	64 (81)	3 (4)	12 (16)
6	Do birth control pills protect from HIV?	68 (88)	1 (1)	8 (10)
7	Getting a tattoo/piercing by a non-licensed person increases the risk of contracting HIV.	67 (85)	11 (14)	1 (1)
8	Can a pregnant woman with HIV transmit HIV to her child?	64 (81)	4 (5)	11 (14)
9	Can breastfeeding children get HIV from an HIV infected mother?	38 (51)	11 (15)	26 (35)
10	Does washing the genitals after sex protect from HIV?	51 (66)	10 (13)	16 (21)
11	Does pulling out interrupted intercourse before orgasm protect against HIV?	55 (71)	11 (14)	11 (14)
12	If you are HIV positive, can you get treatment?	49 (65)	7(9)	20 (26)
13	Do HIV medications improve the quality of life for people with HIV?	53 (68)	10 (13)	15 (19)

a numbers do not always add up to 79 due to missing values, only available data are reported

HIV?"; "Does pulling out interrupted intercourse before orgasm protect against HIV?"; "Can breastfeeding children get HIV from an HIV infected mother?"; "If you are HIV positive, can you get treatment?" and "Do HIV medications improve the quality of life for people with HIV?".

We further assessed the association of socio-demographic and behavioral characteristics with the range of knowledge about HIV risk behavior by the Fisher's exact test. With regards to ethnicity, the misconception that pulling out before orgasm protects against HIV was statistically significant higher among ethnic Russians than ethnic Estonians or other ethnicities (p-value = 0.03). Statistically significant differences were observed in the HIV/AIDS knowledge by level of education. Less than secondary school education was associated with higher proportion of wrong or 'not sure' answers. For example, two out of 10 men with less than secondary education reported 'not sure' about HIV transmission through sharing meals compared to none among those with higher than secondary education (p-value <0.01). No significant differences were observed in HIV knowledge with regards to income, age categories, sexual orientation and site of recruitment.

Substance use

Nearly all participants (n=72) reported having consumed alcohol in the four weeks prior to the survey, 32 had consumed more than one drink per week and five reported having consumed daily. Reported patterns of monthly consumption did not differ statistically significant by characteristics of participants. We also assessed the number of standard alcoholic drinks consumed in the week before the survey. Mean consumption was 7.1 drinks (SD ±6.8; median = 5). Poisson regression analyses explored the association of the number of drinks consumed with socio-demographic and behavioral characteristics. After adjusting for other variables in the multivariable model, results showed a significant independent association of the rate of mean number of drinks consumed in seven days before the survey with education, age group, illicit drug use and sexual orientation. The rate of consumption was significantly lower in those with a higher education - vocational education (RR 0.26; 95% CI 0.16-0.42) or post-secondary education (RR 0.48; 95% CI 0.33-0.69) compared to less than secondary education. Whereas, the rate was significantly higher in 26-35 years old men (RR 1.92; 95% CI 1.35-2.73) as compared to youngest age group (18-25 years); in those who reported 'not frequent' use of drugs (RR 1.73; 95% CI 1.38-2.16) and 'regular use' of drugs (RR 2.02; 95% CI 1.12-3.62) as compared to those who reported 'no use ever'; and in those who reported homosexual orientation (RR 1.61; 95% CI 1.27-2.06) as compared to bisexual orientation.

Thirty-four of the 79 men (46%) in our study reported some illicit drug use, the majority (n=29) 'not frequent' users. More than half (12 out of 21) in the 18-25 years age group reported drug use compared to five out 23 participants older than 35 years (p-value = 0.05). Fisher's exact test showed significant differences (p-value = 0.02) in drug use by ethnicity: 11 of the 16 Russian ethnic participants used illicit drugs compared with 20 out of 54 Estonians. No significant differences were observed with regards to level of education, monthly income and sexual orientation. Among the 34 participants who used illicit drugs, most commonly used drugs (some participants used more than one drugs), were amphetamines (11 cases), marijuana (11 cases), cocaine (6 cases), China White or White Persian (3 cases), ecstasy (8 cases), and eight cases for other or unknown drugs. Injecting drug use was reported by five men in our sample.

Unprotected sex

About half (n=37) of the men did not use condoms regularly over last 12 months, of which 13 men reported never using condoms. A higher proportion of men with less than secondary education reported never using condoms (4 out of 7) compared to those with higher than secondary levels of education (3 out of 38). Differences however, fell little short of statistical significance (p-value = 0.08). No significant differences were observed by ethnicity, monthly income, age group category, sexual orientation and substance use.

A condom was not used during last sexual intercourse by 35 of the 79 men (46%) in our study group. We assessed the association between condom use during last intercourse and number of alcoholic drinks in the week before the survey. Higher alcohol consumption was negatively associated with use of condom during the last intercourse (RR 0.48; 95% CI 0.41-0.56). No other significant differences were observed with regards to socio-demographic characteristics, sexual orientation and illicit drug use.

Discussion and conclusion

Our results show that about half of the 79 men participating in our study answered correctly for more than 10 out of 13 questions/statements about HIV transmission and risk behavior. Similar findings were reported in an internet based survey conducted in spring 2004 and autumn 2005, by the Estonian Gay League and the National Institute of Health and Development (NIHD) [16, 20]. However, we found significant differences in the range of HIV risk behavior knowledge. Whereas, the majority of the men knew about prevention of HIV by correct use of condom or that HIV could be transmitted through sharing needles, a lower proportion of men could answer correctly about the fact that pulling out before orgasm or washing genitals after sex does not prevent HIV, that HIV could be transmitted to babies through breast-feeding, and that HIV treatment is available to all in Estonia, and it may improve quality of life. Our results indicated that HIV risk behavior knowledge may vary by socio-demographic factors such as education and ethnicity. Other studies in the geographical region have shown similar differences in HIV knowledge [21]. In a study by Kelly *et al.*, on MSM in St. Petersburg, Russia, only 4% bisexual male participants were able to answer correctly to all the questions on HIV risk behavior knowledge; and 54% of the participants believed that washing carefully after sex protects against HIV [22].

We found that lower education, belonging to age group 25-35 years, using illicit drugs and homosexual orientation were significantly associated with higher rate of consumption of alcohol over past seven days. About half of the men used illicit drugs, although most where non-frequent users. Moreover, illicit drug use was found to be higher among Russian men and the youngest age group (18-25 years). Higher level alcohol consumption among MSM has been indicated in other regional studies [17, 23]. In a study based in Zagreb, Croatia, Stulhofer *et al.* reported that more than third of the MSM participants used illicit drugs before having sex in the 12 months before the survey and more than half consumed alcohol before sex over the same period. Higher alcohol and substance use has been shown to increase overall risk of HIV transmission [24, 25]; therefore it is important to consider the socio-demographic differences in substance use among MSM in Estonia for directing HIV public health interventions.

In our study, about half of the men did not use condoms regularly in the 12 months before the survey and a similar proportion reported not using condoms during the last sexual intercourse.

Lower education and high rates of alcohol consumption were found to be negatively associated with condom use. However, since we did not know whether the last intercourse was with a regular or a casual partner and the number of concurrent partners, interpretation of these results warrant caution. Nevertheless, other regional studies have indicated that having casual partners is very common in MSM social networks [17, 21]. Overall, studies investigating the correlation of unprotected sex between men with socio-demographic and behavioral characteristics have given mixed results. In a recent study by Amirkhanian *et al*., results showed that more than half (56%) of MSM participants, from Hungary and Russia, had the most recent unprotected anal sex with a casual partner and that condom use significantly depended on psychosocial factors [26]. A large study based in Denmark, by Cowan and Haff, concluded that in recent years there has been an increase in the frequency of unprotected sex in MSM despite high level knowledge about HIV [27]. Stulhofer *et al*. however, found no relation between alcohol and drug use before sex and condom use over the last 12 months or during last anal sex [18]. Further investigation is warranted to understand the reasons for these mixed findings.

Our research has several limitations. We used a convenience sample, which limits the ability to represent the population, and could potentially bias some behavioral characteristics, such as alcohol use in men recruited from gay bars. Information about sexual partners of the participants, regular or casual, as well as the number of concurrent sexual partners, was not available, and therefore the results could not be adjusted for number of (casual) sex partners. The sample size was small and moreover, data presented in these analyses are self-reported, which resulted in missing data on some questions.

Despite these limitations we conclude that, socio-demographic and behavioral characteristics affect knowledge of HIV transmission, sexual risk behavior and substance use among MSM in Estonia and need to be taken into account for targeted intervention towards HIV prevention. Further research is needed to understand the complex association of HIV risk taking behavior and substance use among MSM.

References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). AIDS Epidemic Update December 2007. Geneva: UNAIDS/WHO; 2007. Available from: http://data.unaids.org/pub/EPISlides/2007/2007_epiupdate_en.pdf
2. European Centre for Disease Prevention and Control / WHO Regional Office for Europe: HIV/AIDS Surveillance in Europe 2007. Stockholm: European Centre for Disease Prevention and Control; 2008. Available from: http://ecdc.europa.eu/en/publications/Publications/0812_SUR_HIV_AIDS_surveillance_in_Europe.pdf
3. van de Laar MJ, Likatavicius G, Stengaard AR, Donoghoe MC. HIV/AIDS surveillance in Europe: update 2007. Euro Surveill, 2008;13(50).pii=19066. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19066
4. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). Epidemiological Fact Sheet on HIV/AIDS. Core data on epidemiology and response. Estonia, 2008. Geneva: UNAIDS/WHO; 2008. Available from: http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_EE.pdf
5. Trummal A, Lõhmus L, Rüütel K. Fighting HIV in Estonia in 2006 and 2007. Tallinn: Estonian National Institute for Health Development; 2008. Available from: http://www.tai.ee/failid/Fighting_HIV_in_Estonia_2006_2007.pdf
6. Lai T, Rätsep M, Rüütel K, Trummal A, Kahur K, Nielsen, et al. Modelling Estonia's concentrated HIV epidemic: a case study. Estonian National Institute of Health Development, Estonian Ministry of Social Affairs, WHO Regional Office for Europe. Copenhagen: WHO; 2009. Available from: http://www.who.it/Document/SHA/EST_HIV_EPI_rep.pdf
7. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO). Eastern Europe and Central Asia: AIDS epidemic update: regional summary. Geneva: UNAIDS; 2008. Available from: http://data.unaids.org/pub/Report/2008/jc1529_epibriefs_eeurope_casia_en.pdf
8. Blystad H, Nilsen Ö, Aavitsland P. Increase in reported HIV infections among MSM in Oslo, Norway. Euro Surveill. 2004;8(11).pii=2405. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2405
9. Gebhardt M., Recent trends in new diagnoses of HIV infections in Switzerland: probable increase in MSM despite an overall decrease. Euro Surveill. 2005;10(12): pii=2850. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2850
10. van de Laar MJ, Likatavicius G, Stengaard AR, Donoghoe MC. HIV/AIDS surveillance in Europe: update 2007. Euro Surveill, 2008;13(50).pii=19066. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19066
11. Amirkhanian YA, Kelly JA, Kirsanova AV, DiFranceisco W, Khoursine RA, Semenov AV, et al. HIV risk behaviour patterns, predictors, and sexually transmitted disease prevalence in the social networks of young men who have sex with men in St Petersburg, Russia. Int J STD AIDS. 2006;17(1):50-6,
12. Preston DB, D'Augelli AR, Kassab CD, Cain RE, Schulze FW, Starks MT. The relationship of stigma to the sexual risk behaviors of rural men who have sex with men. AIDS Educ Prev. 2007;19(3): 291-303.
13. Trummal A, Lõhmus L, HIV/AIDS Prevention in Estonia in 2004 - 2005. Tallinn: Estonian National Institute for Health Development; 2006. Available from: http://www.tai.ee/failid/HIV_prevention_in_Estonia_2004_2005_09.2006.pdf
14. Amon J, Brown T, Hogle J, NacNeil J, Magnani R, Mills S, et al. Behavioral Surveillance Surveys (BSS): Guidelines for Repeated Behavioral Surveys in Populations at Risk of HIV. 2000; Family Health International. Available from: http://www.fhi.org/NR/rdonlyres/ezcscxathgcvhxzmwxjlfgkl4mezcmep6ogzqty3lbyf5ighmb6k2swbgar32xup6yh5sykj6ii2kwp/bssguidelinesfullenhv.pdf
15. Sanchez T, Finlayson T, Drake A, Behel S, Cribbin M, Dinenno E, et al. Human immunodeficiency virus (HIV) risk, prevention, and testing behaviors--United States, National HIV Behavioral Surveillance System: men who have sex with men, November 2003-April 2005. MMWR Surveill Summ. 2006;55(6):1-16.
16. Trummal A, Lõhmus L, HIV/AIDS Prevention in Estonia in 2004 - 2005. Tallinn: Estonian National Institute for Health Development; 2006 [p.1-67]. Available from: http://www.tai.ee/failid/HIV_prevention_in_Estonia_2004_2005_09.2006.pdf
17. Amirkhanian YA, Kelly JA, Kukharsky AA, Borodkina OI, Granskaya JV, Dyatlov RV, et al. Predictors of HIV risk behavior among Russian men who have sex with men: an emerging epidemic. AIDS. 2001;15(3):407-12.
18. Stulhofer A, Baćak V, Bozicević I, Begovac J. HIV-related sexual risk taking among HIV-negative men who have sex with men in Zagreb, Croatia. AIDS Behav. 2008;12(3):505-12.
19. Statistics Estonia. 2009 [cited 2009 30 November]; Available from: http://www.stat.ee/wages-and-salaries-and-labour-costs.
20. Rüütel K, Uusküla A. HIV epidemic in Estonia in the third decade of the AIDS era. Scand J Infect Dis. 2006;38(3):181-6.
21. Longfield K, Astatke H, Smith R, McPeak G, Ayers J. Men who have sex with men in Southeastern Europe: Underground and at increased risk for HIV/STIs. Cult Health Sex. 2007; 9(5):473-87.
22. Kelly JA et al., HIV risk characteristics and prevention needs in a community sample of bisexual men in St. Petersburg, Russia. AIDS Care. 2002;14(1):63-76.
23. Csepe P, Amirkhanian YA, Kelly JA, McAuliffe TL, Mocsonoki L. HIV risk behaviour among gay and bisexual men in Budapest, Hungary. Int J STD AIDS. 2002;13(3):192-200.
24. Celentano DD, Valleroy LA, Sifakis F, MacKellar DA, Hylton J, Thiede H, et al. Associations between substance use and sexual risk among very young men who have sex with men. Sex Transm Dis. 2006;33(4):265-71.
25. Folch C, Esteve A, Zaragoza K, Muñoz R, Casabona J et al. Correlates of intensive alcohol and drug use in men who have sex with men in Catalonia, Spain. Eur J Public Health. 2009 Jun 29.
26. Amirkhanian YA, Kelly JA, Takacs J, Kuznetsova AV, DiFranceisco WJ, Mocsonaki L, et al. HIV/STD prevalence, risk behavior, and substance use patterns and predictors in Russian and Hungarian sociocentric social networks of men who have sex with men. AIDS Educ Prev. 2009;21(3):266-79.
27. Cowan SA, Haff J. HIV and risk behaviour among men who have sex with men in Denmark--the 2006 Sex Life Survey. Euro Surveill. 2008;13(48). pii=19050. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19050

Syphilis and gonorrhoea in men who have sex with men: a European overview

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This paper describes recent trends in the epidemiology of syphilis and gonorrhoea infections in Europe among men who have sex with men (MSM). Routine surveillance data submitted to the European Surveillance of Sexually Transmitted Infections (ESSTI) network from 24 European countries for the period 1998-2007 were analysed. Data on whether syphilis and gonorrhoea infections were in MSM were available for 12 and 10 countries respectively. The number of syphilis cases reported to be MSM increased considerably in all Western European countries. While in some Central and Eastern European countries the male to female ratio remained relatively stable at around 1:1, in Slovenia and the Czech Republic the proportion of male cases increased and so did the percentage of cases reported to be MSM. More cases of gonorrhoea were seen in men than women, but the percentage of male cases reported to be MSM was lower than for syphilis. The findings suggest MSM are at high risk of STI in Western Europe and appear to be an increasingly important risk group in Central Europe. Despite this, data on infections among MSM are not collected routinely in many countries. The introduction of standardised data collection including data on diagnoses in MSM should be prioritised for monitoring STI in this population.

Introduction

Sexually transmitted infections (STI) are a major public health problem in Europe. During the 1980s a reduction in the incidence of STI was seen in many countries likely due to behavioural change occurring in response to the emergence of HIV/AIDS [1]. In recent years an increase in the number of STI in men who have sex with men (MSM) has been reported in a number of industrialised countries [2,3] and has coincided with several reported outbreaks of syphilis and lymphogranuloma venererum (LGV) infection among the MSM population [4-10].

The collection of European surveillance data on HIV and AIDS through EuroHIV has been in place since 1984 with standardised definitions for "route of transmission" data including whether the infection was acquired through homosexual or heterosexual sex. The European Surveillance of Sexually Transmitted Infections (ESSTI) network was first established in 2001 and is a collaboration of STI epidemiologists and microbiologists from 24 European countries (http://www.essti.org/). One of the key objectives of ESSTI is to collate and analyse surveillance data on acute STI in order to inform public health policy and control of STI. While surveillance data on STI had been collected at the European level for some time by both the World Health Organization (WHO) and, more recently, the European Centre for Disease Prevention and Control (ECDC), until recently data on diagnoses in MSM had not been routinely collected. ESSTI has prioritised the development of minimum standards for collecting and disseminating STI surveillance data [11]. New and historic data on diagnoses in MSM have been collected by the network since 2006.

In this paper we analysed ESSTI data to provide an insight into the recent epidemiology of syphilis and gonorrhoea among MSM across Europe and to discuss its public health implications. We also reviewed the potential difficulties of collecting this kind of information at the European level.

Methods

Twenty-three ESSTI participating countries and the Czech Republic were asked to provide, where possible, aggregated data on syphilis and gonorrhoea diagnoses by gender between 1998 and 2007. Data on sexual orientation, whether the infection was homosexually acquired, gender of partner, and probable route of transmission were used to determine infections in MSM, according to the reporting system of each country (Table 1). As some countries either could not provide data specifically for MSM or had only recently started collecting this information, trends in gender ratios were also investigated as a proxy marker for changes in the epidemiology in MSM. Male to female ratios were calculated for all countries that provided gender data.

Data were collected on the stage of syphilis infection and, wherever possible, the analyses presented here used diagnoses of infectious syphilis (definitions in footnote of Table 2). Data on site of infection and diagnostic methods used were not routinely available from all countries and were not collected although the majority of countries in the ESSTI network are known to carry out culture for gonorrhoea [12].

Countries reported data on diagnoses collected through 'universal' or 'sentinel' surveillance systems. Universal systems collect data from all laboratories or the relevant clinical services whereas sentinel systems collect data from only a sample of these (although often with more detailed risk factor information). Countries which had more than one surveillance system in place for a particular infection provided data from their universal systems. From countries that had made significant changes to their

surveillance systems during the study period, data were collected only from the most recent system.

For the purposes of all ESSTI analyses Cyprus, the Czech Republic, Slovakia, Slovenia and Turkey were classified as Central European countries. Estonia and Latvia were classified as Eastern European and all other participating countries as Western European.

Results

Twenty-four countries submitted surveillance data on syphilis and/or gonorrhoea to ESSTI. These data, available in full in the annual report produced by ESSTI [13], were used to describe the overall trends in syphilis and gonorrhoea infection in Europe. Ten and 12 countries were able to provide data on gonorrhoea and syphilis infections in MSM, respectively (Table 1). The type of surveillance system i.e. universal or sentinel, the availability of syphilis stage of infection and the period for which data were available, varied between countries (Table 1).

Syphilis

Western Europe

The overall number of reported syphilis cases increased substantially in most Western European (WE) countries between 1998 and 2007, mostly among men, although there was a slight

Table 1

Characteristics of gonorrhoea and syphilis surveillance data available in Europe for 1998-2007

Country	Surveillance system	Variables collected				Note
		Total numbers	Gender	Data on men who have sex with men (MSM)	Year from which MSM data available	
Western Europe						
Austria	Universal	✓	-	-		
Belgium	Sentinel	✓	✓	SO	2005	
Denmark	Universal	✓	✓	SO	1998	
Finland	Universal	✓	✓	-		
France	Sentinel	✓	✓	SO	2000	SO data only available for syphilis
Germany	Universal	✓	✓	SO	2001	Syphilis only
Greece	Universal[a]	✓	✓	SO	2000	Gonorrhoea only
Iceland	Universal	✓	✓	-		
Ireland	Universal[b]	✓	✓	SO	1998	SO data only available for syphilis
Italy	Universal	✓	✓	-		
Malta	Universal	✓	✓	-		
Netherlands	Sentinel	✓	✓	SO	2003	
Norway	Universal	✓	✓	SO	1998	
Portugal	Universal	✓	✓	-		
Spain	Universal	✓	-	-		
Sweden	Universal	✓	✓	PRT	1998	
United Kingdom	Universal[a]	✓	✓	HOMO	1998	
Central Europe						
Cyprus	Universal	✓	✓	PRT	2005	
Czech Republic	Universal	✓	✓	SO	1998	
Slovakia	Universal	✓	✓	-		
Slovenia	Universal	✓	✓	GP	2001	
Turkey	Universal	✓	✓	-		
Eastern Europe						
Estonia	Universal	✓	✓	-		
Latvia	Universal	✓	✓	-		

[a]Data from genitourinary medicine clinics (GUM)
[b]Enhanced surveillance system for syphilis
✓ Collected variable; - Variable not collected
SO = Sexual orientation
GP = Gender of partner
PRT = Probable route of transmission
HOMO = Homosexually acquired

Table 2

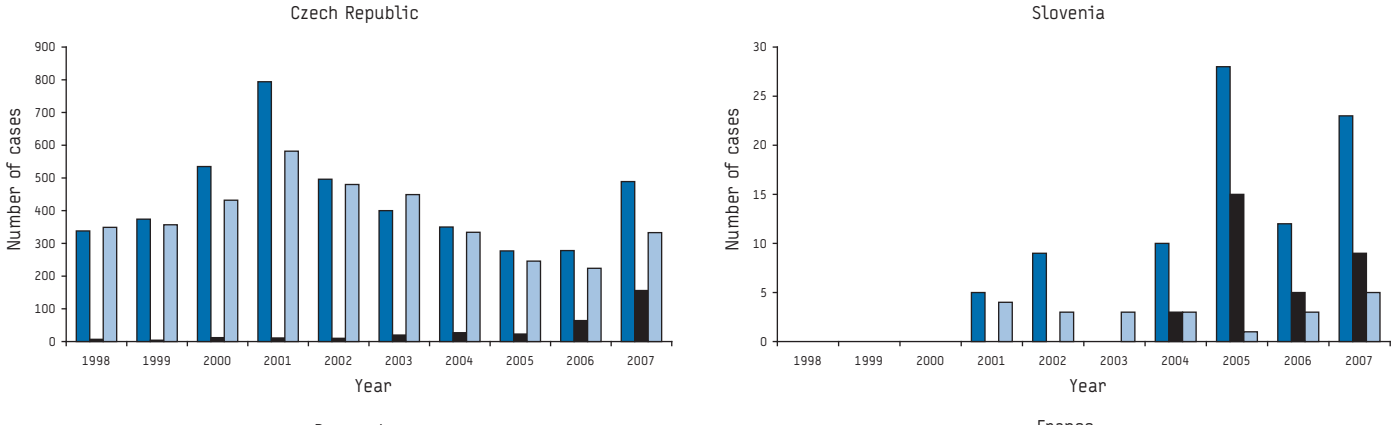
Male to female ratio of reported syphilis* and gonorrhoea cases, and the percentage of male cases in men who have sex with men (MSM), in Europe 1998-2007**

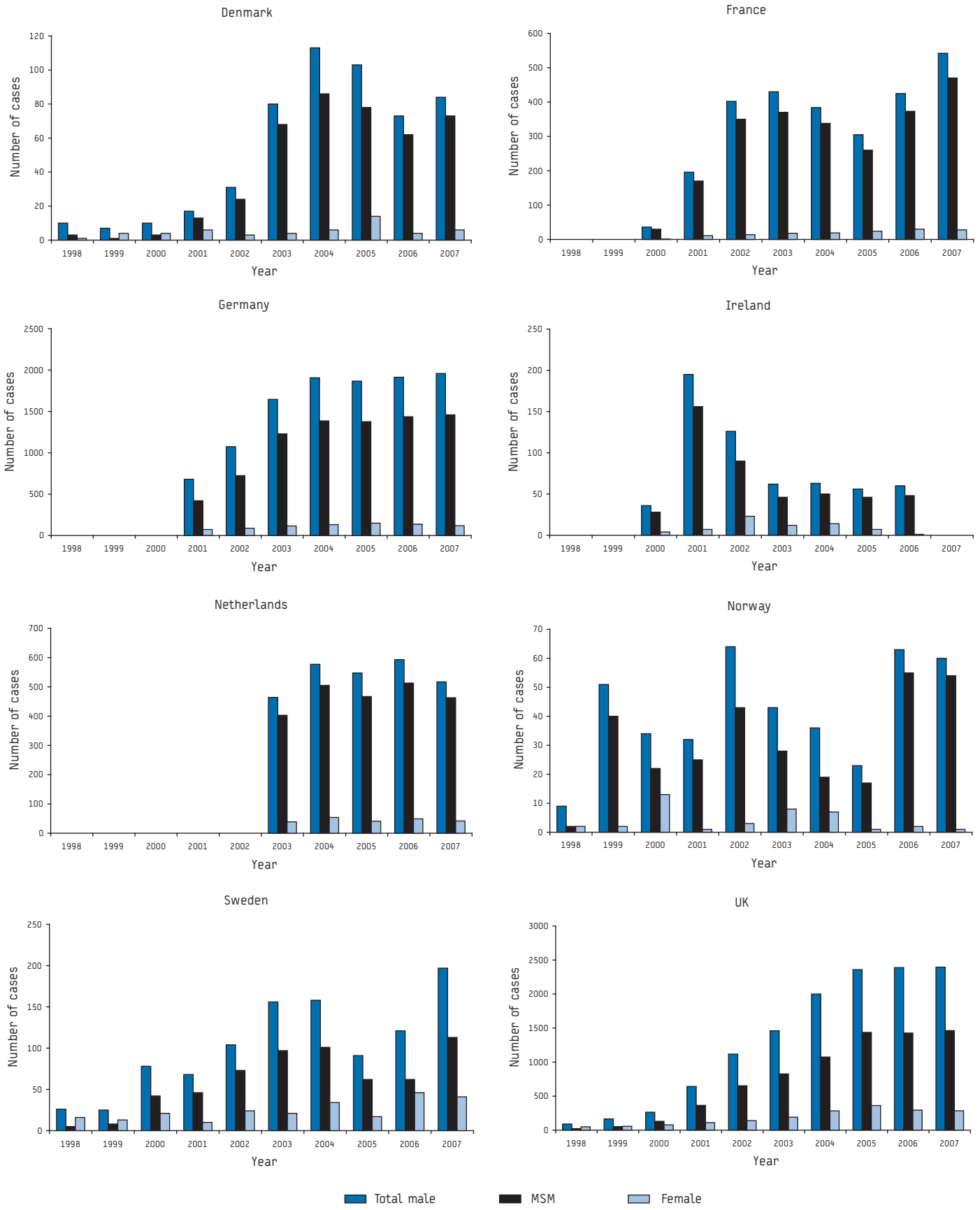
Country	Syphilis						Gonorrhoea					
	1998		2003		2007		1998		2003		2007	
	Gender ratio	% MSM	Gender ratio	% MSM	Gender ratio	% MSM	Gender ratio	% MSM	Gender ratio	% MSM	Gender ratio	% MSM
Western Europe												
Belgium	-	-	9.7	-	7.3	87	2.5	-	4.3	-	2.9	65
Denmark	10.0	30	20.0	85	14.0	87	10.6	61	8.3	42	4.7	44
Finland	1.2	-	1.1	-	1.9	-	3.0	-	5.5	-	4.5	-
France	-	-	23.9	86	19.4	87	-	-	7.1	-	5.5	-
Germany	-	-	14.3	75	16.6	75	-	-	-	-	-	-
Greece	-	-	-	-	-	-	23.4	14	28.8	31	66.0	19
Iceland****	-	-	1.0	-	1.0	-	2.0	-	na***	-	2.1	-
Ireland****	-	-	5.2	74	60.0	80	3.2	-	3.8	-	7.9	-
Italy	3.0	-	5.3	-	3.7	-	11.6	-	20.9	-	12.4	-
Malta	-	-	-	-	2.0	-	-	-	-	-	4.3	-
Netherlands	-	-	11.9	87	12.3	90	-	-	4.4	61	3.3	69
Norway	4.5	29	5.4	65	60.0	90	5.9	30	5.9	35	6.9	37
Portugal	1.0	-	1.6	-	2.2	-	9.0	-	4.9	-	7.2	-
Sweden	1.6	19	7.4	62	4.8	57	4.7	26	4.1	46	4.1	38
UK	1.8	26	7.6	57	8.4	61	2.1	20	2.3	23	2.2	30
Central Europe												
Cyprus	3.1	-	2.0	-	2.3	0	7.4	-	8.3	-	4.0	0
Czech Republic	1.0	2	0.9	5	1.5	32	1.4	5	2.0	13	2.4	26
Slovakia	1.1	-	0.9	-	1.0	-	3.7	-	3.9	-	3.4	-
Slovenia	1.6	-	0.0	0	4.6	39	7.7	-	6.0	19	8.8	69
Turkey	-	-	1.3	-	1.1	-	0.0	-	0.0	-	0.2	-
Eastern Europe												
Estonia	1.0	-	0.4	-	0.5	-	1.4	-	1.1	-	0.6	-
Latvia	1.0	-	1.1	-	1.0	-	2.5	-	3.3	-	3.6	-

* Infectious syphilis data available as follows: primary and secondary syphilis: Italy, UK; primary, secondary and early latent: Belgium, Czech Republic, Denmark, France, Germany, Greece, Iceland, Ireland, Portugal, Slovenia; primary, secondary and latent: Cyprus, Malta, Netherlands, Norway, Sweden. All other countries only collected data on all stages combined.
**Austria and Spain excluded from table as gender is not collected
***All male
****2006 data

Figure 1

Number of syphilis cases reported from various Central and Western European countries, in all men, men who have sex with men (MSM), and women, 1998-2007*

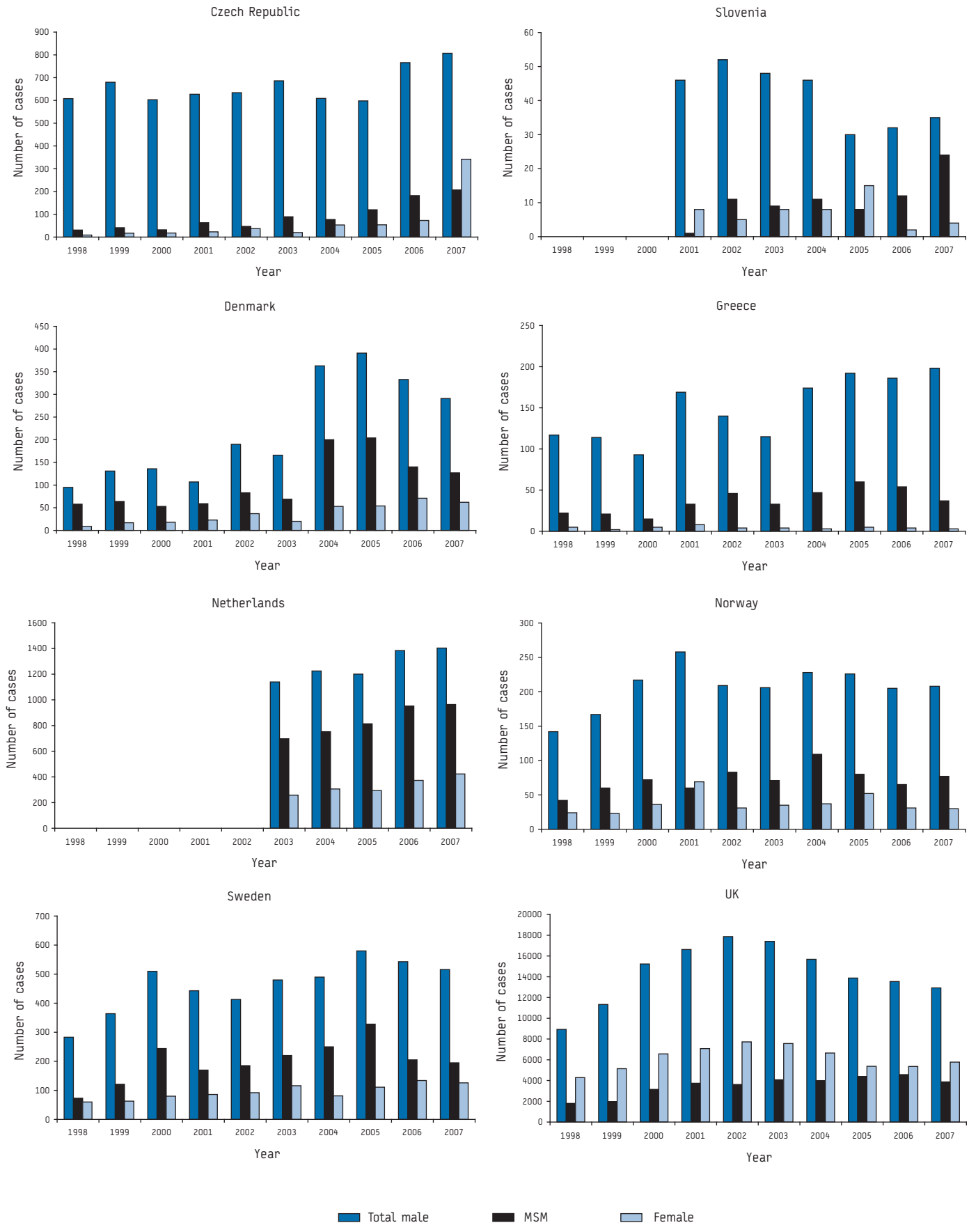




*Includes only countries with complete data from 2003 onwards
Note different scales

FIGURE 2

Number of gonorrhoea cases reported from various Central and Western European countries, in all men, men who have sex with men (MSM), and women, 1998-2007*



*Includes only countries with complete data from 2003 onwards
Note different scales

downturn in overall numbers in many countries from the early to mid-2000s (Figure 1) [13]. In 1998, in four out of seven WE countries reporting these data, the male to female ratio was below 2:1. By 2007, with the exception of Finland and Iceland, in all WE countries reporting these data the male:female ratio was above 2:1, with half of WE countries reporting a male:female ratio of 5:1 or greater (Table 2).

Consistent historic data for MSM dating back to 1998 were only available for four WE countries: Denmark, Norway, Sweden and the United Kingdom (UK). All four countries reported an increase in the number of syphilis cases reported among MSM since the late 1990s (Figure 1). Between 1998 and 2007, the number of male cases reported to be MSM rose 64-fold from 23 to 1,463 in the UK, from 3 to 73 in Denmark, and from 5 to 113 in Sweden. Over the same period, the percentage of male cases reported to be MSM also rose, from 30% to 87% in Denmark, from 19% to 57% in Sweden, from 26% to 61% in the UK and from 29% to 90% in Norway (Table 2). The countries with only more recent data available also showed similar increases in the number and proportion of cases among MSM (Figure 1).

Central and Eastern Europe

In contrast to WE countries, in Central and Eastern Europe between 1998 and 2007 there was a general decline in the number of reported syphilis cases. During the same period the sex ratio was relatively stable at around 1:1, with the exception of Slovenia where the male:female ratio rose to almost 5:1 in 2007. Only the Czech Republic among Central and Eastern European countries has collected data on diagnoses in MSM since 1998. In the Czech Republic the percentage of male cases reported to be MSM varied between 1% and 8% until 2005 but rose to 32% in 2007 (Figure 1; Table 2). In Slovenia in 2007, 39% of male cases were reported to be MSM (Figure 1; Table 2).

Gonorrhoea

Western Europe

The number of reported gonorrhoea cases in most WE countries rose between 1998 and 2007 with only Italy experiencing an overall decline [13]. In 2007, the male:female ratio of reported gonorrhoea cases ranged between 2:1 in Iceland and 66:1 in Greece (Table 2). Trends in the gender ratio over time were much more variable than for syphilis. Between 1998 and 2003, the male:female ratio rose in six WE countries (Belgium, Finland, Greece, Iceland, Italy and UK), fell in three (Denmark, Portugal and Sweden) and remained stable in Norway (Table 2). Between 2003 and 2007, the male:female ratio rose in four WE countries (Greece, Ireland, Norway and Portugal), fell in seven (Belgium, Denmark, Finland, France, Italy, the Netherlands, and UK) and remained stable in Sweden (Table 2). The percentage of male cases reported to be MSM rose slightly in four of the five WE countries with these data available from 1998: Greece, Norway, Sweden and UK, but fell in Denmark. However, over the same period the number of male cases reported to be MSM more than doubled in Denmark (58 to 127), Sweden (73 to 195) and in the UK (1799 to 3868) and also increased in Norway (42 to 77) (Figure 2). In 2007, the highest proportion of male cases reported to be MSM (69%) was in the Netherlands (Figure 2; Table 2).

Central and Eastern Europe

Between 1998 and 2007, the number of reported gonorrhoea cases in Central Europe remained fairly steady, while in Eastern Europe the rate fell considerably (by 89% and 46% in Estonia and Latvia respectively). There has been no clear pattern in the male:female ratio in Central and Eastern European countries since 1998, and in 2007 it ranged from 0.2:1 in Turkey to 9:1 in Slovenia. The percentage of male cases reported to be MSM rose from 5% to 26% in the Czech Republic between 1998 and 2007 and from 19% to 69% in Slovenia between 2003 and 2007 (Figure 2; Table 2). No cases of gonorrhoea in MSM were reported from Cyprus, and the overall number of gonorrhoea cases reported from Cyprus was small.

Discussion

Data from the ESSTI network indicate that MSM bear a disproportionate burden of syphilis and gonococcal infection across Western Europe and, in the case of syphilis, there is clear evidence that this has increased considerably. Patterns of diagnoses of these infections in Central and Eastern Europe are consistent with predominantly heterosexual transmission, although sex between men is becoming an increasingly important route of transmission in Slovenia and the Czech Republic.

In the early 1990s rates of syphilis infection in Western Europe were at historically low levels [14] but since then a large number of outbreaks affecting major urban centres in Europe have been reported [4,5,7,9,15-20]. The proportion of male cases reported to be MSM in these outbreaks ranged from 45% in Sweden [16] to 94% in Brighton, UK [18]. Reports of syphilis outbreaks have waned since 2003, possibly due to public health control measures [21]. However, syphilis remains a public health concern. While still rare, the number of cases seen annually in many countries is higher than before the outbreaks, suggesting syphilis is now endemic in the MSM population in parts of Western Europe.

Central and Eastern Europe experienced heterosexually acquired syphilis epidemics in the 1990s and total numbers of cases have been in decline since then [22]. However, although the overall numbers are low, ESSTI data indicate that syphilis transmission in MSM in Central and Eastern Europe is an emerging problem. Around a third of cases among men in the Czech Republic and two-fifths in Slovenia in 2007 were reported to be MSM.

Across Europe, more cases of gonorrhoea are seen in men than women. However, trends in numbers of diagnoses and the male:female ratio of reported cases may be poor markers of changes in infection burden among MSM over time. In some settings, gonococcal infections in women may be under-diagnosed because they tend to have fewer symptoms and due to the use of sub-optimal diagnostic methods which favour the definitive diagnosis of male gonococcal urethritis [23,24]. Similarly, screening for rectal and pharyngeal infections, which are often asymptomatic [25,26], is unlikely to be routine in many European countries, leading to under-diagnosis in MSM in particular. On the other hand, increasing use of highly sensitive nucleic acid amplification tests may have led to rising numbers of diagnoses being reported by many European countries. Despite these concerns, data from the ESSTI network suggest that, in 2007, MSM bore a disproportionate burden of gonococcal infection in many Western European and some Central and Eastern European countries.

The advent of HIV and AIDS in the 1980s heralded a change in sexual behaviour which was associated with subsequent falls in the number of STI diagnosed in the early 1990s [27,28]. The resurgence of syphilis and gonorrhoea among MSM in Western Europe coincided with the introduction of highly active antiretroviral therapies (HAART) and the resultant decrease in HIV-associated mortality [29]. The availability of HAART may have resulted in the

re-emergence of unsafe sexual behaviour among MSM [30,31], particularly among the core group which can maintain high levels of syphilis transmission. Increased transmission through oral sex, considered safer sex with respect to HIV risk, may also have contributed to rising diagnoses of these STI [4,5]. Furthermore, increasing use of the internet to select sexual partners with the same HIV status (serosorting) has likely led to more unprotected sex among HIV-positive men, contributing to high levels of STI and also HIV and STI co-infection [32]. In Western Europe, about 42% of syphilis cases in MSM were co-infected with HIV [33]. HIV co-infection has also been a feature of the ongoing lymphogranuloma venereum (LGV) epidemic in MSM [10].

Interpretation of trends in incident STI diagnoses across Europe has been hindered by the heterogeneity of surveillance systems, the lack of standardised case definitions, as well as different approaches to screening, testing and data collection [11].

Improvements in the reporting of homosexual behaviour over time, especially in Western Europe, may have contributed to rising diagnoses of STI among MSM presented here. At the same time underreporting of homosexual behaviour has also probably led to some underestimation of STI burden in MSM overall, particularly in Central and Eastern European countries where non-disclosure of sexual identity may be an issue [34].

The introduction of the new European Surveillance System (TESSy) at the European Centre for Disease Prevention and Control (ECDC) should help standardise and harmonise future data collection across Europe. The inclusion of data on diagnoses in MSM as part of this new standard may present challenges in some countries but will be crucial for informing STI control measures. The continuing transmission of STI in MSM is a major public health challenge facing Europe. Targeted control measures and improved monitoring of STI in this population need to be prioritised.

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References

1. Fenton KA, Lowndes CM. Recent trends in the epidemiology of sexually transmitted infections in the European Union. Sex Transm Infect. 2004;80(4):255-63.
2. Sullivan PS, Hamouda O, Delpech V, Geduld JE, Prejean J, Semaille C, et al. Reemergence of the HIV epidemic among men who have sex with men in North America, Western Europe, and Australia, 1996-2005. Ann Epidemiol. 2009;19(6):423-31.
3. Fenton KA, Imrie J. Increasing rates of sexually transmitted diseases in homosexual men in Western Europe and the United States: why? Infect Dis Clin North Am. 2005;19(2):311-31.
4. Couturier E, Michel A, Janier M, Dupin N, Semaille C, the syphilis surveillance network. Syphilis surveillance in France, 2000-2003. Euro Surveill. 2004;9(12):pii=493. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=493
5. Cowan S. Syphilis in Denmark-Outbreak among MSM in Copenhagen, 2003-2004. Euro Surveill. 2004;9(12):pii=498. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=498
6. Cusini M, Ghislanzoni M, Bernardi C, Carminati G, Zerboni R, Alessi E, et al. Syphilis outbreak in Milan, Italy. Sex Transm Infect. 2004;80(2):154.
7. Geusau A, Mayerhofer S, Schmidt B, Messeritsch E, Tschachler E. The year 2002 re-emergence of syphilis in Austria. Int J STD AIDS. 2004;15(7):496-7.
8. Marcus U, Bremer V, Hamouda O. Syphilis surveillance and trends of the syphilis epidemic in Germany since the mid-90s. Euro Surveill. 2004;9(12):pii=494. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=494
9. Hopkins S, Lyons F, Coleman C, Courtney G, Bergin C, Mulcahy F. Resurgence in infectious syphilis in Ireland: an epidemiological study. Sex Transm Dis. 2004;31(5):317-21.
10. Van de Laar MJW, Fenton KA, Ison C, on behalf of the ESSTI network. Update on the European lymphogranuloma venereum epidemic among men who have sex with men. Euro Surveill. 2005;10(22):pii=2714. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2714
11. Lowndes CM, Fenton KA, European Surveillance of STI's Network. Surveillance systems for STIs in the European Union: facing a changing epidemiology. Sex Transm Infect. 2004;80(4):264-71.
12. Ison CA, Martin IM, Lowndes CM, Fenton KA, ESSTI Network. Comparability of laboratory diagnosis and antimicrobial susceptibility testing of Neisseria gonorrhoeae from reference laboratories in Western Europe. J Antimicrob Chemother. 2006;58(3):580-6.
13. European Surveillance of Sexually Transmitted Infections (ESSTI). Sexually Transmitted Infections Surveillance in Europe. Annual Report No. 2. London: Health Protection Agency Centre for Infections; 2007. Available from: http://www.essti.org/docs/ESSTI_Surveillance_Annual_Report_2007.pdf
14. Nicoll A, Hamers FF. Are trends in HIV, gonorrhoea, and syphilis worsening in western Europe? BMJ. 2002;324(7349):1324-7.
15. Battu VR, Horner PJ, Taylor PK, Jephcott AE, Egglestone SI. Locally acquired heterosexual outbreak of syphilis in Bristol. Lancet. 1997;350(9084):1100-1.
16. Blystad H, Nilsen O, Berglund T, Blaxhult A, Aavitsland P, Giesecke J. Syphilis outbreaks in Norway and Sweden among men who have sex with men 1998-2002. Euro Surveill. 2003;7(24)pii=2241. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2241
17. De Schijver K. Syphilis outbreak in Antwerp, Belgium. Euro Surveill. 2001;5(19):pii=1754. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=1754
18. Poulton M, Dean GL, Williams DI, Carter P, Iversen A, Fisher M. Surfing with spirochaetes: an ongoing syphilis outbreak in Brighton. Sex Transm Infect. 2001;77(5):319-21.
19. Vall-Mayans M, Casals M, Vives A, Loureiro E, Armengol P, Sanz B. [Reemergence of infectious syphilis among homosexual men and HIV coinfection in Barcelona, 2002-2003]. Med Clin (Barc.). 2006;126(3):94-6.
20. van der Meijden W, van der Snoek E, Haks K, van de Laar MJ. Outbreak of syphilis in Rotterdam, the Netherlands. Euro Surveill. 2002;6(12):pii=2103. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2103
21. Hopkins S, Coleman C, Quinlan M, Cronin M. Interventions in a syphilis outbreak. Epi-Insight 2002;3(8):2-3.
22. Riedner G, Dehne KL, Gromyko A. Recent declines in reported syphilis rates in eastern Europe and central Asia: are the epidemics over? Sex Transm Infect. 2000;76(5):363-5.
23. Naaber P, Uuskula A, Naaber J, Poder A, Hjelm E, Hallen A, et al. Laboratory diagnosis of sexually transmitted infections in Estonia in 2001-2002: shortcomings with impact on diagnostic quality and surveillance. Sex Transm Dis. 2005;32(12):759-64.

24. Vagoras A, Butylkina R, Juseviciute V, Hallén A, Unemo M, Domeika M. Diagnosis of non-viral sexually transmitted infections in Lithuania and international recommendations. Euro Surveill. 2006;11(7):pii=638. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=638

25. Kent CK, Chaw JK, Wong W, Liska S, Gibson S, Hubbard G, et al. Prevalence of rectal, urethral, and pharyngeal chlamydia and gonorrhea detected in 2 clinical settings among men who have sex with men: San Francisco, California, 2003. Clin Infect Dis. 2005;41(1):67-74.

26. Morris SR, Klausner JD, Buchbinder SP, Wheeler SL, Koblin B, Coates T, et al. Prevalence and incidence of pharyngeal gonorrhea in a longitudinal sample of men who have sex with men: the EXPLORE study. Clin Infect Dis. 2006;43(10):1284-9.

27. Nicoll A, Hughes G, Donnelly M, Livingstone S, De Angelis D, Fenton K, et al. Assessing the impact of national anti-HIV sexual health campaigns: trends in the transmission of HIV and other sexually transmitted infections in England. Sex Transm Infect. 2001;77(4):242-7.

28. Berglund T, Asikainen T, Grützmeier S, Rudén AK, Wretlind B, Sandström E. The epidemiology of gonorrhea among men who have sex with men in Stockholm, Sweden, 1990-2004. Sex Transm Dis. 2007;34(3):174-9.

29. Survival after introduction of HAART in people with known duration of HIV-1 infection. The CASCADE Collaboration. Concerted Action on SeroConversion to AIDS and Death in Europe. Lancet. 2000;355(9210):1158-9.

30. Elford J, Bolding G, Davis M, Sherr L, Hart G. Trends in sexual behaviour among London homosexual men 1998-2003: implications for HIV prevention and sexual health promotion. Sex Transm Infect. 2004;80(6):451-4.

31. Stolte IG, Dukers NHTM, de Wit JBF, Fennema H, Coutinho RA. A summary report from Amsterdam: increase in sexually transmitted diseases and risky sexual behaviour among homosexual men in relation to the introduction of new anti-HIV drugs. Euro Surveill. 2002;7(2):pii=346. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=346

32. Elford J. Changing patterns of sexual behaviour in the era of highly active antiretroviral therapy. Curr Opin Infect Dis. 2006;19(1):26-32.

33. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.

34. International Lesbian and Gay Association (ILGA) Europe. Accessing Health: the Context and Challenges for LGBT People in Central and Eastern Europe. Brussels: ILGA-Europe; 2006. Available from: http://www.ilga-europe.org/content/download/4638/28034/version/3/file/HEALTHreportWWW.pdf

Disproportionate and increasing burden of HIV infection among men who have sex with men in Slovenia: surveillance data for 1999-2008

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The report presents data on HIV infection among men who have sex with men (MSM) in Slovenia during 1999-2008. HIV surveillance was based on universal mandatory reporting of HIV/AIDS cases, monitoring HIV infection prevalence among sentinel populations of MSM and STI patients and selected behaviour indicators in a sentinel population of MSM. Among 48 newly diagnosed HIV cases reported for 2008, 34 were MSM. Since 1999, the annual reported rate of HIV diagnoses in MSM rose from 7.1 to 46.8 per million men aged 15-64 years (an increase of more than six times). During 1999-2008, the proportion of MSM diagnosed with AIDS within three months of HIV diagnosis declined from 60% to 21%, however, the corresponding rate per million men aged 15-64 increased from 4.3 to 9.6. During 1999-2008, HIV prevalence among male clients of STI outpatient services tested for syphilis (including a substantial proportion of MSM) increased from 0% to 3.4%, and it remained below 5% in a sentinel population of MSM in Ljubljana. In the same sentinel population of MSM, the proportion reporting HIV test last year increased from 29% in 2003 to 38% in 2008 while the proportion reporting condom use at last anal intercourse decreased from 81% in 2004 to 66% in 2008. The burden of HIV among MSM in Slovenia is disproportionately high and increasing fast. Promotion of safer sexual behaviour and HIV testing among MSM as well as positive prevention among MSM with diagnosed HIV infection are urgently needed.

Introduction

Human immunodeficiency virus (HIV) infection remains of major public health importance in Europe [1]. The predominant mode of transmission for HIV infection in European Union (EU) and European Free Trade Association (EFTA) countries appears to be sex between men [1]. The number of newly diagnosed HIV cases reported among men who have sex with men (MSM) has recently increased throughout EU and EFTA countries [1,2]. In 23 countries with consistent data for the period from 2000 to 2006, there was an overall 86% increase in the number of reported cases of newly diagnosed HIV infection among MSM [2]. Among these countries, in those reporting at least 20 new diagnoses of HIV infection among MSM in 2006, more than doubling of cases since 2000 was observed in five countries, with the highest increase of more than three times reported from Slovenia [2].

HIV surveillance data are vital to monitor the trends of the HIV epidemic and evaluate the public health response. Comprehensive HIV surveillance including routine behavioural surveillance and HIV prevalence monitoring in addition to case-based national reporting systems for HIV and acquired immunodeficiency syndrome (AIDS) has been advocated for by the European Centre for Disease Prevention and Control (ECDC) and World Health Organization (WHO) Regional Office for Europe [1]. The main objective of the second generation HIV surveillance recommended by WHO and Joint United Nations Programme on HIV/AIDS (UNAIDS) is to monitor HIV and high-risk behaviour trends over time in order to provide essential data needed for the development of interventions and the evaluation of their impact [3,4].

During 1999-2008, HIV surveillance in Slovenia, coordinated by the National Institute of Public Health (NIPH), has been based on routine collection, analysis and interpretation of data from:

- mandatory universal reporting of newly diagnosed cases of HIV infection, AIDS and deaths among AIDS cases;
- monitoring of overall HIV diagnostic testing rates;
- monitoring of HIV infection prevalence in several easily accessible sentinel populations at higher behavioural risk: MSM, patients with sexually transmitted infections (STI) and injecting drug users (IDU); and in one population group with on average low behavioural risk: pregnant women;
- monitoring HIV infection prevalence among blood donors by collating information on mandatory testing of all donated blood or blood products; and
- monitoring selected behaviour indicators in two easily accessible sentinel populations at higher behavioural risk: MSM and IDU [5,6].

The aim of this paper is to present evidence of a disproportionate and increasing burden of HIV infection among MSM in Slovenia during the period from 1999 to 2008 using the second generation HIV surveillance data.

Methods

Case reporting

Reporting of HIV and AIDS has been mandatory in Slovenia since 1986. According to the Slovenian Communicable Diseases Act, physicians report anonymous individual data on newly diagnosed cases of HIV infection, AIDS and deaths among AIDS cases to the NIPH. European AIDS surveillance case definition has been used

[7]. SOUNDEX coding of surnames together with dates of birth were used as unique identifiers to eliminate duplicates. Information collected included transmission category; the proportion of HIV cases categorised as other/unknown was 12% in 2008 and during the last ten years varied between the highest 39% (in 1999) and the lowest 11% (in 2005 and 2007). HIV diagnosis was defined as late at CD4 cells count <350 mm^3; very late at CD4 cells count <200 mm^3; and extremely late when AIDS clinical stage was reported within three months of HIV diagnosis.

Monitoring diagnostic HIV testing

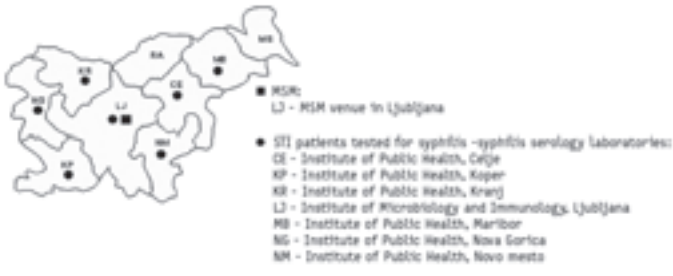
To complement and better interpret information from universal mandatory reporting of newly diagnosed cases of HIV infection, the NIPH monitored overall HIV diagnostic testing rates by annual postal surveys including all Slovenian laboratories performing HIV testing. Only information on overall absolute numbers of HIV tests performed and numbers of positive test results was collated.

Monitoring HIV infection prevalence in sentinel populations

Detailed methods for monitoring HIV prevalence in selected sentinel populations with unlinked anonymous testing (including laboratory HIV testing strategy) together with the results for the period from 1993 to 2002 have been published previously [6]. Ideally, monitoring HIV prevalence in the chosen sentinel populations should provide information with respect to all three major modes of HIV transmission: unprotected sexual intercourse with infected individuals, exposure to infected blood and infected mother-to-child [3]. At the NIPH we had chosen three sentinel populations at higher behavioural risk: MSM, STI patients tested for syphilis, and IDU entering substitution treatment and/or taking part in needle and syringe exchange harm reduction programmes. In addition, we have monitored HIV prevalence in a low risk sentinel population of pregnant women screened for syphilis, a population group which is more similar to the general population with respect to the level of risk for HIV transmission. We had decided to use unlinked anonymous testing because individuals with high-risk behaviour might be more inclined than those with lower-risk behaviour to refuse or avoid HIV testing and information on results from voluntary confidential testing might be biased [3,8]. Also, the logistics of such an approach is simple and the costs are relatively low. Here we briefly present the data collection methods for two sentinel populations, MSM and STI patients, the latter group including a substantial proportion of MSM. Figure 1 presents the geographical distribution of corresponding sentinel sites.

FIGURE 1

Sentinel sites for HIV prevalence monitoring in MSM and STI patients using unlinked anonymous testing, Slovenia, 1999-2008



MSM: men who have sex with men
STI: sexually transmitted infections

Since 1993, residual sera from specimens obtained from patients of STI outpatient services and sent for syphilis serology have been sampled continuously and consecutively in all participating syphilis serology laboratories. The second inclusion of specimens obtained from the same individuals during the same calendar year was prevented by keeping a separate list of identifying information on individuals whose sera had already been included. All specimens were labelled only with information about the type of sentinel population, sampling period, sentinel site, gender and age group, frozen and stored at -20ºC until testing.

Since 1996, one-day cross sectional studies have been repeated annually by the NIPH in collaboration with a MSM non-governmental organisation (SKUC MAGNUS: 1996-2005; Legebitra: 2006-2008) at one sentinel site, a MSM community venue in the capital city Ljubljana. Saliva specimens have been voluntarily obtained from all men attending the event for unlinked anonymous testing for HIV surveillance purposes. All specimens were labelled only with information about the type of sentinel population, sampling period, sentinel site and age group. During these events, safer sex including condom use has been promoted and information about access to voluntary confidential or anonymous counselling and HIV testing has been provided.

Monitoring selected behaviour indicators

Since 2000, the NIPH has added a behavioural surveillance component to the HIV prevalence monitoring with unlinked anonymous testing in the sentinel population of MSM at a community venue in Ljubljana. All men participating and contributing a saliva specimen have also been invited to anonymously complete a short self-administered questionnaire. Behavioural data collected included information on condom use at anal sex, number of male partners and HIV testing during the year preceding the survey.

Results

Of a total of 48 newly diagnosed HIV infection cases reported for 2008 (23.5/million population), 34 cases, representing more than two thirds, were MSM. Since 1999, the annual reported rate of newly diagnosed HIV cases in MSM raised from 2.5 to 16.7 per million general population (Figure 2), which corresponds to 7.1 and 46.8 per million men 15-64 years old, an increase of more than six times. The overall increase in the number of newly diagnosed HIV cases in Slovenia during recent years has been due almost exclusively to the increase in new diagnoses among MSM.

During the same period, the proportion of MSM presenting with AIDS defining illness within three months of HIV diagnosis declined from 60% to 21% and the proportion of MSM with CD4 cells count <200/mm^3 at HIV diagnosis declined from 80% to 32% (Figure 3). However, the rate of extremely late diagnosis (AIDS within three months of HIV diagnosis) increased from 4.3 cases per million men 15 to 64 years old in 1999 to 9.6 cases per million men 15 to 64 years old in 2008 and the rate of very late diagnosis (presenting with CD4 cells count <200/mm^3) increased from 5.7 cases per million men 15 to 64 years old in 1999 to 15.1 cases per million men 15 to 64 years old in 2008.

In 2008, AIDS was diagnosed in seven MSM and in all seven cases clinical AIDS diagnosis was within three months of first HIV

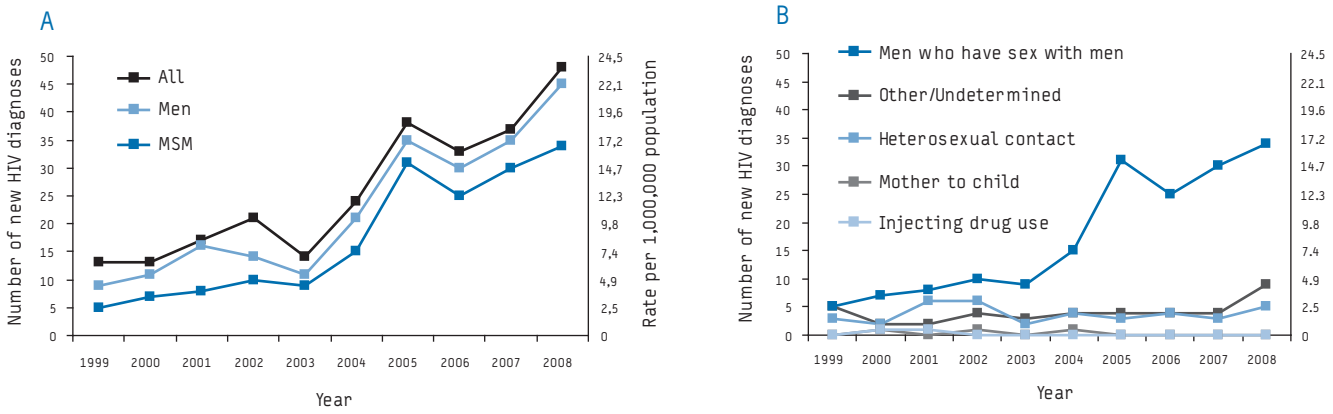
diagnosis. During the period from 1999 to 2008, the reported rates of AIDS diagnoses in MSM varied from 1.4 per million men 15 to 64 years old (in 2002) to 9.6 per million men 15 to 64 years old (in 2008). In 2008, death was reported for two MSM living with AIDS. During the period from 1999 to 2008, the corresponding death rates in MSM varied from 0 per million men 15 to 64 years old (in 2005 and 2006) to 2.9 per million men 15 to 64 years old (in 1999).

Overall HIV diagnostic testing rates (excluding unlinked anonymous testing for surveillance purposes and testing of all donations for blood and blood products safety purposes) remained relatively low during the last ten years, although an increase from 8.5 tests per 1,000 population in 1999 to 15.3 tests per 1,000 population in 2008 was observed. Overall, there were two positive test results per 1,000 HIV tests in 2008.

Some insight into recent changes in HIV testing uptake and sexual behaviour among MSM is provided by our sentinel behavioural surveillance in small convenience venue-based annual samples of MSM in Ljubljana. The proportion of MSM reporting an HIV test during the year preceding the survey increased from 29% in 2003 to 38% in 2008, suggesting a slight improvement in HIV testing uptake in this particular sentinel population (Figure 4). Overall, our data on selected sexual behaviour indicators for the period from 1999 to 2008, do not suggest a major deterioration

Figure 2

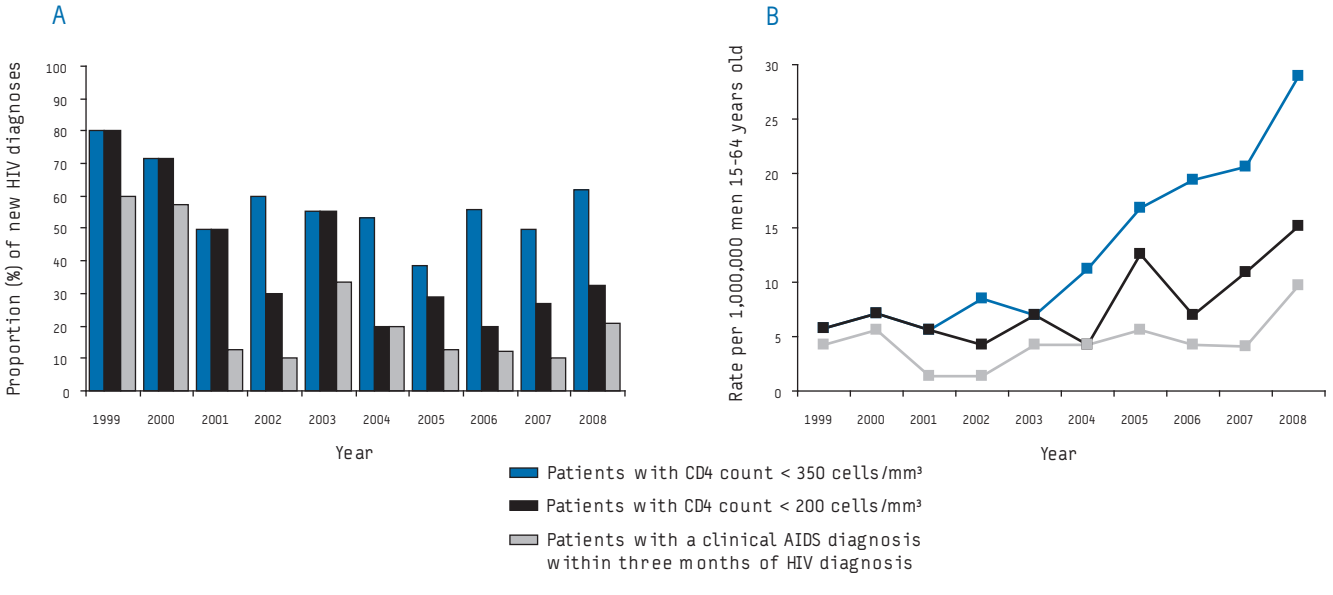
Newly diagnosed cases of HIV infection in Slovenia, 1999-2008: A) overall, among men, among MSM; B) according to transmission category



MSM: men who have sex with men

Figure 3

Late diagnosis of HIV infection among MSM, Slovenia, 1999-2008



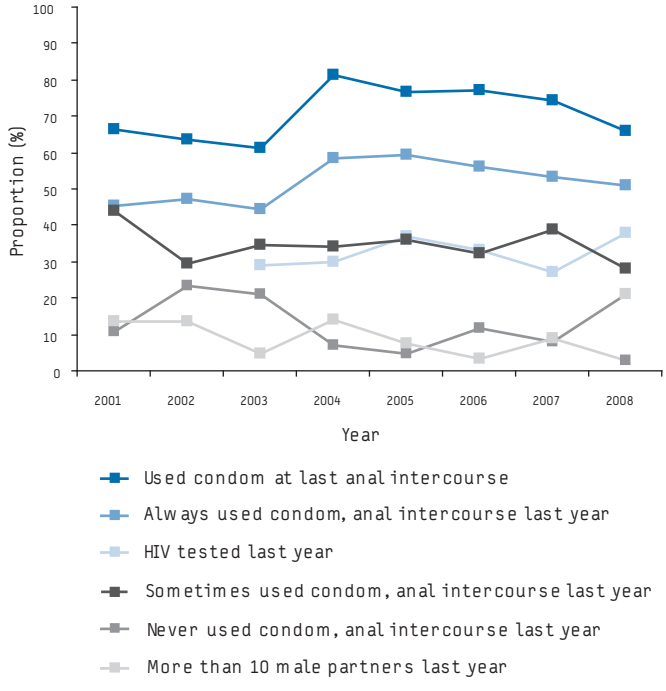
MSM: men who have sex with men

of safe sexual behaviour in this particular sentinel population of MSM. The proportion of MSM reporting 10 or more male partners during the year preceding the survey has remained below 10% since 2005 and since 2004 at least half of MSM have reported to have always used a condom at anal intercourse during the year preceding the survey. However, in 2008, the proportion of MSM who reported to have never used a condom at anal intercourse during the year preceding the survey raised above 20% after being below 20% since 2004 and the proportion of MSM reporting to have used a condom during the most recent anal intercourse decreased from 81% in 2004 to 66% in 2008, suggesting a recent slight deterioration in safe sexual behaviour among MSM in this particular sentinel population in Ljubljana.

During the period from 1999 to 2008, the prevalence of HIV in a national convenience sample of male clients of STI outpatient services tested for syphilis increased from 0% in 1999 to 3.4% in 2008 (Table). A substantial proportion of male clients of STI outpatient services in Slovenia are MSM and early syphilis cases among MSM, including MSM with known HIV infection, represented a substantial proportion of all early syphilis diagnoses during recent years (data not shown) [9]. During the same period, the prevalence of HIV infection among female clients of STI outpatient services tested for syphilis remained below 1% and the prevalence of HIV infection consistently remained below 5% in a sentinel population of MSM in Ljubljana. For comparison, the prevalence of HIV infection among convenience samples of pregnant women screened for syphilis during the same period (sample sizes varied from the smallest 6,900 sera in 1999 to the largest 8,963 sera in 2007) varied from 0% (years: 2001, 2003, 2007) to 0.01% (years: 1999, 2005).

FIGURE 4

Selected behavioural indicators in venue-based convenience samples of MSM, Ljubljana, Slovenia, 2001-2008



Note: The size of convenience samples of MSM recruited in 2001-2008 ranged from 68 in 2006 to 124 in 2008 (average: 89). The proportions shown in the Figure are based on the number of responses to individual questions (range: 59-124)

MSM: men who have sex with men

Discussion and conclusion

The burden of HIV among MSM in Slovenia is disproportionately high and increasing fast. HIV cases among MSM represent the greatest proportion among all new HIV diagnoses and the substantial increase in the number of newly diagnosed HIV cases during recent years has been due almost exclusively to the increase in new diagnoses among MSM.

The former European Centre for the Epidemiological Monitoring of HIV/AIDS (EuroHIV) compared the annual burden of new HIV diagnoses among MSM calculated per 100,000 men 15 to 64 years old for European countries for the year 2006 [2]. For three countries these rates were above 100 per 100,000, for 10 countries between 50 and 100 per 100,000 and for 14 below 50 per 100,000. Slovenia with the rate of 35 newly diagnosed HIV cases in MSM per 100,000 men aged 15-64 in 2006, was in the third group. However, an analysis of trends in these reported rates for 23 countries with consistent HIV reporting systems showed an overall increase in 2006 in comparison to 2000 of 86% while for Slovenia the corresponding increase was 260%.

Our national HIV surveillance data suggest that the recent increase in the reported numbers of newly diagnosed HIV cases among MSM in Slovenia may at least in part reflect a true increase in HIV incidence in this group and some deterioration of safer sex behaviour.

Some insight into recent changes in sexual behaviour among MSM is provided by our sentinel behavioural surveillance in small convenience venue-based annual samples of MSM in Ljubljana. Both the proportion of MSM who reported to have never used a condom at anal intercourse during the year preceding the survey and the proportion of MSM reporting to have not used a condom during the most recent anal intercourse increased in 2008, suggesting some deterioration of safe sexual behaviour among MSM in this particular sentinel population in Ljubljana. Recent increases in overall early syphilis reported rates in Slovenia (in 2008 increase of 130% compared with 2007), with great majority of cases occurring in men (94%) and among cases in men a substantial proportion of cases among men known to have sex with men (44%) and among those almost one in three with a foreign MSM partner within three months preceding syphilis diagnosis, suggest recent increase in unsafe sexual behaviour among MSM and sexual mixing of Slovenian MSM with MSM abroad [9]. Most worrying, two in three early syphilis cases reported in 2008 among MSM were men with known HIV infection, indicating unsafe sexual behaviour among HIV-positive MSM aware of their infection [9].

The overall HIV diagnostic testing rates in Slovenia have been relatively low in comparison to most EU countries [1], however it is not only important how many individuals are tested but also who is tested. The very simple method we use for monitoring national overall HIV testing rates does not provide data for understanding HIV testing rates in different patient groups (e.g. patients with tuberculosis or STI) or uptake of HIV testing in groups with different behavioural risk (e.g. MSM or IDU). So we do not have reliable information about whether HIV testing uptake has recently increased among MSM. However, our sentinel behavioural

surveillance in small convenience venue-based annual samples of MSM in Ljubljana provides some insight into recent changes in HIV testing uptake and the data suggest a possible slight increase in HIV testing uptake in this particular sentinel population of MSM.

Relatively low reported AIDS incidence and mortality among MSM with AIDS in Slovenia can be attributed to universal access to treatment and care including highly active antiretroviral treatment (HAART) introduced after 1996. However, although our surveillance data for the last 10 years show a reduction in the proportion of extremely late HIV diagnoses (AIDS diagnosis within three months) among MSM, at least half of HIV infections diagnosed annually among MSM with the exception of year 2005, were late (CD4 cell count below 350/mm^3), indicating that we have been missing opportunities for early treatment of HIV infection and positive prevention among MSM.

Our national HIV surveillance system with different components including behavioural surveillance and HIV prevalence monitoring in high-risk behaviour sentinel populations such as MSM and STI patients in addition to case-based national reporting systems for HIV and AIDS provides fairly good information about the distribution, trends in time and potential spread of HIV infection in Slovenia with rather modest investment of resources. It also provides public health decision makers with some insight into how successful HIV prevention, treatment and care interventions have been. The strengths of our monitoring of HIV infection prevalence in easily accessible sentinel populations of STI patients and MSM and monitoring selected behaviour indicators in a sentinel population of MSM in Ljubljana are minimal participation bias, anonymity, feasibility, sustainability and relatively low costs. The limitations include very small sample sizes to reliably monitor prevalence change and non-availability of additional risk behavioural information (e.g. history of sharing injecting equipment among MSM). We should be very cautious when inferring about the distribution and spread of HIV infection among all MSM and STI patients in Slovenia, as these easily accessible sentinel populations are not representative for all MSM and STI patients. Also the validity of self-reported behavioural data can always be questioned, but, if this bias does not change with time, such an approach is good for monitoring trends in self-reported behaviour among MSM. Overall, the results of our second generation HIV surveillance system are very informative and enable crude monitoring of trends in prevalence of HIV and selected behaviour indicators and early warning.

The burden of HIV among MSM in Slovenia is disproportionately high and increasing fast. Prevention and control of HIV and STI among MSM largely depends on supporting safe sexual behaviour among MSM, promoting uptake of HIV testing, and promoting HIV and STI healthcare seeking behaviour. Also, understanding sexual behaviour and needs of MSM with diagnosed HIV infection and positive prevention interventions among MSM are urgently needed.

Table

HIV infection prevalence among MSM and STI patients, results of unlinked anonymous testing for surveillance purposes, Slovenia, 1999-2008

	Year	Number of sentinel sites	Number of tested individuals		Number of infected individuals		Proportion of infected individuals	
			Male	Female	Male	Female	Male	Female
MSM	1999	1	120		2		1.7 %	
	2000	1	132		4		3.0 %	
	2001	1	101		3		3.0 %	
	2002	1	113		0		0 %	
	2003	1	101		1		0.9 %	
	2004	1	79		2		2.5 %	
	2005	1	82		3		3.7 %	
	2006	1	94		2		2.1 %	
	2007	1	124		3		2.4 %	
	2008	1	137		3		2.2%	
STI patients	1999	5	305	153	0	0	0 %	0 %
	2000	6	279	107	0	0	0 %	0 %
	2001	6	147	83	0	0	0 %	0 %
	2002	7	334	201	1	1	0.3 %	0.5 %
	2003	7	267	200	1	0	0.4 %	0 %
	2004	7	328	148	5	0	1.5 %	0 %
	2005	7	403	170	1	1	0.2 %	0.6 %
	2006	7	419	211	10	0	2.4 %	0 %
	2007	7	484	257	11	0	2.3 %	0 %
	2008	7	677	264	23	2	3.4 %	0.8 %

MSM: men who have sex with men
STI: sexually transmitted infections

Finally, preventive responses targeted to MSM at the national level only may not be enough. MSM are highly mobile and there is substantial sexual mixing also between countries. Preventive interventions for MSM should probably be synchronised at the EU level and coverage, quality and impact of these programmes should be monitored on international level.

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References

1. European Centre for Disease Prevention and Control, World Health Organization Regional Office for Europe. HIV/AIDS surveillance in Europe 2007. Stockholm: European Centre for Disease Prevention and Control; 2008. Available from: http://ecdc.europa.eu/en/publications/publications/0812_sur_hiv_aids_surveillance_in_europe.pdf
2. Likatavicius G, Klavs I, Devaux I, Alix J and Nardone A. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000-6: implications for a European public health strategy. Sex Transm Inf. 2008;84(6);499-505.
3. World Health Organization (WHO) and Joint United Nations Programme on HIV/AIDS (UNAIDS). Guidelines for second generation surveillance. Geneva: WHO; 2000. Available from: http://www.emro.who.int/gfatm/guide/tools/unaidssurveillance/unaidssurveillance.pdf
4. World Health Organization (WHO) and Joint United Nations Programme on HIV/AIDS (UNAIDS). Initiating second generation HIV surveillance systems: practical guidelines. Geneva: UNAIDS; 2002. Available from: http://www.who.int/hiv/pub/surveillance/en/isbn9291732192.pdf
5. Klavs I, Bergant N, Kastelic Z, Kustec T. [HIV infection in Slovenia]. Ljubljana: National Institute of Public Health; 2009. Slovene. Available from: http://www.ivz.si/javne_datoteke/datoteke/1952-HIV_letno2008.pdf
6. Klavs I, Poljak M. Unlinked anonymous monitoring of human immunodeficiency virus prevalence in high- and low-risk groups in Slovenia, 1993-2002. Croat Med J. 2003;44(5):545-549.
7. European Centre for the Epidemiological Monitoring of AIDS. 1993 revision of the European AIDS surveillance case definition. AIDS surveillance in Europe. Quarterly Report No. 37. Paris: Institut de Médicine et d'Epidemiologie Africaines; 1993. Available from: http://www.eurohiv.org/reports/report_37/aids_euro_definition_eng.pdf
8. Hull HF, Bettinger CJ, Gallaher MM, Keller NM, Wilson J, Mertz GJ. Comparison of HIV antibody prevalence in patients consenting to and declining HIV-antibody testing in an STD clinic. JAMA. 1988;260(7):935-8.
9. Klavs I, Bergant N, Kastelic Z, Kustec T. [Sexually transmitted infections in Slovenia]. Ljubljana: National Institute of Public Health; 2009. Slovene. Available from: http://www.ivz.si/javne_datoteke/datoteke/930-SPO_letno2008.pdf

HIV infections and STI co-infections in men who have sex with men in Belgium: sustained increase in HIV diagnoses

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Belgium is currently experiencing an upward trend in the number of new HIV diagnoses characterised by a continuous increase in the number of cases among men who have sex with men (MSM). Based on surveillance data, in the past decade the yearly number of newly diagnosed HIV cases in MSM increased more than threefold, from 101 cases diagnosed in 1999 to 332 cases in 2008. During this period, the majority of new HIV infections in MSM were diagnosed among Belgians citizens (72%), followed by other European nationalities (13%). The increase in HIV diagnoses does not reflect an increase in HIV testing since the number of tests performed nationwide remained remarkably stable over time. The steady increase in the number of newly diagnosed HIV cases among MSM, and the high proportion of MSM among HIV-positive patients co-infected with other sexually transmitted infections (STI) (95.6% in 2008) indicate increases in unsafe sex practices in this group. Development of behavioural surveillance and more qualitative research on reasons for unsafe sex are needed in order to develop more effective prevention strategies.

Introduction

Re-emergence of the HIV epidemic and continuous high notification rates of newly diagnosed HIV cases in men who have sex with men (MSM) have been observed in many Western European countries. [1-7] Diagnoses of concurrent other sexually transmitted infections (STI) have also increased substantially. In this paper, based on surveillance data collected by the Unit of Epidemiology at the Scientific Institute of Public Health in Brussels, we describe the trends and epidemiological features of HIV and STI among MSM in Belgium.

Methods

HIV infection

The total number of screening tests was provided by the National Institute for Sickness and Invalidity Insurance (INAMI-RIZIV) based on reimbursement figures. HIV testing is widely available and used in Belgium. People may seek HIV testing from their general practitioner, a hospital or a family planning centre.

All serums with positive screening test results are submitted for confirmation to one of the seven AIDS Reference Laboratories. For each confirmed test, a form is sent to the patient's clinician. Based on biology results and information collected at the consultation, the clinician provides data on age, sex, nationality, residence, sexual orientation, probable mode of HIV transmission and CD4 count at the time of HIV diagnosis. Data are validated for duplicate recording and included in a HIV database maintained at the Scientific Institute of Public Health in Brussels since 1985. In 1990, HIV and AIDS databases were integrated.

Sexually transmitted infections

Data on co-infections of HIV and other STI in MSM were collected from the Belgian AIDS Reference Centres. These centres are specialised in STI/HIV counselling and treatment. Seven of the nine medical Centres participate since the beginning of 2007 in the ongoing surveillance of STI. The reported STI included chlamydia, gonorrhoea, syphilis, lymphogranuloma venereum (LGV), hepatitis B virus infection (HBV) and sexually acquired hepatitis C virus infection (HCV). In the surveillance system, only recent, active syphilis infections have to be reported; no information on stage of disease is collected. For hepatitis B and C, only acute infections have to be reported. In order to minimise the workload for the voluntarily participating physicians, no information on the laboratory testing results is collected.

Statistical methods

Stata 10 (Statacorp, College Station, Texas, US) was used for analysis and proceeding. Logistic regression was used to analyse factors for late HIV diagnosis.

Results

HIV infection

In 2008, there were 1,079 persons newly diagnosed with HIV in Belgium. This is the highest number ever reported. During the

Figure 1

Newly diagnosed HIV infections per million population in Belgium, 1985-2008

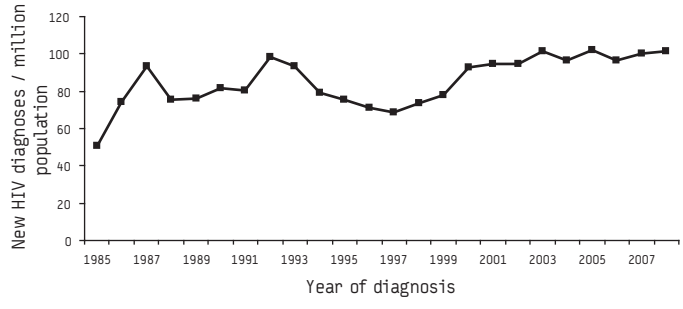


Figure 2

Newly diagnosed HIV cases per mode of transmission, Belgium, 1997-2008

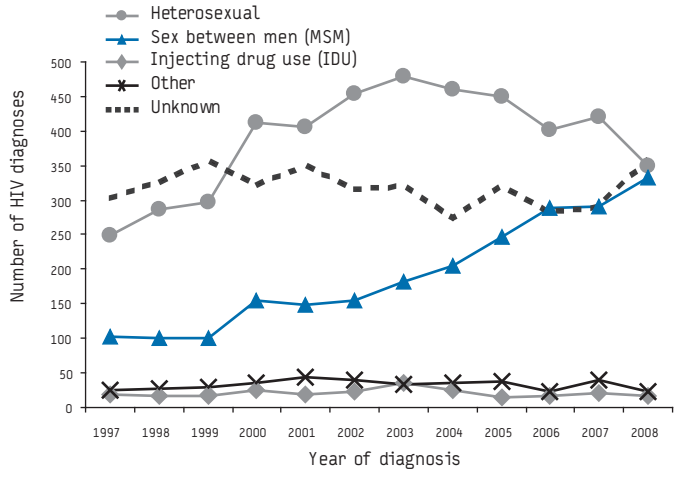
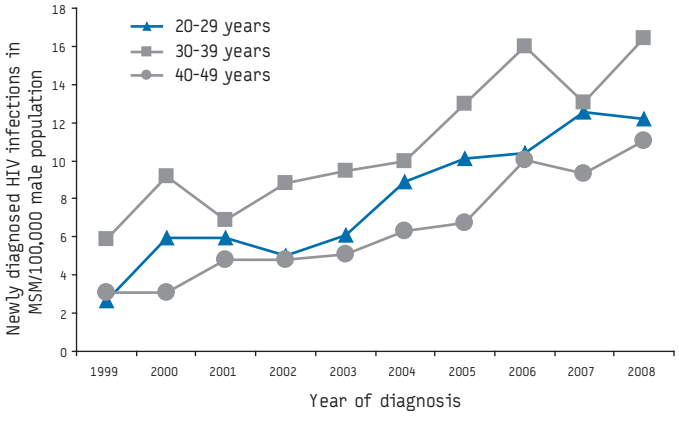


Figure 3

Newly diagnosed HIV infections in men who have sex with men (MSM) per 100,000 population in the respective male age groups in Belgium, 1999-2008



period 2003-2008, a plateau was observed; the rate of newly diagnosed cases of HIV infection fluctuated between 96 and 102 per million population (Figure 1). Before this plateau phase, the rate of newly diagnosed cases had increased by 47%, from 69 per million in 1997 to 101 per million in 2003.

In the past decade, the yearly number of new HIV diagnoses in MSM increased by 228%, from 101 cases diagnosed in 1999 to 332 cases in 2008 (Figure 2). The proportion of MSM among all newly diagnosed HIV cases for whom the probable transmission mode was known increased from 23% in 1999 to 46% in 2008. During the same period, the trend in new HIV diagnoses in heterosexuals was reversed: in a first phase the yearly number of new diagnoses increased by 61%, from 298 cases diagnosed in 1999 to 480 cases in 2003; in a second phase, this number decreased by 27% to 350 cases diagnosed in 2008 (Figure 2).

In 2008, almost half of HIV diagnoses were in MSM (46%), even if heterosexual transmission remained the predominant reported mode of infection (48%). Only 2% of patients were infected by intravenous drug use. Transmission mode data were available for approximately 70% of new diagnoses.

During the period 1999-2008, increasing rates of newly diagnosed HIV cases in MSM per 100,000 male population were observed among all age groups: the rate in age group 20-29 years increased by a factor 4.5, and the rates in age groups 30-39 years and 40-49 years by factors 2.8 and 3.5 respectively (Figure 3). The median age of MSM at time of diagnosis remained constant. For the period 1999-2008, the median age was 37 years.

The majority of new HIV infections in MSM were diagnosed among Belgians citizens (72%), followed by other European nationalities (13%). Among new diagnoses in heterosexuals, 59% were patients from sub-Saharan Africa, and 27% were of Belgian nationality (Figure 4).

Surveillance data suggest that HIV testing behaviour evolved in MSM and that significant improvement was made regarding early HIV diagnosis during the last years. A steady and significant increase of CD4 count at HIV diagnosis was observed between 2001

Figure 4

Nationality of newly diagnosed HIV cases in Belgium, 1997-2008

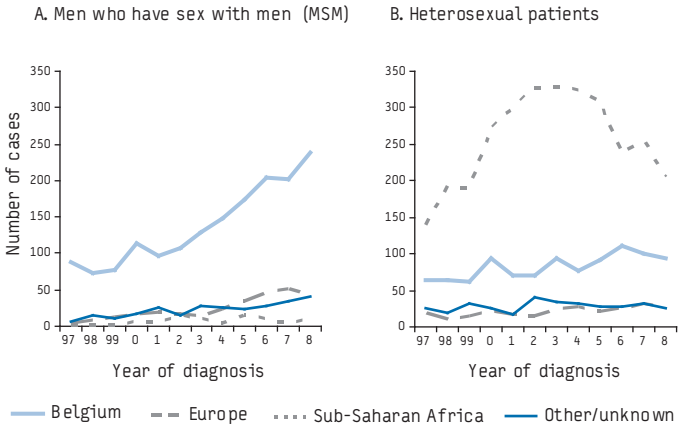
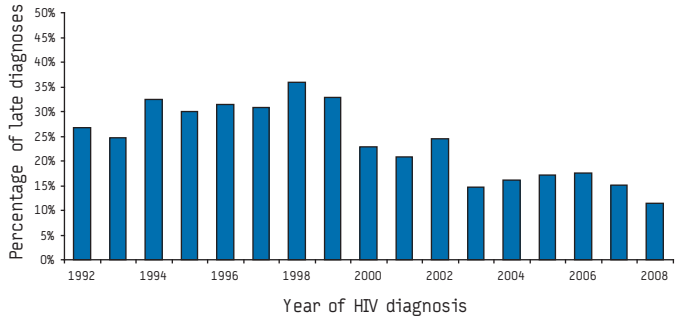


Figure 5

Proportion of late HIV diagnoses among men who have sex with men (MSM) in Belgium, 1992-2008



Late diagnosis defined as CD4 <200mm³ at HIV diagnosis or AIDS diagnosed within three months of the HIV

and 2008, suggesting that HIV infections were diagnosed earlier in recent years. The mean CD4 count at HIV diagnosis among MSM was 526 in 2008 versus 395 in 2001 (p<0.001).

Furthermore, the proportion of late HIV diagnoses (defined as CD4 cell count < 200 per mm^3 at diagnosis or AIDS diagnosed within three months) among MSM significantly decreased over time (Figure 5). In a multivariate analysis controlling for time of diagnosis and nationality, older age was independently associated with late HIV diagnosis (p<0.001).

HIV testing

An average of 56 HIV tests per 1000 population are performed nationwide yearly, excluding tests related to blood donations. The number of tests performed remained remarkably stable over time, varying between 51 and 57 HIV screening tests per 1,000 individuals per year during the period 1997-2008.

Sexually transmitted infections

For 2008, seven of the nine AIDS Reference Centres reported 267 episodes of STI diagnosed in 241 MSM living with HIV. MSM represented 95.6% of all HIV-positive patients reported with a new STI episode in these centres for 2008 (Table). In 215 cases, patients were aware of their HIV status at the time of the STI consultation. In 26 cases (10.8%), HIV infection was diagnosed at the STI consultation.

Among 162 syphilis diagnoses, 67 (41.4%) were reported as re-infections. In 26 patients (10.8%), two STI other than HIV were diagnosed at the same time. Syphilis was associated with chlamydia in eight cases, with LGV in six cases, with HCV in three cases and with gonorrhoea in one case. Gonorrhoea was associated with chlamydia in five cases and with LGV in three cases.

Discussion

After years of steady decrease, from 1997, a reverse has been observed in the number of newly diagnosed HIV infections in Belgium [7].

In 2008, the number of reported new HIV diagnoses among MSM was higher than ever since the beginning of the epidemic, including among young MSM. The increasing trend in Belgian MSM was continuous from 1999 until 2008, while the numbers reported in heterosexuals of sub-Saharan origin seem to decrease in recent years.

Changes in HIV testing may influence trends in HIV diagnoses [8]. In Belgium however, the increase in HIV diagnoses does not reflect an increase in HIV testing since the number of tests performed nationwide has remained remarkably stable over time. On the other hand, increasing trends may partially reflect changes in the targeting of most at-risk groups during the period 1997-2008, as suggested by the fact that MSM are diagnosed earlier in recent years. Testing promotion campaigns focused on MSM have been launched in recent years.

The steady increasing trend in newly diagnosed HIV infections among MSM, and the high rate of co-infections with other STI are worrying [9-10]. In 2008, in 11% of HIV-positive MSM co-infected with STI reported by the participating AIDS Reference Centres, HIV seropositivity was discovered following the STI consultation. This finding underlines the importance of offering an HIV test to patients presenting with a STI.

These observations corroborate recent studies indicating increasing prevalence of sexual risk behaviour among MSM, including those who are aware of their HIV-positive status. A survey in the French Community of Belgium carried out in 2004 and 2005 among 942 MSM pointed out that although the majority of the respondents mentioned a high level of protection during anal intercourse, a quarter of respondents had at least one unprotected anal intercourse in the last year with a partner whose status was unknown or different from their own [11]. Moreover, HIV-positive men and men who were not sure about their HIV status, were found to be more likely to admit unprotected anal intercourses [11]. In the Flemish Community of Belgium, 1,793 MSM completed an internet questionnaire in 2007; this study found a higher rate of STI infections among HIV-positive MSM compared to HIV-negative MSM. The characteristics associated with sexual risk behaviour in this study were drug use, lower educational level, lower score on mental health, less social support, more sensation seeking and more sex partners [9].

It is essential to adapt and to reinforce prevention interventions aimed at risk groups. The survey conducted in the French Community showed that knowledge of ways of transmission and treatment of HIV among respondents was good, nevertheless many engaged in high-risk sexual practices. Hence, while providing information on HIV and STI remains necessary, it is not sufficient and has to be combined with other preventive interventions. Development of behavioural surveillance and more qualitative research on reasons why people practise unsafe sex are needed in order to develop more effective prevention strategies.

Table

Sexually transmitted infections (STI) diagnosed in HIV-positive men who have sex with men (MSM) in Belgium, 2008

STI diagnoses	Number of episodes
Syphilis	162
Chlamydia	29
Gonorrhoea	29
Lymphogranuloma venereum (LGV)	31
Hepatitis C (HCV)	14
Hepatitis B (HBV)	2
Total*	267

*Total number of STI episodes diagnosed in 241 MSM living with HIV

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References

1. EuroHIV. HIV/AIDS Surveillance in Europe. End-year report 2006. Saint-Maurice: Institut de veille sanitaire; 2007. Available from: http://www.eurohiv.org/reports/report_75/pdf/report_eurohiv_75.pdf
2. Sullivan PS, Hamouda O, Delpech V, Geduld JE, Prejean J, Semaille C, et al. Reemergence of the HIV epidemic among men who have sex with men in North America, Western Europe, and Australia, 1996-2005. Ann Epidemiol. 2009;19(6):423-31.

3. Rice B, Nardone A, Gill N, Delpech V. Continuing high levels of HIV diagnoses in men who have sex with men in the United Kingdom. Euro Surveill. 2008;13(14):pii=8085. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=8085

4. Marcus U, Voss L, Kollan C, Hamouda O. HIV incidence increasing in MSM in Germany: factors influencing infection dynamics. Euro Surveill. 2006;11(9):pii=645. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=645

5. Gebhardt M. Recent trends in new diagnoses of HIV infections in Switzerland: probable increase in MSM despite an overall decrease. Euro Surveill. 2005;10(49):pii=2850. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2850

6. op de Coul EL, de Boer IM, Koedijk FD, van de Laar MJ, Stichting HIV Monitoring (HIV Monitoring Foundation), SOA Peilstation (STI sentinel surveillance network), et al. HIV and STIs increasing in the Netherlands according to latest surveillance data. Euro Surveill. 2006;11(7):pii=2901. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2901

7. Sasse A, Liesnard C, Van der Groen G, Burtonboy G, Plum J, Sondag-Thull D, et al. Recent increase in diagnoses of HIV infections based on surveillance data system in Belgium. AIDS. 2000;14(17):2798-800.

8. Dougan S, Elford J, Chadborn TR, Brown AE, Roy K, Murphy G, et al. Does the recent increase in HIV diagnoses among men who have sex with men in the UK reflect a rise in HIV incidence or increased uptake of HIV testing? Sex Transm Infect 2007;83(2):120-5.

9. Defraye A, Sasse A. SOA surveillance system via een peilnetwerk van clinici in België. Jaarrapport 2008. [STI surveillance system via a sentinel network of clinicians in Belgium. Annual report 2008]. Scientific Institute of Public Health, Unit of Epidemiology: Brussels; 2009.

10. Pelgrom JM, Vogelaers D, Colle I. Hepatitis C-seroconversion within three to six months after having contracted clinical syphilis and/or lymphogranuloma venereum rectitis in five homosexually active, HIV seropositive men. Acta Clin Belg. 2008;63(5):335-8.

11. Martens V, Huynen P. Knowledge and behaviour of men who have sex with men towards HIV/AIDS in the French Community of Belgium. Arch Public Health. 2006;64:13-26.

Recently acquired HIV infection in men who have sex with men (MSM) in France, 2003-2008

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An increase in the number of new HIV diagnoses among men who have sex with men (MSM) was observed in several countries in the early 2000s. In this article, we explore the trends among MSM in France between 2003 and 2008. To estimate the number of MSM newly diagnosed with HIV, we take into account the reporting delay, underreporting and missing data for HIV case notification. To identify recent infections (RI) (acquired an average of six months before diagnosis), we used an enzyme immunoassay for recent HIV-1 infections (EIA-RI) which has been performed routinely for new HIV diagnoses since 2003. Multivariate analysis was used to identify factors associated with RI. We estimate that between 1,900 and 2,400 MSM have been newly diagnosed with HIV every year: the proportion of MSM among all newly diagnosed with HIV cases has increased from 25.2% (95% confidence interval (CI): 23.3-27.1) in 2003 to 37.0% (95% CI: 35.2-38.7) in 2008 and was stable during the period 2006-2008. In 2008, the rate of newly diagnosed HIV cases per 10,000 MSM living in France was 72.5. The proportion of non-B subtypes of HIV-1 among cases diagnosed in MSM was 11.7% (2003-2008). The assessment of RI was performed for 4,819 MSM newly diagnosed with HIV in 2003-2008. Of these, 47.6% (95%CI = 46.2-49.0) (2,295 cases) were shown to have been recently infected. The risk of RI was greater for those of French nationality (adjusted odds ratio (aOR) =1.6 [95% CI: 1.4-1.9]), those with high economic status (aOR =1.4 [95% CI: 1.2-1.8]), those tested after a risk exposure (aOR =1.6[95% CI: 1.3-1.8]) or after presenting with clinical symptoms or abnormal biological markers (aOR =1.8 [95% CI: 1.5-2.0]), those who had tested for HIV three or more times during their lifetime (aOR =4.2 [95% CI: 3.4-5.2]) and those living in the Paris area (aOR =1.2 [95% CI: 1.0-1.3]). The risk of RI decreased with age. The HIV situation among MSM living in France is a cause of concern, despite the prevention campaigns dedicated to this highly educated sub-population.

Introduction

Men who have sex with men (MSM) were one of the largest groups of reported AIDS cases until 1999 in France. In the early 1990s, MSM in most countries adopted strategies for reducing the risk of HIV transmission. But since 1996, an increase in sexual risk practices has been observed in North America, Australia and most Western European countries [1-4]. An increase in frequency of unprotected anal intercourse (UAI) was observed for the first time in France in 2000, through the "Enquête Presse Gay" (EPG survey), a behavioural survey that has been conducted since 1985 among readers of the gay press in France (increase of UAI in the last 12 months with a casual partner from 19% to 26% between 1997 and 2000) [5]. The increase of sexual risk practices among MSM may have an impact on the incidence of sexually transmitted infections (STI), including HIV.

In this article, we analyse trends and characteristics of MSM newly diagnosed with HIV from 2003 to the end of 2008 in France and describe factors associated with recent infection (RI) defined as HIV transmission in the last six months preceding diagnosis [6].

Materials and methods

New HIV diagnoses

Case reporting of HIV infection became mandatory in France in early 2003 [7]. All laboratories must notify all new HIV diagnoses anonymously, and practitioners must provide clinical information. The following variables are collected and entered into the national database: sex, age, country of birth, current nationality, region of residence, mode of transmission, socio-professional category, clinical stage at the time of HIV diagnosis (primary infection, asymptomatic stage, symptomatic non-AIDS stage, AIDS stage), number of previous HIV tests and reasons for HIV screening (such as exposure to HIV, clinical symptoms or abnormal biological markers, routine testing). Information on 'primary infection' is reported by clinicians independently of the test result of recent infection. The data presented here are for diagnoses made between 1 January 2003 and 31 December 2008. The MSM category is compared with male heterosexuals when we describe characteristics in terms of age, clinical stage, socio-professional category, region of residence, reason for screening and testing frequency.

The estimated proportion of cases not reported per estimated total number of newly diagnosed HIV cases varied from 44% in 2003 to 29% in 2008, depending on the year of diagnosis. The methodology is described in details in previous published articles [8,9]. In this article, the underreporting rate and the reporting delay are taken into account when presenting the trends in MSM and the estimated numbers of new HIV diagnoses. Moreover, some crucial data (such as unknown mode of transmission or unknown current nationality) were missing for some cases. We used a multiple imputation method (ICE-STATA 9) to estimate missing data when we presented trends over time among MSM [10,11].

To estimate the rate of new HIV diagnoses per 10,000 MSM, we used an estimated number of MSM living in France in the denominator. This estimate is based on the results from a national survey on sexual practices conducted in 2005 (the definition used for MSM was "reported sexual intercourse with a man in the last 12 months")[12]. Based on this survey, the estimated number of MSM is 330,000 men, representing 1.6% of the male population in France.

Virological surveillance

Virological surveillance (VS) based on voluntary participation by both microbiologists and patients (the patient's consent is obtained by the reporting clinician through the HIV notification form) was implemented at the same time as the HIV case reporting system and described in detail in a previous publication [7]. For each case, the laboratories were asked to take a dried serum spot (DSS) from the stored serum sample and send it to the National Reference Center (NRC), to determine the type, group and subtype of HIV by serotyping and to perform a test for RI (EIA-RI) [6,13,14]. The RI assessment was done by an EIA-RI assay able to identify infections acquired less than six months before obtaining the sample. Similar to the various avidity assays, in the initial design of the EIA-RI, the cut-off for recently acquired infection was at 180 days and the biomarkers' threshold was estimated retrospectively [14]. Results from the NRC were linked to the epidemiological data in the HIV national database. Individuals diagnosed during the first half of 2003 were excluded because the virological surveillance was implemented progressively in early 2003.

Statistical analyses

Percentages were compared with the chi-squared test for raw data and by confidence interval for the data which have been corrected by multiple imputation. The threshold of significance was set at 5%. To identify factors associated with RI, we used multiple logistic regression (using backward procedure) including all variables that were significant in a univariate analysis; the Wald test was used for categorical variables. The goodness of fit of the resulting model was tested according to the Hosmer–Lemeshow test. SAS software version 9.1 was used for all analyses.

Results

Trends in newly diagnosed HIV cases among MSM

The proportion of new HIV diagnoses with missing information on mode of transmission was 31.2% for the study period 2003-2008. When the multiple imputation method is applied and underreporting is taken into account, MSM account for 32.0% and male heterosexuals for 28.3% of all new HIV diagnoses reported between 2003 and 2008. Sex between men was reported for more than 50% of male cases newly diagnosed with HIV every year and we estimate that between 1,900 and 2,400 MSM were diagnosed every year (1,858 in 2003; 2,059 in 2004; 2,288 in 2005; 2,409 in 2006; 2,340 in 2007 and 2,393 in 2008).

Sex between men represented the only risk category for which an increase was observed during the study period: the proportion of MSM among all newly diagnosed HIV cases has increased from 25.2% (95% CI: 23.3-27.1) in 2003 to 37.0% (95% CI: 35.2-38.7) in 2008, and the estimated number of MSM newly diagnosed with HIV increased from 1,858 (95% CI : 1604-2145) in 2003 to 2,409 (95% CI : 2175-2668) in 2006 and remained stable in 2007 and 2008 (Figure). The proportion of male heterosexuals was stable, at around 28%.

The estimated rate of new HIV diagnoses among MSM was 72.5 per 10,000 MSM population in 2008 (2,393 cases per estimated 330,000 MSM population living in France).

Characteristics of MSM newly diagnosed with HIV

Between 2003 and 2008, 6,213 cases of new HIV diagnoses in MSM were notified in France. The average age of MSM at diagnosis was 37 years and MSM aged under 30 years represented 24% of all cases. The majority of MSM (82%) were of French nationality, while 3.3 % were from the Americas, mainly Brazil and Peru, and 2.6% were from Western Europe, mainly from Italy and Portugal. Nearly one in five MSM (18.7%) discovered their infection at the time of primary infection ('PI' as reported by clinicians independently of the test result) whereas male heterosexuals rarely discovered their seropositivity at the PI stage (5.4%). Nevertheless, 11.5% of MSM were diagnosed at a very late stage of the disease (AIDS-defining illness) and this proportion was highest among MSM aged over 50 years (27.5%). However, the proportion of MSM presenting with an AIDS-defining illness at the time of diagnosis declined from 19.5% in 2003 to 8.8% in 2008. An exposure to HIV (whatever the type of exposure) was the reason for HIV testing for one in three MSM (31.5%) (compared to 18.5% for male heterosexuals). Among MSM aged below 40 years, the main reason for testing (37.4%) was a possible exposure to HIV, whereas among older MSM (> 40 years old) biological or clinical symptoms represented the principal reason for performing an HIV test (38.7%). Of the MSM newly diagnosed with HIV in 2003-2008, 42% had a high level of education, 24% were employees and 10.4% were blue collar workers.

Nearly one in three MSM newly diagnosed with HIV (29.8%) had been tested twice or more for HIV prior to their diagnosis (compared to 16% for male heterosexuals).

Recent infections among new HIV diagnoses

The results of the test for RI were available for 4,819 MSM (77.5% of MSM newly diagnosed with HIV). Nearly half of these patients (47.6%, 95% CI 46.2 to 49.0) had been recently infected.

The proportion of RI among all MSM newly diagnosed with HIV remained stable between 2003 and 2008. It was higher in young MSM (57% [CI 95% = 53.7-59.4] in the 15-29 age group) than among the oldest age group (30% [CI 95% = 26.3-34.2] in the > 50 age group) and higher in MSM with French nationality (49%, [CI 95% =47.6-50.7]) than in those with another nationality (40% [CI 95% = 37.2-43.8]). The proportion of RI varied according to socio-professional categories: RI was less frequent in blue-collar workers (37%) than in employees or other professions. The proportion of RI was also higher in the Paris area (51%) than in the rest of France (45%).

Results of the multivariate analysis

The year of diagnosis was not associated with recent infection in the univariate analysis and was not included in the multivariate analysis. MSM of French nationality (aOR=1.6), those who had undergone HIV testing because of clinical/biological manifestations (aOR=1.7), those who were tested after an exposure to HIV (aOR=1.6), those with high socio-economic status, residence in the Paris region, notification by a community physician and those who had undergone three or more tests were all independently associated with an increased risk of RI in multiple logistic regression analysis (Table). The risk of RI also decreased with age (>50 years

aOR= 1, <30 years, aOR=2.6). The risk of RI increased with the lifetime number of tests performed aOR=1 (one HIV test), aOR=2.0 (two HIV tests), aOR=4.2 (three or more tests).

HIV type, group and subtype

The results for the HIV type, group and subtype were available for 4,369 MSM newly diagnosed with HIV in 2003-2008. For the remaining individuals, the DSS was not sent by the biologist (811 cases) or the virus was not typeable by the serotyping method (710 cases). There were four cases of HIV-2 infection, one involving a French national, one from Peru, one from Colombia and one from the Ivory Coast. Most MSM were infected with HIV-1 subtype B (76.5%), non-B subtype was found in 11.7% and the M group HIV was detected in 11.8% of MSM.

Discussion

MSM account for more than 50% of new HIV diagnoses in men each year, while it is estimated that in 2005 they represented only 1.6% of the male population in France [15]. The rate of newly diagnosed HIV infection among MSM is therefore very high (72/10,000 MSM for the year 2008). Moreover, MSM are the only transmission group in which the number of new HIV diagnoses increased between 2003 and 2006 in France. Screening pattern trends in MSM can not fully explain this increase: in every year of the EPG survey, we observed a substantial and stable proportion of MSM who had never been tested for HIV (14.5% in 1997, 13.0% in 2000, 13.3% in 2004, p=0.16) [16].

The results of virological surveillance are worrying: 47.6% of MSM were infected within the six months preceding HIV diagnosis. This high proportion reflects, to a certain extent, the incidence of HIV infection in the MSM community. However, it also depends on other factors, particularly screening practices. We know that French MSM are more frequently tested for HIV than the rest of the population: 12% of MSM newly diagnosed with HIV reported more than three tests before their HIV diagnosis, compared with 2.5% of male heterosexuals. Moreover, among readers of the gay press based on a survey conducted regularly since 1985, 31% had had at least one test in the previous 12 months compared to 11% in the general male population [16,17]. A French study estimating the national incidence rate of HIV infection using the EIA-RI test and testing patterns will be published next year.

The probability of being diagnosed soon after the infection is also higher when the test is motivated by a high-risk event. This is confirmed by the high proportion of diagnoses made shortly after high-risk events of any type among MSM newly diagnosed with HIV (31.5%). However, this is not the case for MSM aged over 50 years, of whom nearly one in three discover their seropositivity at a late stage of the disease (AIDS-defining illness) and wait for clinical or biological manifestations to perform a HIV screening.

We also found that residence in Paris was independently associated with a diagnosis of RI and the Paris region was the area most affected by HIV (the Paris region accounted for 20% of all new HIV diagnoses between 2003 and 2008). Behavioural surveys showed no difference in risk behaviours between MSM living in Paris and other regions [18,19] . It therefore seems that the rate of HIV test per population is higher in the Paris area than in other regions [9]. In addition, seronegative and seropositive MSM may mix more frequently in Paris because of the many commercial gay-venues available in the city.

In addition to the test of RI, virological surveillance showed a high proportion of non-B subtype HIV-1 infection in France among MSM (12% in 2003-2008). In France, the HIV-1 epidemic has historically been dominated by strains of subtype B. The presence of non-B subtypes in MSM was detected as early as 1996-1998, but the proportion was only 2% [20]. The high proportion of non-B subtypes among MSM suggests an increasing genetic diversity of HIV strains that are transmitted within the homosexual community in France. In a pilot survey conducted in Berlin among 114 MSM newly diagnosed with HIV, the authors identified no strains of non-B subtypes [21]. The increase in non-B subtypes in France suggests also a closer interplay between the HIV epidemics in MSM and in the African population living in France.

The increase in the number of newly diagnosed HIV cases in MSM occurred in France during the same time period as the re-emergence of syphilis in the late 2000s [5,22], and the emergence of rectal lymphogranuloma venereum (LGV) in 2003 [23]. Half of MSM who had syphilis were HIV-seropositive and rectal LGV in France has been diagnosed exclusively in HIV positive MSM [24]. The recent outbreaks of syphilis in MSM have probably had a minor impact on HIV incidence because for many years now in France, most MSM with a new diagnosis of syphilis have already been infected by HIV and this is also true for some other countries [25].

The epidemiological situation regarding HIV and other STI in MSM in France is not very different from that in the neighbouring European countries. In the early 2000s, epidemics of syphilis and then of LGV occurred in all Western European countries, mainly among HIV-infected MSM [26-31]. The number of new HIV diagnoses among MSM and bisexual men increased by 86% between 2000 and 2006 in 23 European countries [32]. The rate of HIV notifications among MSM in eight countries with concentrated HIV epidemics (Australia, Canada, France, Germany, Netherlands, Spain, United Kingdom and the United States) increased by 3.3% per year from 2000 to 2005 and this increase is not wholly explained by changes in HIV patterns [33].

Prevention campaigns remain crucial, but they do not seem sufficient to contain sexual risk behaviours among MSM in France, despite the wide availability of screening, condoms and information and the fact that MSM represent a highly educated sub-population. Moreover, in view of the large proportion of HIV-seropositive MSM who are affected by STI, counselling of seropositive MSM during medical follow-up must be reinforced. Regarding the high proportion of MSM aged over 50 years who have been diagnosed with HIV at the AIDS stage and who have been screened for HIV only when they have presented with clinical manifestations, HIV screening should be encouraged among this specific sub-population of MSM. The HIV epidemic situation in MSM in France remains a serious issue and more research into the underlying causes may be necessary to adopt appropriate prevention and control measures.

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References

1. Chen SY, Gibson S, Katz MH, Klausner JD, Dilley JW, Schwarcz SK, et al. Continuing increases in sexual risk behavior and sexually transmitted diseases among men who have sex with men: San Francisco, Calif, 1999-2001, USA. Am J Public Health. 2002;92(9):1387-8.
2. Strathdee SA, Martindale SL, Cornelisse PG, Miller ML, Craib KJ, Schechter MT, et al. HIV infection and risk behaviours among young gay and bisexual men in Vancouver. CMAJ. 2000;162(1):21-5.
3. Van de Ven P, Prestage G, Crawford J, Grulich A, Kippax S. Sexual risk behaviour increases and is associted with HIV optimism among HIV-negative and HIV-positive gay men in Sydney over the 4 years period to February 2000. AIDS. 2000;14(18):2951-3.
4. Elford J. Changing patterns of sexual behaviour in the era of highly active antiretroviral therapy. Curr Opin Infect Dis. 2006;19(1):26-32.
5. Adam P, Hauet E. [Preliminary results of the 2000 Gay Press Survey on the risk-taking and STDs among gays]. Saint-Maurice: Institut de Veille Sanitaire, 2001. French.
6. Barin F, Meyer L, Lancar R, Deveau C, Gharib M, Laporte A, et al. Development and validation of an immunoassay for identification of recent human immunodeficiency virus type 1 infections and its use on dried serum spots. J Clin Microbiol. 2005;43(9):4441-7.
7. Semaille C, Barin F, Cazein F, Pillonel J, Lot F, Brand D, et al. Monitoring the Dynamics of the HIV Epidemic Using Assays for Recent Infection and Serotyping among New HIV Diagnoses: Experience after 2 Years in France. J Infect Dis. 2007;196(3):377-83.
8. Cazein F, Pillonel J, Le Strat Y, Lot F, Pinget R, David D, et al. [HIV and AIDS surveillance in France, 2006]. Bull Epidemiol Hebd. 2008;46-47:434-43. French.
9. Cazein F, Pillonel J, Imounga L, Le Strat Y, Bousquet V, Spaccaferri G, et al. Surveillance du dépistage et du diagnostic de l'infection VIH et du sida, France, 2008. BEHWeb. 2009;(2). Available from: http://www.invs.sante.fr/display/?doc=behweb/index.html
10. Royston P. Multiple imputation of missing values. Stata J. 2004;4(3):227-41.
11. Sterne JA, White IR, Carlin JB, Spratt M, Royston P, Kenward MG, et al. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. BMJ. 2009;338:b2393.
12. Bajos N, Bozon M. [Survey on sexuality in France. Practices, gender and health]. Paris: Editions La Découverte, 2008. French.
13. Barin F, Plantier JC, Brand D, Brunet S, Moreau A, Liandier B, et al. Human immunodeficiency virus serotyping on dried serum spots as a screening tool for the surveillance of the AIDS epidemic. J Med Virol. 2006;78 Suppl 1:S13-8.
14. Le Vu S, Meyer L, Cazein F, Pillonel J, Semaille C, Barin F, et al. Performance of an immunoassay at detecting recent infection among reported HIV diagnoses. AIDS. 2009;23(13):1773-9.
15. ANRS-Inserm-Ined. First results of the CSF survey Context of sexuality in France. ANRS. 2007. [cited 2007 Aug 30]. Available from: http://gazette.kb.inserm.fr/csf/Premiers-resultats-CSF-noData.html
16. Institut de Veille Sanitaire. [Press Survey Report Gay 2004]. Saint-Maurice: Institut de Veille Sanitaire, 2007. French. Available from: http://www.invs.sante.fr/publications/2007/epg_2004/epg_2004.pdf
17. Moreau C, Lydié N, Warszawski J, Bajos N. [Sexual activity, STIs, contraception: a stable situation]. In: Beck F, Guilbert P, Gautier A. Health Barometer 2005, Saint-Denis: Éditions INPES. 2005:329-54. French.
18. Michel A, Velter A, Couturier E, Couturier C, Semaille C. [Gay Barometer 2002: Survey among men attending gay venues in France]. Bull Epidemiol Hebd. 2004;(43):227-8. French.
19. Velter A. [Sexual behaviour at risk for HIV and STIs and strategies for reducing sex-related risks. Gay Press Survey Report]. Saint Maurice: Institut de Veille Sanitaire, 2007:15-32. French.
20. Couturier E, Damond F, Roques P, Fleury H, Barin F, Brunet JB, et al. HIV-1 diversity in France, 1996-1998. The AC 11 laboratory network. AIDS. 2000;14(3):289-96.
21. Batzing-Feigenbaum J, Loschen S, Gohlke-Micknis S, Hintsche B, Rausch M, Hillenbrand H, et al. Implications of and perspectives on HIV surveillance using a serological method to measure recent HIV infections in newly diagnosed individuals: results from a pilot study in Berlin, Germany, in 2005-2007. HIV Med. 2009;10(4):209-18.
22. Couturier E, Michel A, Janier M, Dupin N, Semaille C, the syphilis surveillance network. Syphilis surveillance in France, 2000-2003. Euro Surveill. 2004;9(12):pii=493. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=493
23. Herida M, de Barbeyrac B, Sednaoui P, Scieux C, Lemarchand N, Kreplak G, et al. Rectal lymphogranuloma venereum surveillance in France 2004-2005. Euro Surveill. 2006;11(9):pii=647. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=647
24. Gallay A, Bouyssou A, Fischer A, Dupin N, Lassau F, Lemarchand N, et al. HIV infection among patients with sexually transmitted infections in the RésIST surveillance network in France between 2000 and 2007. Bull Epidemiol Hebd. 2008;45-46:453-7. French
25. Buchacz K, Greenberg A, Onorato I, Janssen R. Syphilis epidemics and human immunodeficiency virus (HIV) incidence among men who have sex with men in the United States: implications for HIV prevention. Sex Transm Dis. 2005;32(10 Suppl):S73-9.
26. Bremer V, Meyer T, Marcus U, Hamouda O. Lymphogranuloma venereum emerging in men who have sex with men in Germany. Euro Surveill. 2006;11(9):pii=643. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=643
27. Simms I, Fenton KA, Ashton M, Turner KM, Crawley-Boevey EE, Gorton R, et al. The re-emergence of syphilis in the United Kingdom: the new epidemic phases. Sex Transm Dis. 2005;32(4):220-6.
28. Sasse A, Defraye A, Ducoffre G. Recent syphilis trends in Belgium and enhancement of STI surveillance systems. Euro Surveill. 2004;9(12):pii=492. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=492
29. op de Coul EL, de Boer IM, Koedijk FD, van de Laar MJ, Stichting HIV Monitoring (HIV Monitoring Foundation), SOA Peilstation (STI sentinel surveillance network), et al. HIV and STIs increasing in the Netherlands according to latest surveillance data. Euro Surveill. 2006;11(7):pii=2901. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2901
30. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV-positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.
31. Marcus U, Bremer V, Hamouda O, Kramer MH, Freiwald M, Jessen H, et al. Understanding recent increases in the incidence of sexually transmitted infections in men having sex with men: changes in risk behavior from risk avoidance to risk reduction. Sex Transm Dis. 2006;33(1):11-7.
32. Likatavicius G, Klavs I, Devaux I, Alix J, Nardone A. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000-6: implications for a European public health strategy. Sex Transm Infect. 2008;84(6):499-505.
33. Sullivan PS, Hamouda O, Delpech V, Geduld JE, Prejean J, Semaille C, et al. Reemergence of the HIV epidemic among men who have sex with men in North America, Western Europe, and Australia, 1996-2005. Ann Epidemiol. 2009;19(6):423-31.

HIV/STI co-infection among men who have sex with men in Spain

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In Spain, neither the HIV nor the STI national surveillance system collects information on HIV/STI co-infection. However, there are two networks based on HIV/STI clinics which gather this data. We describe HIV prevalence in men who have sex with men (MSM) diagnosed with infectious syphilis and/or gonorrhoea in 15 STI clinics; and concurrent diagnoses of STI in MSM newly diagnosed with HIV in 19 HIV/STI clinics. In total, 572 MSM were diagnosed with infectious syphilis and 580 with gonorrhoea during 2005-2007. HIV prevalence among syphilis and gonorrhoea cases was 29.8% and 15.2% respectively. In the multivariate analysis, HIV/syphilis co-infection was associated with being Latin American; having a history of STI; reporting exclusively anal intercourse; and having sex with casual or several types of partners. HIV and gonorrhoea co-infection was associated with age older than 45 years; having no education or only primary education completed; and having a history of STI. In total, 1,462 HIV infections were newly diagnosed among MSM during 2003-2007. Of these, 31.% were diagnosed with other STI at the same time. Factors associated with STI co-infection among new HIV cases in MSM were being Latin American; and having sex with casual partners or with both steady and casual partners. In Spain, a considerable proportion of MSM are co-infected with HIV and STI.

Introduction

HIV infection continues to disproportionately affect men who have sex with men (MSM) in the European Union [1], and many countries have reported an increase of the number of new HIV diagnoses in MSM since the early 2000s [2,3]. At the same time,

sexually transmitted infections (STI) have also re-emerged in this group [4] and the occurrence of several outbreaks mainly involving HIV-infected MSM [5], underlies the extent of HIV and other STI co-infections in this population. It is known that the presence of other STI may increase the likelihood of transmitting or contracting HIV [6].

While information on new HIV diagnoses is not yet available on a national basis in Spain, data collected in eight autonomous regions, covering 32% of the total Spanish population, show that the number of MSM newly diagnosed with HIV has been increasing among Spaniards as well as foreign-born population (Figure) [7]. Furthermore, nationwide surveillance data on gonorrhoea and syphilis show an increase in the number of reported cases of both diseases since 2002 [8], and syphilis outbreaks affecting MSM have been reported recently [9]. Unfortunately, at the moment, neither the HIV nor the STI national surveillance systems collect information on co-infection.

However, in addition to population surveillance systems, in Spain there are two networks that collect detailed data on new HIV, syphilis and gonorrhoea diagnoses, including information on HIV/STI co-infection. These networks are based on HIV/STI clinics which are very low-threshold public facilities, where barriers to access are minimised and medical consultation for HIV and STI is free of charge.

This report presents data coming from both networks and examines HIV/STI co-infection in MSM with the following aims:

a) To describe HIV prevalence and factors associated with HIV co-infection in MSM diagnosed with infectious syphilis and/or gonorrhoea in 15 STI clinics (STI Study Group)

b) To describe concurrent diagnoses of STI and factors associated with STI co-infection in MSM newly diagnosed with HIV in 19 HIV/STI clinics (EPI-VIH Group)

Methods

HIV prevalence among MSM with infectious syphilis and/or gonorrhoea

All infectious syphilis (primary, secondary and early latent) and/or gonorrhoea patients prospectively identified between July 2005 and December 2007 by the STI Study Group were included in this study. The Group is a network of 15 STI clinics located in 14 of the most populated Spanish cities: Madrid, Barcelona, Seville, Malaga, Bilbao (two clinics), Granada, Algeciras, Oviedo, Gijon, San Sebastian, Tarragona, Cartagena, Murcia and Alicante. Data from the Prison Health Service were incorporated since January 2007. These clinics have a long tradition of attending STI patients belonging to core at-risk populations (sex workers and their clients, migrants, MSM and heterosexuals with high-risk sexual behaviours). Participation is voluntary but, to our knowledge, all but one of this type of clinic in Spain belong to this network.

Cases included in this analysis were identified using the corresponding European case definitions [10].

Data on the patients´ socio-demographic (age, sex, country of birth, educational level) and clinical variables (HIV status, history of previous STI, transmission route), as well as information on the circumstances of infection, were collected in a standard questionnaire by the attending physicians, the majority of whom are STI specialists.

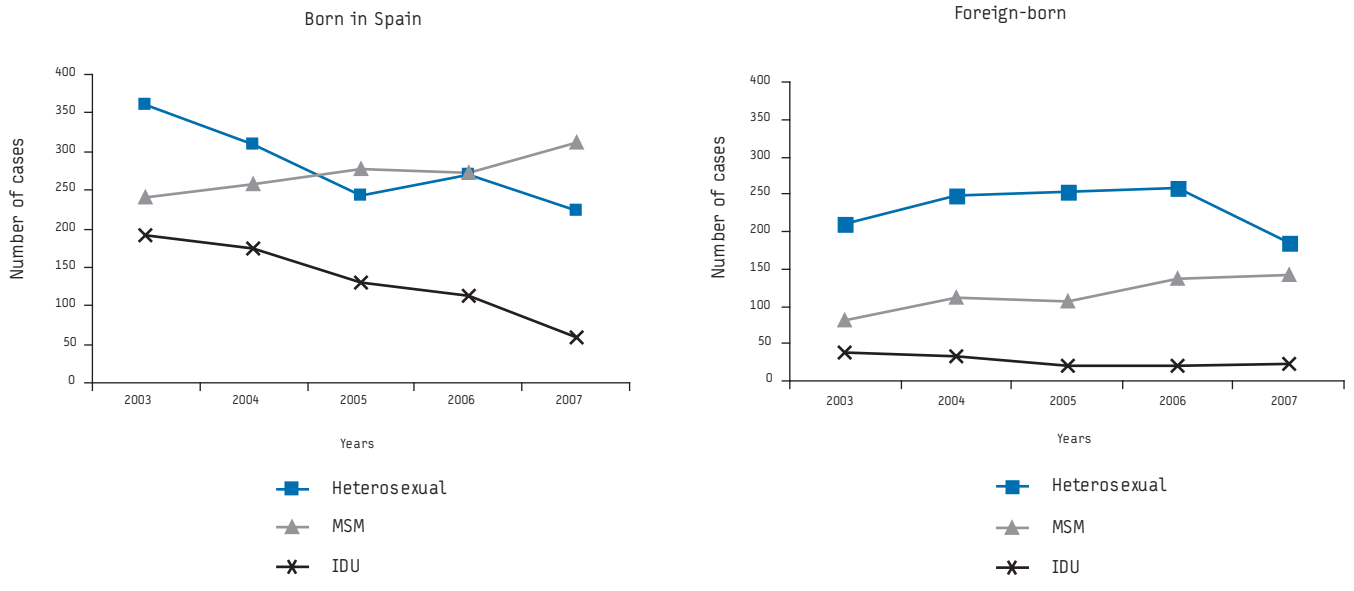
The study was performed according to the requirements of the Spanish legislation on data protection. No personal identifiers were collected.

Concurrent diagnosis of STI among HIV infections newly diagnosed in MSM

All MSM newly diagnosed with HIV between 2003 and 2007 by the EPI-VIH Group were prospectively identified and included in this study. The EPI-VIH Group is a network of HIV and STI clinics

Figure

Newly diagnosed HIV infections, by country of birth and transmission mode, Spain (eight autonomous regions), 2003-2007



MSM: Men who have sex with men; IDU: Intravenous drug user

located in 18 Spanish cities: Madrid (two clinics), Barcelona, Seville, Bilbao, Granada, Oviedo, Gijon, San Sebastian, Vitoria, Logroño, Pamplona, Cartagena, Murcia, Alicante, Castellón, Valencia, Santa Cruz de Tenerife, Santander. Ten of these clinics are also included in the STI Study Group; the rest are clinics specialised in HIV diagnosis that mostly serve HIV-vulnerable populations. Participation is voluntary, but more than 90% of the STI/HIV clinics in Spain belong to this network.

Table 1

HIV prevalence in syphilis and gonorrhoea cases in men who have sex with men (MSM), by different variables, Spain, 2005-2007

Variables	Syphilis cases			Gonorrhoea cases		
	Total number of cases	HIV prevalence n (%)	p*	Total number of cases	HIV prevalence n (%)	p*
Age groups (years)						
< 25	52	9 (17.3)		91	7 (7.7)	
25-34	210	56 (26.7)		207	28 (13.5)	
35-44	177	65 (36.7)	0.05	120	24 (20.0)	0.01
≥45	67	22 (32.8)		37	11 (29.7)	
Unknown	10	2 (20.0)		7	0 (0.0)	
Educational level						
Illiteracy/Primary education	115	29 (25.2)		68	16 (23.5)	
Secondary/University education	323	100 (31.0)	0.47	310	41 (13.2)	0.10
Unknown	78	25 (32.1)		84	13 (15.5)	
Region of birth						
Spain	399	110 (27.6)		377	52 (13.8)	
Western Europe	27	9 (33.3)		22	2 (9.1)	
Eastern Europe	3	0 (0.0)	0.09	3	0 (0.0)	0.05
Latin America	80	33 (41.2)		52	13 (25.0)	
North Africa	3	0 (0.0)		3	2 (66.7)	
Other/Unknown	4	2 (50.0)		5	1 (20.0)	
Previous STI						
Yes	178	68 (38.2)		212	42 (19.8)	
No	166	21 (12.6)	0.00	166	5 (3.0)	0.00
Unknown	172	65 (37.8)		84	23 (27.4)	
Sexual practices						
Only oral intercourse	106	35 (33.0)		125	20 (16.0)	
Only anal intercourse	21	10 (47.6)	0.00	44	6 (13.6)	0.01
Oral and anal intercourse	182	32 (17.6)		192	19 (9.9)	
Unknown	207	77 (37.2)		101	25 (24.7)	
Type of partners						
Sexual contact with a steady partner (solely)	33	2 (6.1)		59	3 (5.1)	
Sexual contact with a casual partner (solely)	189	55 (29.1)		230	30 (13.0)	
Sexual contact with a steady and casual partner	85	18 (21.2)		65	4 (6.1)	
Exchange of sex for drugs or money	14	3 (21.4)	0.01	11	5 (45.4)	0.00
Mixed**	26	11 (42.3)		24	8 (33.3)	
Unknown	169	65 (38.5)		73	20 (27.4)	
Number of sexual partners in the last 12 months						
1-2	61	12 (19.7)		74	6 (8.1)	
3-10	127	24 (18.9)		136	14 (10.3)	
≥11	126	36 (28.6)	0.00	141	22 (15.6)	0.00
Unknown	202	82 (40.6)		111	28 (25.2)	
TOTAL* **	**516**	**154 (29.8)**		**462**	**70 (15.2)**	

*Chi-squared or Fisher's test
**Mixed: sexual contact with different partners (casual, steady, exchange of sex for drugs or money)
***56 syphilis and 118 gonorrhoea cases were excluded from the table because their HIV status was unknown

Cases included in this analysis met the European case definition for new HIV diagnosis [10].

Epidemiological variables (age, sex, country of birth, educational level), clinical information (transmission route, history of previous and concomitant STI) and circumstances of the infection were collected by the attending physicians using a standardised questionnaire.

The study was performed according to the requirements of the Spanish legislation on data protection. No personal identifiers were collected.

Frequency distributions for each variable and prevalence of HIV/STI co-infection, global and stratified by different variables were calculated. To evaluate the association between qualitative variables, the chi-squared and Fisher's exact tests were used. Logistic regression models were fitted, following Hosmer and Lemeshow model-building strategies [11], to identify: a) factors associated with HIV co-infection among MSM with infectious syphilis or gonorrhoea; b) concomitant STI co-infection among newly HIV diagnosed MSM. Associations were measured using the odds ratio (OR) and its 95% confidence interval (95% CI). Data analyses were performed using the STATA statistical software package Version 10.0 [12].

Results

HIV prevalence among MSM with infectious syphilis and/or gonorrhoea

A total of 1,152 MSM with infectious syphilis and/or gonorrhoea were identified during the study period: 572 were diagnosed with

Table 2

Factors associated with HIV co-infection among men who have sex with men (MSM) diagnosed with syphilis or gonorrhoea, Spain, 2005-2007

Variables	HIV and syphilis co-infection		HIV and gonorrhoea co-infection	
	Adjusted OR	95% CI	Adjusted OR	95% CI
Age groups (25-34 years)				
< 25	0.8	(0.3-2.1)	0.6	(0.2-1.5)
35-44	1.6	(0.9-2.6)	1.4	(0.7-2.8)
≥45	1.5	(0.7-3.0)	3.4	(1.3-9.0)
Educational level (secondary/university education)				
Illiteracy/Primary education	0.8	(0.4-1.4)	3.4	(1.5-7.5)
Unknown	0.5	(0.2-1.1)	1.4	(0.5-3.6)
Region of birth (Spain)				
Western Europe	1.0	(0.4-2.5)	0.3	(0.1-1.5)
East Europe	-	-	-	-
Latin America	2.2	(1.2-4.0)	1.2	(0.4-3.0)
North Africa	-	-	4.3	(0.3-69.1)
Other/Unknown	4.1	(0.4-38.0)	0.8	(0.1-8.8)
Year of diagnosis (2006)				
2005	0.8	(0.4-1.4)	0.6	(0.3-1.5)
2007	1.8	(1.1-3.1)	1.2	(0.6-2.3)
Previous STI (No)				
Yes	4.3	(2.2-8.5)	6.0	(2.1-16.9)
Sexual practices (oral and anal intercourse)				
Only anal intercourse	5.5	(1.6-19.1)	1.5	(0.4-5.3)
Only oral intercourse	1.8	(0.9-3.5)	1.6	(0.7-3.6)
Type of partners (sexual contact with a steady partner only)				
Sexual contact with a casual partner (solely)	6.8	(1.3-36.0)	1.7	(0.4-7.4)
Sexual contact with a steady and casual partner	3.7	(0.7-21.1)	0.6	(0.1-3.4)
Exchange of sex for drugs or money	4.8	(0.4-62.2)	18.4	(0.9-363.7)
Mixed**	14.0	(2.1-91.7)	4.5	(0.8-25.6)
Unknown	6.8	(0.7-64.9)	8.4	(0.4-197.6)
Number of sexual partners in the last 12 months (1-2 partners)				
3-10	0.5	(0.2-1.2)	1.6	(0.4-5.9)
≥11	0.8	(0.3-2.0)	1.4	(0.4-4.9)
Unknown	2.1	(0.6-7.7)	2.3	(0.4-14.4)

*Reference categories in brackets; models adjusted by clinic of diagnosis
** Mixed: sexual contact with different partners (casual, steady, exchange of sex for drugs or money)
OR: odds ratio; CI: confidence interval

syphilis (215 primary, 265 secondary and 92 early latent) and 580 with gonorrhoea.

The mean age for syphilis patients was 35 years (SD: 9.2), (range 16-77 years), and the most affected age group was 25-34 years (40.7%). The majority (63.6%) had completed secondary/university education and almost a quarter (132 cases) were born outside Spain, mainly in Latin America and Western Europe.

Nearly one third of the cases (183, 32.0%) had a history of previous STI, and 97 (17.0%) had other STI concurrently diagnosed: 28 chlamydia, 24 genital warts, 22 gonorrhoea, 18 herpes simplex virus infection and five other STI.

Information on sexual practices considered to be the cause of the current syphilis episode was available for 321 (56.1%) cases. Of these, 108 (33.6%) reported exclusively oral sex, 24 (7.5%) had anal intercourse solely, whereas 189 (58.9%) recalled both. Regarding type of sexual partner thought to be the source of infection, data were available in 359 (62.7%) cases. Of these, 195 (54.3%) had sex with a casual partner solely; 36 (10.0%) with their steady partner only; 87 (24.2%) reported sex with both casual and steady partners; in nine cases (2.5%) the infection was attributed to being a sex worker; in five (1.4%) to being a client of a sex worker; and 27 patients reported a combination of the above categories.

Information on HIV status was available for a total of 516 (90.2%) syphilis cases. Of these, 154 (29.8%) were co-infected with HIV and the majority (125 cases) were aware of their infection. HIV co-infection was more likely in those with higher number of sexual partners in the last year; those with prior history of STI; those having sex with casual partners and those who reported anal intercourse as the most likely transmission mode for the syphilis episode (Table 1).

In the multivariate analysis, the probability of being co-infected with HIV and syphilis was higher among Latin Americans (OR: 2.2; 95% CI: 1.2-4.0), men with a history of previous STI (OR:4.3;

Table 3

STI co-infections in men who have sex with men (MSM) newly diagnosed with HIV, by different variables, Spain, 2003-2007

Variables	Total number of cases	STI and HIV co-infection	p*
	n	n, prevalence (%)	
Age groups (years)			
< 25	161	53 (32.9)	
25-34	712	222 (31.2)	0.54
35-44	407	121 (29.7)	
>=45	108	29 (26.8)	
Unknown	74	28 (37.8)	
Educational level			
Illiteracy/Primary education	228	76 (33.3)	
Secondary/University education	1078	325 (30.1)	0.51
Unknown	156	52 (33.3)	
Region of birth			
Spain	909	259 (28.5)	
Western Europe	55	20 (36.4)	
East Europe	19	7 (36.8)	0.04
Latin America	450	162 (36.0)	
Sub-Saharan Africa	6	1 (16.7)	
Other/Unknown	23	4 (17.4)	
Previous STI			
Yes	720	231 (32.1)	
No	658	196 (29.8)	0.65
Unknown	84	26 (31.0)	
Type of partners			
Sexual contact with a steady partner (solely)	175	42 (24.0)	
Sexual contact with a casual partner (solely)	695	223 (32.1)	
Sexual contact with a steady and casual partner	199	75 (37.7)	0.06
Exchange of sex for drugs or money	33	7 (21.2)	
Mixed**	309	91 (29.5)	
Unknown	51	15 (29.4)	
TOTAL	**1462**	**453 (31.0)**	

*Chi squared or Fisher's test
**Mixed: sexual contact with different partners (casual partner, steady partner, exchange of sex for drugs or money)

95% CI: 2.2-8.5), those reporting anal intercourse solely (OR: 5.5; 95% CI:1.6-19.1) and those having sex with casual (OR: 6.8; 95% CI:1.3-36.0) or several types of partners (OR:14.0; 95% CI:2.1-91.7) (Table 2).

In total, 580 MSM were diagnosed with gonorrhoea during the study period. Mean age at diagnosis was 32 years (SD: 8.3), (range 16-65) years, and the age group most affected was 25-34 years (44.1%). Almost 69% of the cases had completed secondary/university education and 121 (20.9%) were born in countries other than Spain, mostly in Latin America and Western Europe.

History of previous STI was very common (38.8% of the cases), and 132 (22.8%) gonorrhoea cases were concurrently diagnosed with other STI: 67 with chlamydia, 24 with genital warts, 22 with syphilis, 18 with herpes virus and 13 with other STI.

Gonorrhoea transmission was attributed to exclusively oral sex in 51 cases (12.8%), solely anal intercourse in 136 (34.1%) and to both oral sex and anal intercourse in 212 (53.1%); for 181 cases (31.2% of the total) this information was not available.

Regarding the category of sexual partner considered to be the possible source of infection, this information was available for 430 (74.1%) gonorrhoea cases. Of these, 256 (59.5%) attributed the infection to sex with casual partner only, 73 (17.0%) to sex with both casual and steady partners, 66 (15.3%) to sexual contact with their steady partner only, 10 (2.3%) to sexual contact with clients (sex work), and 25 (5.9%) to contact with several types of sexual partners.

Of the 462 (79.6%) gonorrhoea cases with data on HIV infection, 70 (15.2%) were co-infected and the majority of these (59 cases) had been aware of their HIV status. HIV prevalence increased with age and with number of sexual partners in the last 12 months; it was also higher in men with a history of previous STI, those recalling only oral sex as the practice most likely to be the cause of this gonorrhoea episode, and those who exchanged sex for drugs or money (Table 1).

In the multivariate analysis, HIV and gonorrhoea co-infection among MSM was associated with age older than 45 years (OR: 3.4; 95% CI: 1.3-9.0), having no education or only primary education

Table 4

Factors associated with STI co-infection in men who have sex with men (MSM) newly diagnosed with HIV, Spain, 2003-2007

Variables	STI and HIV co-infection	
	Adjusted OR	95% CI
Age groups (25-34 years)		
< 25	1.1	(0.7-1.6)
35-44	1.0	(0.7-1.3)
≥45	0.8	(0.5-1.3)
Educational level (Secondary/University education)		
Illiteracy/Primary education	1.2	(0.9-1.7)
Unknown	0.7	(0.5-1.1)
Region of birth (Spain)		
Western Europe	1.4	(0.8-2.5)
East Europe	2.2	(0.8-6.0)
Latin America	1.5	(1.2-2.0)
Sub-Saharan Africa	0.5	(0.1-4.7)
Other/Unknown	0.5	(0.2-1.7)
Year of diagnosis (2003)		
2004	1.3	(0.8-2.0)
2005	1.0	(0.6-1.5)
2006	1.5	(1.0-2.2)
2007	1.2	(0.8-1.7)
Previous STI (No)		
Yes	1.0	(0.7-1.2)
Type of partners (sexual contact with a steady partner only)		
Sexual contact with a casual partner (solely)	1.5	(1.0-2.3)
Sexual contact with a steady and casual partner	1.9	(1.2-3.2)
Exchange of sex for drugs or money	1.0	(0.4-2.7)
Mixed**	1.2	(0.8-1.9)
Unknown	1.2	(0.6-2.5)

*Reference categories in brackets; model adjusted by clinic of diagnosis
**Mixed: sexual contact with different partners (casual partner, steady partner, exchange of sex for drugs or money)
OR: odds ratio; CI: confidence interva

completed (OR: 3.4; 95% CI: 1.5-7.5), and having a history of STI (OR: 6.0; 95% CI: 2.1-16.9) (Table 2).

Concurrent diagnosis of STI among HIV infections newly diagnosed in MSM

In total, 1,462 HIV infections were newly diagnosed among MSM during the period 2003-2007. The majority (62.2%) were Spanish, mean age at diagnosis was 32.8 years (SD: 7.6) and almost two thirds (73.7%) had secondary/university education completed. Patients attributed their HIV infection to sexual contact with a casual partner in 695 (47.5%) cases, sex with their steady partner in 175 (12.0%), sexual contact with casual and steady partners in 199 (13.6%), exchanging sex for drugs or money in 33 (2.3%), and different combinations of the previous categories in 309 cases (21.1%). In 51 cases (3.5%) this information was not available.

History of previous STI was very common among the newly diagnosed HIV cases in MSM (49.2%). A total of 453 (31.0%) men were concurrently diagnosed with other STI at the time of HIV diagnosis. The most frequent infections diagnosed were: syphilis (223 cases), genital warts (92) and gonorrhoea (56). Concurrent STI and HIV co-infection was higher among those in the age-group 25-34 years and among Latin American men (Table 3).

In the multivariate analysis, factors associated with STI co-infection among newly diagnosed HIV cases in MSM were: being Latin American (OR: 1.5; 95% CI: 1.2-2.0), having sex with casual partners (OR: 1.5; 95%CI: 1.0-2.3) or with both steady and casual partners (OR: 1.9; 95%CI: 1.2-3.2) (Table 4).

Discussion

In this article data from Spain on HIV prevalence among MSM with syphilis and/or gonorrhoea, and concurrent STI diagnoses in MSM newly diagnosed with HIV are presented. Data were collected in clinics specialising in STI and/or HIV diagnosis. While results cannot be extrapolated to all MSM in the country, they provide valuable information on STI/HIV co-infections among MSM with risk behaviours for HIV and other STI resident in medium and big Spanish cities. This information is even more valuable because, to date, neither the HIV nor the STI national surveillance systems have collected information about HIV/STI co-infection.

HIV prevalence among MSM with syphilis in Spain is 29.8%. This figure is intermediate and within the range of 14%-59% found in different European countries [13]. Regarding HIV prevalence among MSM with gonorrhoea (15.2%), it is lower than the 32% reported in the United Kingdom in 2008 [2] or the 19% reported in New York City for 1990-1997 [14], but higher than the 11% found in a Stockholm STI clinic in 2004 [15].

Most of the syphilis and gonorrhoea cases co-infected with HIV were aware of their status. This finding, common to other studies [13,16,17], shows that some HIV-positive MSM continue to pursue risky behaviours even if they are aware of their HIV status, thus contributing to HIV transmission and putting themselves at risk of re-infection with HIV or infection with another STI.

Almost one third of MSM newly diagnosed with HIV during the period 2003-2007 were concurrently diagnosed with other STI, most commonly syphilis (15% prevalence). Similar results were found in a cohort of HIV-infected MSM in Sidney, where prevalence of syphilis among HIV-positive MSM was 19% (compared to 3.0% among HIV-negative MSM) [18]; whereas an even higher prevalence, 44.4%, was found among newly diagnosed HIV-infected MSM in a San Francisco STI clinic, in spite of the fact that only gonorrhoea and chlamydia infections were considered in this study [19].

Being born in Latin America was associated with both high HIV prevalence in syphilis and gonorrhoea patients and high STI prevalence in newly diagnosed HIV patients. This finding is consistent with what has been found in other studies in Spain [20] and shows that this MSM population is particularly vulnerable to HIV and other STI infections. Reasons for this are unclear. Latin Americans speak Spanish and, in theory, should have fewer problems to adapt to Spain. On the other hand, data from the EPI-VIH study show that a high percent of sex workers are Latin American [21,22]. Besides, it has been suggested that some HIV-positive Latin-American MSM might have migrated to Spain in search of a more socially-friendly environment.

Having sex with casual partners or having "mixed sexual contacts" (i.e. "casual partners + sex clients", "casual partners + contact with a sex worker" etc.) was also associated with HIV and syphilis co-infection. This result has been found also in other studies [17,23] and it is not surprising since in these situations people are less likely to know their partner's HIV status.

Although in this and in other studies [24,25] history of previous STI has been associated with higher HIV prevalence, both in syphilis and gonorrhoea cases, other factors associated with HIV and gonorrhoea co-infection differ clearly from those related to HIV and syphilis co-infection. Thus, among MSM with gonorrhoea, we found that HIV infection was more likely among men older than 45 years, those with low educational level and sex workers, variables that did not appear so relevant in MSM with HIV and syphilis co-infection. Further studies are needed to confirm these differences and provide insight into the possible reasons behind these differences.

Data presented in this paper show that there is a great degree of overlap among HIV and other STI among MSM in Spain. Implications of this finding are several: a) further studies are needed to better understand the epidemiology of HIV/STI co-infection in MSM; b) HIV-positive MSM should be a priority for HIV and STI prevention programmes; c) Latin American MSM should be a priority for prevention; d) in addition to HIV testing being included in the STI diagnostic process, the presence of other STI should be assessed in MSM newly diagnosed with HIV.

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References

1. European Centre for Disease Prevention and Control (ECDC)/ World Health Organization (WHO) Regional Office for Europe. HIV/AIDS surveillance in Europe 2007. Stockholm: ECDC. 2008. Available from: http://ecdc.europa.eu/en/publications/Publications/0812_SUR_HIV_AIDS_surveillance_in_Europe.pdf
2. Health Protection Agency (HPA). Sexually Transmitted Infections and Men who have Sex with Men in the UK: 2008 report. London: HPA; 2008. Available from: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1227515298225
3. Marcus U, Voss L, Kollan C, Hamouda O. HIV incidence increasing in MSM in Germany: factors influencing infection dynamics. Euro Surveill 2006;11(9):pii=645. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=645
4. European Surveillance of Sexually Transmitted Infections (EESSTI). Sexually Transmitted Infections Surveillance in Europe Annual Report No 3. London: HPA; 2008. Available from: http://www.essti.org/docs/ESSTI_Surveillance_Annual_Report_2008.pdf
5. Van de Laar MJ. The emergence of LGV in Western Europe: what do we know, what can we do?. Euro Surveill. 2006;11(9):pii=641. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=641
6. Fleming D, Wasserheit J. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. Sex Transm Infect 1999;75(1):3-17.
7. Spanish Ministry of Health and Social Policy, Ministry of Science and Innovation, Carlos III Institute of Health. [HIV epidemiological surveillance in Spain. Assessment of new HIV diagnoses in Spain from the case notification systems of the AARR. 2003-2007. Updated 30 June 2008]. Madrid: National Epidemiology Centre; 2008. Spanish. Available from: http://www.isciii.es/htdocs/pdf/nuevos_diagnosticos_ccaa.pdf
8. Carlos III Health Institute, National Epidemiology Centre. [Epidemiological surveillance of sexually transmitted infections 1995-2007]. Madrid: National Epidemiology Centre ; 2009. Spanish. Available from: http://www.isciii.es/htdocs/pdf/its.pdf
9. Vall Mayans M, Sanz Colomo B, Armengol P, Loureiro E. Outbreaks of infectious syphilis and other STIs in men who have sex with men in Barcelona, 2002-3. Euro Surveill. 2004;8(44):pii=2578. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=2578
10. European Commission. Commission Decision of 30 April 2009 amending Decision 2002/253/EC laying down case definitions for reporting communicable diseases to the Community network under Decision No 2119/98/EC of the European Parliament and of the Council. Official Journal of the European Union. 1 May 2009.
11. Hosmer D, Lemeshow A. Applied logistic regression. 2nd ed. New York: Wiley-Interscience; 2000.
12. Stata Corporation. Stata Corp.Stata Statistical Software:Release10.0. College Station,TX: Stata Corp LP; 2007.
13. Dougan S, Evans B, Elford J. Sexually Transmitted Infections in Western Europe Among HIV-Positive Men Who Have Sex With Men. Sex Transm Dis. 2007;34(10):783-90.
14. Torian LV, Makki HA, Menzies I, Murrill CS, Benson DA, Schween FW, et al. High HIV seroprevalence associated with gonorrhea: New York City Department of Health, sexually transmitted disease clinics, 1990-1997. AIDS. 2000;14(2):189-95.
15. Berglund T, Asikainen T, Grützmeier S, Rudén AK, Wretlind B, Sandström E. The epidemiology of gonorrhea among men who have sex with men in Stockholm, Sweden, 1990-2004. Sex Transm Dis. 2007;34(3):174-9.
16. Couturier E, Michel A, Janier M, Dupin N, Semaille C. Syphilis surveillance in France, 2000-2003. Euro Surveill. 2004;9(12):pii=493. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=493
17. Williamson LM, Dodds JP, Mercey DE, Hart GJ, Johnson AM. Sexual risk behaviour and knowledge of HIV status among community samples of gay men in the UK. AIDS. 2008;22(9):1063-70.
18. Jin F, Prestage G, Zablotska I, Rawstorne P, Kippax SC, Donovan B, et al. High rates of sexually transmitted infections in HIV positive homosexual men: data from two community based cohorts. Sex Transm Infect. 2007;83(5):397-9.
19. Scott KC, Philip S, Ahrens K, Kent C, Klausner JD. High prevalence of gonococcal and chlamydial infection in men who have sex with men with newly diagnosed HIV infection: an opportunity for same-day presumptive treatment. J Acquir Immune Defic Syndr. 2008;48(1):109-12.
20. Rodríguez C, Del Romero J. [The emergence of Sexually Transmitted Diseases in Spain and the impact on immigrants in the Mediterranean area]. In: XII Congreso Nacional sobre el SIDA. Valencia; 2009. Spanish.
21. Belza MJ. Risk of HIV infection among male sex workers in Spain. Sex Transm Infect. 2005;81(1):85–8.
22. Sanchez F, Diaz A, Colomo C, López de Munain J, de Armas C, Junquera M, et al. [Factors associated with HIV infection in male and transsexuals sex workers]. Gac Sanit 2008;22. Spanish.
23. Bellis M, Cook P, Clark P, Syed Q, Hoskins A. Re-emerging syphilis in gay men: a case-control study of behavioural risk factors and HIV status. J Epidemiol Community Health. 2002;56(3):235-6.
24. Vall Mayans M, Escribà J. Previous STI and risk of HIV infection in men. Int J STD AIDS. 2003;14(5):341-3.
25. Cano S, Fuentes M, Ballesteros J, Clavo P, Menéndez N, Del Romero J. [Gonorrhea diagnoses in a center for sexually transmitted disease (STD) and their relationship with HIV and other STD]. Enf Infecc Microbiol Clin. 2009;27(6):338-41. Spanish.

Lymphogranuloma venereum in Europe, 2003-2008

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Lymphogranuloma venereum, caused by the L serovars of *Chlamydia trachomatis*, emerged in Europe in 2003 and a series of outbreaks were reported in different countries. The infection presents as a severe proctitis in men who have sex with men, many of whom are co-infected with HIV and other sexually transmitted infections. This paper reviews the number of cases reported over a five year period, from 2003 to 2008, from countries that were part of the European Surveillance of Sexually Transmitted Infections (ESSTI) network. Reports were received from Belgium, Denmark, France, Germany, the Netherlands, Portugal, Spain, Sweden, and the United Kingdom. It appears that after five years the characteristics of the patients infected has overall remained unchanged, although the total number of cases has increased and more countries in Europe have now identified cases of LGV.

Introduction

After initial case reports in late 2003, an outbreak of lymphogranuloma venereum (LGV) among men who have sex with men (MSM) was described in the Netherlands in 2004 [1-3]. MSM with LGV have presented with severe proctitis, the majority were co-infected with HIV and other sexually transmitted infections (STI) such as Hepatitis C, and reported unprotected anal intercourse [2-5]. Prior to 2003, LGV had been unusual in Western Europe for many years with most cases being imported. Classically, LGV presents as genital ulceration with lymphadenopathy and a secondary anorectal syndrome in tropical and subtropical countries in Africa, Asia, Central and South America [6]. The causative agent of LGV is *Chlamydia trachomatis* belonging to the L serovars and the current outbreak in Europe has been almost exclusively attributed to L2 genotype.

LGV was not a notifiable disease in many countries but enhanced surveillance has been established since 2004 in the Netherlands (January) and the United Kingdom (UK, October), and sentinel surveillance was set up in Germany (May). France introduced sentinel surveillance in January 2005 while LGV reporting in Sweden was performed via the mandatory *Chlamydia* laboratory reporting system since 2004. Other EU Member States did not change their national STI notification systems and LGV cases were reported through routine clinical or laboratory observations. From June 2003, the European Surveillance of Sexually Transmitted Infections (ESSTI) network enabled epidemiologists and microbiologists to communicate, share information and raise alerts on emerging STI or outbreaks of STI via ESSTI_ALERT. This platform was also used to disseminate information about LGV. This report collates data collected through the ESSTI network and comments on the situation regarding LGV five years on from the apparent start of the outbreak in 2003.

Methods

In June 2008, the focal points of 24 countries participating in the ESSTI network were asked to provide information on LGV since 2003 for their respective countries (by short questionnaire). Countries were asked to provide available data on: monthly/quarterly number of cases, their sexual orientation, HIV status, age, sex, concurrent STI, travel abroad, clinical syndrome i.e. ano-rectal or inguinal, clinical symptoms, number of sexual partners in the last three months, and any other information available which they felt was relevant. Where no data or only incomplete data was available, information was compiled from reports of LGV submitted to ESSTI_ALERT during 2004 and 2008.

The ESSTI_ALERT system was developed as an informal system for epidemiologists and microbiologists to facilitate sharing and dissemination of early information on unusual events or outbreaks of STI across Europe. The system is based on a monthly active notification of unusual STI transmission events to the ESSTI coordinating centre meaning that notifications were requested actively each month from the coordination centre and were made using a standard reporting form.

Results

Nine countries (Belgium, Denmark, France, Germany, the Netherlands, Portugal, Spain, Sweden and the UK) provided data on LGV cases. For three additional countries: Ireland, Italy, and

Norway information was compiled using ESSTI alerts from 2007 and 2008.

Trends

From 2002 to 2007, the total number of cases reported was 1,693 (the UK 648 cases, France 556, the Netherlands 255, Germany 159, Belgium 45, Denmark 18, Portugal 8, Spain 4). LGV cases were already reported between 2002 and 2004 in Belgium, the UK, France, the Netherlands and Germany from where cases continued to be diagnosed. The highest number of cases was reported in the third quarter of 2005 with 96 cases diagnosed in the UK. The number of cases in the UK declined in 2006 but increased again in 2007 (Figure 1) and 2008 (191 cases) (data not shown). The Netherlands also saw an increase in the number of LGV cases reported starting towards the end of 2006. In France, the number of cases increased each year since 2002 until 2007 and seemed stable in 2008 with 170 and 174 cases respectively. Denmark, Portugal and Spain - countries that had not seen LGV cases early in the outbreak - started to report cases in 2006 and 2007 (Figure 2).

Characteristics

Characteristics of recent cases were similar to those in early outbreak reports. LGV cases were predominantly found among MSM with between 80-100% of cases in all countries reporting, except for Portugal (Table 1). In France, information on sexual orientation is not available; however, all French cases were male and C. trachomatis serovar L2 was identified from anorectal samples.

The majority of the European cases were co-infected with HIV, with the proportion of HIV-positives ranging from 40% in one sentinel site in Spain (Bilbao) to 100% in Sweden (Table 1).

Data on concurrent infections other than HIV was available from Belgium, Denmark, the Netherlands, Portugal, Spain (Bilbao), and the UK (Table 1). For gonorrhoea the proportion ranged from 0% in Portugal to 25% in the Netherlands and for syphilis co-infections the range was between 6% in the UK where a large number of LGV cases had been detected, to 40% in Portugal.

The clinical presentation was anorectal syndrome in the majority of cases: all cases in Netherlands, both cases in Portugal where the clinical syndrome was known, and 31 out of 36 cases in Denmark. Thirty-eight of 45 cases in Belgium had proctitis. In six cases, LGV was reported as inguinal manifestation (Denmark 5 cases, Spain 1 case).

LGV was mostly diagnosed in MSM aged above 25 years, with the exception of an outbreak in Catalonia where 25 of 28 cases of LGV were in MSM younger than 25 years (Table 1). High numbers of sexual partners were noted for cases in Spain, with more than 20 partners in the last six months reported for three of five cases; while more than five partners in the last six months were reported for eight of 15 cases in Belgium.

Only few male heterosexual cases were reported: two in Portugal, one in Spain (female partner also infected), and three in the UK. In Germany, cases were reported without additional information on sexual orientation.

Reports to ESSTI_ALERT

Reports to ESSTI-ALERT were received from Ireland; two LGV cases, both MSM, one HIV-positive; from Italy, three cases, all MSM, two of whom were HIV-positive; and from Norway, four cases, without additional information. These reports, however, do not necessarily represent the total number detected in each of these countries. Sweden described an LGV cluster of five cases with domestic transmission in a sexual network in Stockholm .

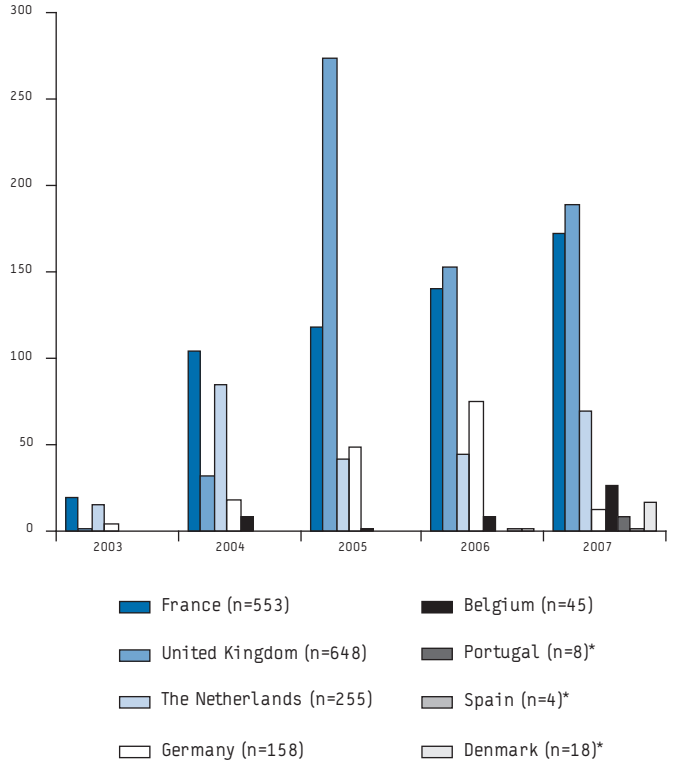
Discussion

From 2003 to 2008 the number of reported cases of LGV has increased in different countries in Europe, with the largest numbers reported in the UK, France, the Netherlands and Germany [7-10]. Moreover, since 2006 LGV has been reported in additional countries including Italy, Austria, Denmark, Portugal and Spain although often with a small total number of cases [11-15]. The profile of infected individuals, MSM with proctitis over 25 years of age and predominantly co-infected with HIV, has remained largely unchanged throughout the epidemic. Only some exceptions were reported, such as a small number of heterosexual cases detected by systematic screening in Portugal, with only few cases in total [14]. In the UK, where over 800 cases were detected, 13 presented with unusual clinical features: five cases of urethral LGV, three cases of LGV-associated inguinal buboes, one case of a solitary LGV penile ulcer and another case with a penile ulcer and bubonulus [16]. A case of bubonulus has also been reported from France [17].

The number of LGV cases continued to increase in several European countries and the characteristics of the patients appear to have remained unchanged, despite a few exceptions. Countries have reported actively on the number of cases detected, however, the reporting is largely influenced by the existence of a national

Figure

Cases of lymphogranuloma venereum in selected European countries, 2002-2007



*Data for 2006 and 2007.

sentinel surveillance system for LGV and the active case finding practices in clinical care across and within countries. The LGV cases presented here are probably largely underestimated due to the fact that cases may not be recognised, remain undiagnosed or are not reportable to national surveillance systems. Furthermore, ESSTI_ALERTS have increased awareness throughout the network but did not involve clinicians in the participating countries. Another weakness in our data and in the literature is a lack of a consistent case definition across Europe and the lack of LGV genotyping in some countries particularly early in the outbreak. Nevertheless, the consistency in the characteristics of patients infected with LGV across Europe suggests that this is a distinct entity.

There is little evidence that the LGV outbreak in MSM has spread to a wider population since 2003. LGV still seems to occur amongst a core group of individuals infected with HIV and with high-risk sexual behaviour [18-20]. The low number of cases among HIV-negative and heterosexual men indicates little bridging between the core MSM and other sexual networks. Molecular typing studies have shown that, where the data is available, the infecting LGV strain belongs primarily to serovar L2b [21] and although variants have been found, these differ from the parent strain by only a few base pairs [22]. This seems to point towards transmission within a closed network but data needs to be interpreted with caution as the molecular typing methods are poorly discriminatory at present. Spaargaren et al. [21] compared strains from the current European outbreak with strains collected in the 1980s in the United States and found both belonging to serovar L2b. The conclusion from this might be that the outbreak has not emerged recently but may rather have gone undetected due to the lack of specific screening for LGV genotypes.

The reasons for the re-emergence of LGV in Europe over the last five to six years remain unclear and it has been suggested that it is the result of the increased availability of molecular diagnostic tests [23]. While there has certainly been considerable development [24-27] and increased use of molecular tests to directly detect C. trachomatis belonging to the L serovars [28], this appears to have been largely in response to a clinical need [29]. There do remain a number of elusive questions regarding the reservoir and mode of transmission that perpetuates the ongoing outbreak. Data regarding the existence of an asymptomatic reservoir are conflicting with only a small number of asymptomatic cases detected in the UK compared to a larger number in the Netherlands [28,30-32], although this may simply reflect variation in protocols for screening and testing of MSM patients across Europe. The inability to detect C. trachomatis serotypes causing LGV in the urethra points at possible transmission through inanimate objects such as sex toys, or the inability of the pathogen to colonise the urethra. High-risk behaviour is now well documented as a characteristic of individuals infected with LGV but the use of enemas and increased number of partners are the only risk factors currently identified [22]. There

Table

Risk factors of LGV cases in selected countries in Europe, 2004-2008

Country	Period	Number of male cases	No. MSM (%)	HIV positive (% of known status)	HIV unknown serostatus (% of total)	Concurrent STI (%)					Age Years
						Syphilis	Gonorrhoea	Hepatitis B	Hepatitis C	Chlamydia infection	
Belgium	2004-2008	43	42* (97.7)	41 (95.3)	0	6 (14)	5 (11.6)	-	-	-	Mean age 38 (range 20-58)
Denmark	2006-2008	43	42 (97)	15 (35)	6 (16.7)	3 (7)	2 (5)	NA	NA	NA	Mean age 38 (range 24-52)
France	2002-2008	725	NA	280 (90)	415 (57)	-	-	-	-	-	Median age 37 (range 20-58)
The Netherlands	2004-2007	225	224 (99.6)	117 (55)	14 (6.2)	27 (12)	56 (24.9)	3 (1.3)	-	-	Mean age 41
Portugal	2007–March 2008	5	3 (60)	3 (100)	2 (40)	2 (40)	-	-	-	3 (60)	Mean age 42 (range 29-52)
Spain: Bilbao	2006-June 2008	5	4* (80)	2 (40)	0	0	1 (20)	0	0	2 (40)	Mean age 35 (range 33-39)
Spain: Catalonia	2007-June 2008	17	17 (100)	16 (94)	0	-	-	-	-	-	Age group 15-24(n=25) 25-44 (n=3)
United Kingdom	2004-2008	848 (763 with further epidemiological data)	756 (99.1)	566 (74)	33 (4)	49 (6)	135(18)	1 (0.1)	112 (15)	-	Mean age 38 (range 19-67)
Sweden	2007-August 2008	9	9 (100)	9 (100)	0	-	-	-	-	-	NA

MSM: men who have sex with men; STI: sexually transmitted infections; NA: not available
*Includes 1 bisexual

is other epidemiological evidence that STI such as syphilis and resistant gonorrhoea are increasing in MSM in many countries, showing that STI infections can spread in sexual networks of MSM across Europe [33].

Sharing of information through the ESSTI has raised awareness for the problem of LGV in MSM. However, cases continue to be detected in many European countries, implying that control and prevention strategies which have so far concentrated on accurate diagnosis and treatment of cases and their sexual partners, have not been optimal. Activities also included raising awareness amongst healthcare professionals and the gay community in some countries. This is in contrast to the situation which occurred in the late 1990s when outbreaks of syphilis were first reported in Western Europe among MSM. A variety of control measures targeting MSM were introduced by countries such as health education and promotion, increased clinic capacity, syphilis screening at social venues and clinics and at HIV treatment centres, distribution of free condom packs, and contact tracing [34]. Despite all these efforts, syphilis rates have reached high levels almost equal to the pre-AIDS era in many countries. Although the numbers of LGV remain small in comparison to the number of syphilis cases reported, it is clear that LGV is becoming endemic in particular sexual networks and alternative approaches to the control of LGV should possibly be considered. Surveillance and monitoring of LGV is currently implemented at EU level by the European Centre for Disease Prevention and Control (ECDC) as part of the enhanced surveillance for STI as agreed with the Member States. Reporting to one European surveillance system shall contribute to the availability of more comparable data on LGV, and STI in general, in the future.

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References

1. van de Laar MJ, Koedijk FD, Gotz HM, de Vries HJ. A slow epidemic of LGV in the Netherlands in 2004 and 2005. Euro Surveill. 2006;11(9):pii=642. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=642
2. Gotz HM, Ossewaarde JM, Nieuwenhuis RF, van der Meijden WI, Dees J, Thio B, et al. [A cluster of lymphogranuloma venereum among homosexual men in Rotterdam with implications for other countries in Western Europe]. [Article in Dutch]. Ned Tijdschr Geneeskd. 2004;148(9):441-2.
3. Nieuwenhuis RF, Ossewaarde JM, van der Meijden WI, Neumann HA. Unusual presentation of early lymphogranuloma venereum in an HIV-1 infected patient: effective treatment with 1 g azithromycin. Sex Transm Infect. 2003;79(6):453-5.
4. Gambotti L and the acute hepatitis C collaborating group. Acute hepatitis C infection in HIV positive men who have sex with men in Paris, France, 2001-2004; http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=535
5. Götz HM, Doornum GJJ van, Niesters HGM, et al. A cluster of acute hepatitis C virus infection among men who have sex with men -- results from contact tracing and public health implications. AIDS. 2005;19(9):969-74
6. Perine PL, Stamm WE. Lymphogranuloma venereum. In: Holmes KK, Mardh PA, Sparling PF, et al., eds. Sexually transmitted diseases. New York, NY:McGraw-Hill;. 1999: p. 423-32.
7. Jebbari H, Alexander S, Ward H, Evans B, Solomou M, Thornton A, et al. Update on lymphogranuloma venereum in the United Kingdom. Sex Transm Infect. 2007;83(4):324-6.
8. Herida M, de Barbeyrac B, Sednaoui P, Scieux C, Lemarchand N, Kreplak G, et al. Rectal lymphogranuloma venereum surveillance in France 2004-2005. Euro Surveill. 2006;11(9):pii=647. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=647
9. Kivi M, Koedijk FD, van der SM, van de Laar MJ. Evaluation prompting transition from enhanced to routine surveillance of lymphogranuloma venereum (LGV) in the Netherlands. Euro Surveill. 2008;13(14):pii-8087. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=8087
10. Bremer V, Meyer T, Marcus U, Hamouda O. Lymphogranuloma venereum emerging in men who have sex with men in Germany. Euro Surveill. 2006;11(9):pii=643. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=643
11. Cusini M, Boneschi V, Arancio L, Ramoni S, Venegoni L, Gaiani F, et al. Lymphogranuloma Venereum: the Italian experience. Sex Transm Infect. 2009;85(3):171-2.
12. Stary G, Stary A. Lymphogranuloma venereum outbreak in Europe. J Dtsch Dermatol Ges. 2008;6(11):935-40.
13. Castro R, Baptista T, Vale A, Nunes H, Prieto E, Mansinho K, et al. Anorectal lymphogranuloma venereum: the first two confirmed cases in Portugal. Euro Surveill. 2008;13(50):pii=19060. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19060
14. Gomes JP, Nunes A, Florindo C, Ferreira MA, Santo I, Azevedo J, et al. Lymphogranuloma venereum in Portugal: unusual events and new variants during 2007. Sex Transm Dis. 2009;36(2):88-91.
15. Vall Mayans M, Sanz CB, Ossewaarde JM. First case of LGV confirmed in Barcelona. Euro Surveill 2005;10(2):E050203. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?PublicationType=W&Volume=10&Issue=5&OrderNumber=2
16. Sethi G, Allason-Jones E, Richens J, Annan NT, Hawkins D, Ekbote A, et al. Lymphogranuloma venereum presenting as genital ulceration and inguinal syndrome in men who have sex with men in London, United Kingdom. Sex Transm Infect. 2009;85(3):165-70.
17. Spenatto N, Boulinguez S, de Barbeyrac B, Viraben R. First case of "bubonulus" in L2 lymphogranuloma venerum. Sex Transm Infect. 2007;83(4):337-8.
18. van den Bos RR, van der Meijden WI. Persistent high-risk sexual behaviour in men who have sex with men after symptomatic lymphogranuloma venereum proctitis. Int J STD AIDS. 2007;18(10):715-6.
19. Hamill M, Benn P, Carder C, Copas A, Ward H, Ison C, et al. The clinical manifestations of anorectal infection with lymphogranuloma venereum (LGV) versus non-LGV strains of Chlamydia trachomatis: a case-control study in homosexual men. Int J STD AIDS. 2007;18(7):472-5.
20. de Vries HJ, Van der Bij AK, Fennema JS, Smit C, de WF, Prins M, et al. Lymphogranuloma venereum proctitis in men who have sex with men is associated with anal enema use and high-risk behavior. Sex Transm Dis. 2008;35(2):203-8.
21. Spaargaren J, Schachter J, Moncada J, de Vries HJ, Fennema HS, Peña AS, et al. Slow epidemic of lymphogranuloma venereum L2b strain. Emerg Infect Dis. 2005;11(11):1787-8.
22. Stary G, Meyer T, Bangert C, Kohrgruber N, Gmeinhart B, Kirnbauer R, et al. New Chlamydia trachomatis L2 strains identified in a recent outbreak of lymphogranuloma venereum in Vienna, Austria. Sex Transm Dis. 2008;35(4):377-82.
23. Schachter J, Moncada J. Lymphogranuloma venereum: how to turn an endemic disease into an outbreak of a new disease? Start looking. Sex Transm Dis. 2005;32(6):331-2.
24. Morré SA, Ouburg S, van Agtmael MA, de Vries HJ. Lymphogranuloma venereum diagnostics: from culture to real-time quadriplex polymerase chain reaction. Sex Transm Infect. 2008;84(4):252-3.

25. Alexander S, Martin IM, Ison C. A comparison of two methods for the diagnosis of lymphogranuloma venereum. J Med Microbiol. 2008;57(Pt 8):962-5.

26. Chen CY, Chi KH, Alexander S, Ison CA, Ballard RC. A real-time quadriplex PCR assay for the diagnosis of rectal lymphogranuloma venereum and non-lymphogranuloma venereum Chlamydia trachomatis infections. Sex Transm Infect. 2008;84(4):273-6.

27. Jalal H, Stephen H, Alexander S, Carne C, Sonnex C. Development of real-time PCR assays for genotyping of Chlamydia trachomatis. J Clin Microbiol. 2007;45(8):2649-53.

28. Morré SA, Spaargaren J, Fennema JS, de Vries HJ, Coutinho RA, Pena AS. Real-time polymerase chain reaction to diagnose lymphogranuloma venereum. Emerg Infect Dis. 2005;11(8):1311-2.

29. Van der Bij AK, Spaargaren J, Morré SA, Fennema HS, Mindel A, Coutinho RA, et al. Diagnostic and clinical implications of anorectal lymphogranuloma venereum in men who have sex with men: a retrospective case-control study. Clin Infect Dis. 2006;42(2):186-94.

30. Ward H, Alexander S, Carder C, Dean G, French P, Ivens D, et al. The prevalence of Lymphogranuloma venereum (LGV) infection in men who have sex with men: results of a multi-centre case finding study. Sex Transm Infect. 2009;85(3):173-5.

31. Annan NT, Sullivan A, Nori A, Naydenova P, Alexander S, McKenna A, et al. Rectal chlamydia - A reservoir of undiagnosed infection in men who have sex with men. Sex Transm Infect. 2009;85(3):176-9.

32. Spaargaren J, Fennema HS, Morré SA, de Vries HJ, Coutinho RA. New lymphogranuloma venereum Chlamydia trachomatis variant, Amsterdam. Emerg Infect Dis. 2005;11(7):1090-2.

33. Savage EJ, Hughes G, Ison C, Lowndes CM, the European Surveillance of Sexually Transmitted Infections (ESSTI) network. Syphilis and gonorrhoea in men who have sex with men: a European overview. Euro Surveill. 2009;14(47):pii=19417. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19417

34. Dougan S, Evans BG, Elford J. Sexually transmitted infections in Western Europe among HIV positive men who have sex with men. Sex Transm Dis. 2007;34(10):783-90.

Viral hepatitis among men who have sex with men, epidemiology and public health consequences

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Viral hepatitis causes major disease burden worldwide, due to the chronic hepatitis sequelae: cirrhosis and primary liver cancer. Transmission of viral hepatitis is a problem not only in low-income countries, but also in high-income ones where viral hepatitis is a frequently occurring infection among men who have sex with men (MSM). Although the transmission routes of the three main hepatitis viruses, A, B and C, differ, MSM mainly acquire viral hepatitis during sexual contact. Vaccination programmes (only available for hepatitis A and B), raising awareness, and screening can be used to prevent transmission. However, despite the introduction of such methods in many high-income countries, the spread of viral hepatitis among MSM is still ongoing. This paper provides an overview of sexually acquired hepatitis A, B, and C among MSM in high-income countries, using recent insights obtained through molecular epidemiology, with the aim to raise awareness, improve vaccination coverage, and stimulate prevention programs.

Introduction

Worldwide, more than two billion people are infected with viral hepatitis A, B or C (HAV, HBV or HCV, respectively). Although the clinical symptoms of these infections are largely similar and include fever, malaise, and jaundice, their frequency and severity differ. HAV is symptomatic mainly in adults, whereas infections with HBV and especially HCV are often asymptomatic. The transmission routes of HAV, HBV, and HCV also differ: HAV spreads through faecal-oral contact, HBV is transmitted by blood contact as well as by sexual contact, and HCV is mainly transmitted by blood contact [1-3]. HAV is self-limiting, a fulminant course of infection is rare and the case fatality rate is low (0.3%). In contrast, 5-10% of adults with acute HBV infection and 50-80% of individuals with acute HCV infection develop persistent viraemia [4, 5]. Over decades, chronic infection with HBV and HCV can lead to liver cirrhosis, hepatocellular carcinoma and eventually death. Spontaneous viral clearance of HAV and HBV, but not HCV, results in life-long immunological protection. HCV re-infection, on the other hand, is frequently observed in individuals with ongoing risk behaviour [6].

In high endemic countries, HAV is mainly transmitted by close contact or as a result of inadequate sanitation (e.g. ingesting contaminated food or water), HBV is mainly transmitted at birth or during early childhood whereas new HCV infections are often health-care associated. In contrast, the majority of new HBV and HCV infections in low endemic countries occur within specific risk groups. HBV spreads among drug users and sexual risk groups, such as men who have sex with men (MSM) and commercial sex workers, whereas HCV has been traditionally restricted to injecting drug users and, before donor screening was introduced, to recipients of blood and blood products. In low endemic areas, new HAV infections occur mostly among travellers returning from high endemic places, causing small outbreaks among unvaccinated children or adults at, for example, child care centres, or among MSM via oro-anal contact [1-3].

There is no specific treatment available for HAV. For chronic HBV carriers treatment includes interferon and nucleoside analogues, while pegylated-interferon, in combination with ribavirin, is available for chronic HCV [1, 2]. For both viruses, but especially chronic HBV, treatment does not always result in viral eradication. An effective vaccine, which gives 20 years to life-long protection, is available for HAV and HBV, while no vaccination is as yet available for HCV, meaning that prevention relies totally on precautionary measures that prevent its further spread [1-3].

In this article, we provide an overview of sexually acquired viral hepatitis among MSM, using recent insights obtained through molecular epidemiology of HAV, HBV, and HCV. In addition we want to stress that, among MSM, awareness and risk perception regarding viral hepatitis needs to be improved in order to increase vaccination coverage and limit further spread of these viruses among the MSM community.

Hepatitis A

In high-income countries such as those in Western Europe and North America, HAV is rarely contracted during childhood, therefore the majority of adults are susceptible to the infection. Individuals living in low endemic countries can contract HAV when they travel to developing countries where the virus still circulates widely. HAV has for many years also been recognised as a sexually transmitted infection (STI), especially among MSM. In Scandinavia – one of the first areas where the incidence and prevalence of HAV declined strongly - outbreaks of hepatitis A among MSM were already reported about three decades ago [7, 8]. In a cohort study of MSM in Amsterdam, performed at the time of the Scandinavian outbreaks, 42% of 689 MSM tested positive for HAV antibodies.

HAV prevalence was shown to increase with the time the person had been homosexually active, and strongly exceeded the prevalence in the general population [9]. Among susceptible MSM, the HAV incidence was about 7% per year and correlated with the number of sexual partners. Other early studies identified oro-anal sexual contact as the most likely transmission route among MSM [10]. In recent years, outbreaks of hepatitis A among MSM have been described in most high-income countries [11].

The molecular typing of HAV isolates is used to gain a better insight into how HAV spreads among the population. In a study in Amsterdam in 2000-2002, HAV isolated from stool samples of acute HAV cases was amplified and sequenced [12]. Two separate transmission chains with little mutual interrelation were found: one among MSM (mostly genotype 1A) and another among travellers from HAV-endemic countries (genotype 1B and genotype 3). The patterns of HAV introduction and transmission in these groups were further investigated, using cluster analysis based on the genetic distances between the HAV isolates obtained during the acute phase of infection [13]. Large clusters were found among MSM, indicating the ongoing spread of specific HAV viruses among this group.

Among travellers, introductions of new HAV strains from endemic countries occur regularly, especially after the summer holidays. Transmission to close contacts occurs on a limited scale. These outbreaks are usually detected early and stopped through preventive measures (vaccination).

Recently, a collaborative European study was undertaken to determine if HAV strains that cause outbreaks among MSM in different countries are genetically related [11]. By comparing sequences, it was shown that the majority of strains found among MSM in the participating European countries formed closely related clusters belonging to genotype 1A. Similar strains found among MSM during a nearly 10-year period (1995-2005) indicated that these specific strains have been circulating among this risk group for a long time. This shows that HAV is transmitted through sexual networks of MSM throughout Europe and possibly other high-income countries.

Although co-infection of HIV and HAV suggests no impact of HAV infection on the progression rate of HIV, HIV-positive patients co-infected with HAV should be carefully monitored since their HAV infection is more likely to be symptomatic and of longer duration [14]. There is also evidence for a higher lever of viraemia [15]. However, depending on the CD4 count (>200 cells/mm^3), HIV infection does not influence the outcome of acute hepatitis A [14].

Hepatitis B

Transmission of HBV is a problem not only in highly endemic countries, but also in low endemic countries with a low HBV prevalence and incidence. In these countries, transmission of HBV occurring at birth or during early childhood is rare, and the infection is mainly restricted to specific risk groups, such as MSM who acquire HBV mainly through sexual contact [16]. Injecting drug use (IDU) remains an important risk factor for HBV transmission, especially in eastern European countries. However, a decline in IDU HBV cases has been observed in many high-income countries in the past decade [17].

HBV can be transmitted through mucosal contact, making it not only a blood-borne virus, but also an STI. HBV has been recognised as an important STI among MSM for many years, especially as HBV is far more infectious than HIV. The HBV incidence among MSM is estimated to be twenty times higher than among the general population. The high prevalence, together with the increased transmission rates associated with unprotected anal intercourse, makes MSM more prone to becoming infected with HBV than the heterosexual population.

In the 1980s, a steep decline was observed in HBV incidence among MSM [18, 19]. From the 1990s to date, the incidence has remained stable at a low level with some small fluctuations. The steep decline in the 1980s probably reflected a decrease in sexual risk behaviour among MSM caused by HIV/AIDS awareness. No such change in incidence was observed for HAV, most likely due to ongoing transmission through the faecal-oral route and since the perception of the risk of an HAV infection is low. HCV incidence follows a different course, which is described in the next paragraph.

Recent molecular epidemiological studies have shown that an identical HBV genotype A strain has been circulating among MSM for many years. This is not only the case in Europe, for example, in the United Kingdom and the Netherlands, but also in other countries around the globe, like Japan [19-21]. For HAV and HCV, several studies have shown that there is ongoing transmission of several different MSM-specific viral strains within MSM networks [11,22]. Thus far, research indicates that just one HBV strain circulates among MSM in high-income countries. A reason for this could be that genotype A is the predominant genotype in many of these high-income countries. Furthermore, due to the high stability of the HBV genome, it is hard to make a clear distinction between new introductions and ongoing transmission of certain strains compared to HAV and HCV. Another reason could be that in these studies, only the S-gene was sequenced, therefore, regarding the low variability in the genome, it might be better to do full genome sequencing analyses. To ascertain whether this single genotype A strain is the only strain circulating among the majority of MSM in high-income countries, further international collaboration, including testing of samples from a larger set of countries, is needed.

In the MSM community, 6-10% of HBV-infected men are co-infected with HIV [23]. HBV is more progressive in HIV-positive patients, and both the HBV carrier rates and the viral load are higher. The episodes of HBV activation are also more frequent, cirrhosis occurs more rapidly and hepatocellular carcinoma is more frequent than in HBV mono-infected patients [23]. When there is co-infection with HIV, HBV treatment options are limited and treatment outcomes are negatively influenced. Mono-therapy for both HIV and HBV is not appropriate due to the high possibility of resistance [23]. Since many of the antiviral agents used for HBV treatment are included in the HAART regiment against HIV as well, caution should be taken when starting treatment for either HBV or HIV.

Hepatitis C

HCV is primarily transmitted by exposure to infected blood. In high-income countries, parenteral risk factors, particularly IDU, now account for the vast majority of HCV transmissions [1]. Even in the presence of HIV co-infection, HCV is rarely transmitted through heterosexual intercourse [24]. However, recent outbreaks of acute HCV among HIV-positive MSM who deny IDU suggest that the epidemiology of HCV transmission is changing in this population. In several European countries [25-27] as well as in the United

States [28] and Australia [29], HCV has unexpectedly emerged as an STI among HIV-positive MSM. Longitudinal cohort studies have confirmed a marked increase in HCV incidence among HIV-positive MSM, but not HIV-negative MSM, after the year 2000. In Amsterdam, HCV incidence rose 10-fold to 8.7 per 1,000 person years in the period 2000-2003 compared with 0.8 per 1,000 person years in the period 1984-1999 [27]. The HCV prevalence among HIV-positive MSM visiting the STI clinic in Amsterdam reached an alarming 15-20% in the period 2007-2008, versus an estimated 1-4% before 2000. HCV prevalence found among HIV-negative MSM was significantly lower (0.4%) in this study [30]. Also in London, the estimated annual HCV-incidence in HIV-positive MSM attending HIV and sexual health clinics rose by 20% each year to 12 per 1,000 person years in the first six months of 2006 [31]. To what extent HCV affects communities of HIV-positive MSM in other high-income countries remains unclear.

Molecular typing of HCV isolates confirmed the presence of MSM-specific transmission networks in London [25], Paris [26] and Amsterdam [27]. A collaborative phylogenetic study revealed that these locally reported outbreaks were in fact part of one larger interconnected European transmission network [22]. MSM-specific HCV strains, mainly of difficult-to-treat HCV genotypes 1 and 4, were detected in 86% of European MSM with acute HCV. Once introduced, these strains rapidly spread to neighbouring countries; in fact, 74% of European HCV/HIV co-infected MSM were infected with MSM-specific strains that circulated in more than one European country. In contrast, the HCV outbreak in Australia showed very limited overlap with the transmission network in Europe, and has a (much) larger proportion of infections attributable to concomitant IDU [22, 29].

The sudden emergence of HCV as an STI among HIV-positive MSM is poorly understood. As multiple strains of different HCV genotypes circulate among HIV-positive MSM, this suggests a behavioural change in MSM rather than evolution of the virus into a more virulent variant. Evolutionary analysis confirms that HCV had been introduced into the population as early as the 1980s, most likely from the IDU-scene, but its actual spread only started after 1996 [22]. This coincides with the introduction of HAART, which was followed by a decline in HIV risk perception and a rise in sexual risk behaviour among MSM [32]. Only one case-control study with detailed information on risk behaviour has examined its independent relation with acute HCV [25]. This study suggests that in the context of (traumatic) sexual practises, permucosal risk factors were associated with acute HCV infection. Rough sexual techniques, such as fisting; a higher number of sexual partners and group sex; co-infection with ulcerative STI such as syphilis, herpes, and lymphogranuloma venereum (LGV); sex under the influence of drugs (especially when applied anally); the use of rectal enema; and the presence of haemorrhoids have been identified as potential risk factors for sexually acquired HCV [25,30,33]. However, these factors cannot explain why there was no evidence of sexual transmission in the 1980s, a period in which STI and sexual risk taking were highly prevalent among MSM [27].

Nearly all MSM with acute HCV are co-infected with HIV. HIV infection might facilitate HCV transmission by increasing viral infectiousness through higher HCV viral loads in blood and semen [34] as well as viral susceptibility through HIV-impaired immunological control [35]. Even in the presence of preserved overall CD4 counts (>500 cells/mm^3), massive irreversible damage already occurs to the mucosal tissues of the gastrointestinal immune system in the first weeks of HIV infection [36] which could facilitate HCV entry through the mucosa. Moreover, serosorting (engaging in sexual contact with partners of the same HIV serostatus), which is considered a risk reduction strategy for HIV transmission, might fuel the epidemic of other STI, including HCV [37].

The emergence of HCV among HIV-positive MSM has serious clinical implications. HIV/HCV co-infection negatively influences the natural course of HCV infection, in particular when HCV is acquired after HIV and at an older age (>40 years) [28]. HIV/HCV co-infection is associated with lower rates of spontaneous viral clearance, accelerated progression to liver disease and less favourable treatment outcome [38]. HCV antiretroviral therapy achieves sustained virological response in less than 20% of HIV-positive individuals chronically infected with HCV genotypes 1 and 4. However, more favourable response rates have been reported for HIV-positive MSM treated during the acute phase of HCV infection [39].

Preventive measures against viral hepatitis in MSM

In high-income countries, MSM apparently are a major risk group for viral hepatitis. Several studies have shown that MSM-specific strains of HAV, HBV, and HCV circulate among the MSM community, strongly suggesting the presence of MSM-specific networks driven by sexual contact [11-13, 18-22, 26, 30, 40].

Universal vaccination for HAV is only recommended by the WHO in intermediate endemic countries; low endemic countries are advised to limit vaccination to risk groups, like MSM [41]. However, only a few high-income countries have implemented targeted vaccination campaigns for HAV. According to Jacobs *et al.*, the cost-effectiveness of the HAV/HBV combination vaccine in high-risk groups is higher than that of the HBV vaccine alone [42]. Therefore, to increase the HAV coverage, HAV vaccination should be considered for implementation within the existing HBV campaigns for MSM.

Preventive measures for HBV among MSM consist of vaccination and awareness campaigns as well as screening for chronic infections. Vaccination of close contacts and treatment of chronically infected patients reduce the number of secondary infections. Treatment of chronic HBV carriers is also in the interest of the infected patient, as it prevents the long-term sequelae of HBV. Despite the introduction of an effective vaccine more than 25 years ago and the implementation of universal or behavioural risk group vaccination strategies in most high-income countries years ago, HBV is still endemic among MSM. A reason for this ongoing transmission among MSM is that universal vaccination programmes among newborns, with or without catch-up vaccination among adolescents, have up till now left the adult MSM population at risk. Targeted vaccination fails to reach a substantial proportion of MSM at risk and appears to be insufficient to reduce the incidence among this group [43, 44]. Consequently, independent of the various countries' current prevention strategies, the majority of MSM will remain at risk of HBV infection for at least the next decade. Universal vaccination will eventually prevent the ongoing transmission of HBV among MSM, depending on the coverage of these programmes. In the meantime, efforts should be directed towards promoting the HBV vaccination of MSM as early as possible after they become sexually active and targeted at those who are at greatest risk [45].

HBV co-infection in individuals living with HIV increases liver-related mortality and morbidity, toxicity of antiretroviral therapy, and complicates treatment decisions. Therefore, all HIV-infected MSM should receive HBV vaccination. However, the response rate to HBV vaccination is lower (18-71%) and HIV-infected MSM are also less likely to achieve and maintain high (protective) anti-HBs titres [46]. The response rate to HAV vaccination in HIV-infected patients is also lower compared to immunocompetent individuals. The low CD4 cell count and not yet being on HAART are the two main reasons for this low response rate [46, 47]. Administrating higher vaccine doses, revaccination, or postponing vaccination until HAART reaches a higher CD4 count are the current strategies to achieve higher response rate to HAV and HBV vaccination [46, 48-50].

Depending on future improvements in treatment, systematic screening of the MSM population for chronic HBV infections might be feasible. In countries with a targeted vaccination strategy, screening for HBV is automatically embedded in the programme [43]. Screening of migrants, even those with a low HBsAg prevalence (2.2%), has been shown to be cost-effective, because early detection of chronic infections and referral of chronic carriers has a positive impact on liver-related health outcomes and prevents secondary infections [51]. Since in some countries, the HBsAg prevalence among MSM is comparable or even higher than in migrant populations, it is likely that HBV screening of MSM is cost-effective, as well.

Since no vaccination is available for HCV, HIV-infected MSM should be regularly screened for HCV infection. Early detection and treatment of HCV during the acute phase has been associated with a more favourable HCV treatment outcome [39]. Successful treatment prevents secondary infections to HIV-positive sexual contacts and could possibly prevent spill-over to the HIV-negative population [31]. In contrast to HCV screening of the general population, HCV screening of groups with an elevated risk, like IDU, is cost-effective [52]. HIV-infected MSM have now also been recognised as a high risk group for HCV infection. Therefore, screening of this group might also be cost-effective. Screening for HCV infection could be done regularly by, for example, an HIV specialist or at STI clinics for early diagnosis. STI clinics, especially, have the means, the knowledge and the reach to inform high-risk groups about emerging STI like HCV. In addition, because HAV is not yet well known as an STI, promotion of HAV vaccination should be stimulated.

Concluding remarks

Failure to control the spread of HBV among MSM despite the long-term availability of an effective vaccine indicates that vaccines alone are not sufficient to control STI among high-risk groups. Increasing risk perception and awareness of the clinical consequences of STI is essential. Nevertheless, in practice it appears to be difficult to reach MSM who are at high risk of STI, as many do not consider themselves to be at risk or are unaware of the severe clinical consequences of some STI. To limit the spread of viral hepatitis among MSM, raising awareness and increasing risk perception needs to be combined with vaccination programmes.

References

1. Lauer GM, Walker BD. Hepatitis C virus infection. N Engl J Med. 2001;345(1):41-52.
2. Lavanchy D. Hepatitis B virus epidemiology, disease burden, treatment, and current and emerging prevention and control measures. J Viral Hepat. 2004;11(2):97-107.
3. World Health Organization (WHO). Hepatitis A. Fact sheet No 328. Geneva: WHO. [Accessed 24 Nov 2009]. Available from: http://www.who.int/mediacentre/factsheets/fs328/en/index.html
4. Bezemer G, Schalm SW, van Gool AR, de Knegt RJ. [Changes in the management of patients with side effects from the treatment of hepatitis C]. Ned Tijdschr Geneeskd. 2007;151(9):525-30. Dutch.
5. Hyams KC. Risks of chronicity following acute hepatitis B virus infection: a review. Clin Infect Dis. 1995;20(4):992-1000.
6. van de Laar TJ, Molenkamp R, van den Berg C, Schinkel J, Beld MG, Prins M, et al. Frequent HCV reinfection and superinfection in a cohort of injecting drug users in Amsterdam. J Hepatol. 2009;51(4):667-74.
7. Christenson B, Brostrom C, Bottiger M, Hermanson J, Weiland O, Ryd G, et al. An epidemic outbreak of hepatitis A among homosexual men in Stockholm. Hepatitis A, a special hazard for the male homosexual subpopulation in Sweden. Am J Epidemiol. 1982;116(4):599-607.
8. Hoybye G, Skinhoj P, Hentzer B, Faber V, Mathiesen L. An epidemic of acute viral hepatitis in male homosexuals. Etiology and clinical characteristics. Scand J Infect Dis. 1980;12(4):241-4.
9. Coutinho RA, Albrecht-van Lent P, Lelie N, Nagelkerke N, Kuipers H, Rijsdijk T. Prevalence and incidence of hepatitis A among male homosexuals. Br Med J (Clin Res Ed). 1983;287(6407):1743-5.
10. Corey L, Holmes KK. Sexual transmission of hepatitis A in homosexual men: incidence and mechanism. N Engl J Med. 1980;302(8):435-8.
11. Stene-Johansen K, Tjon G, Schreier E, Bremer V, Bruisten S, Ngui SL, et al. Molecular epidemiological studies show that hepatitis A virus is endemic among active homosexual men in Europe. J Med Virol. 2007;79(4):356-65.
12. van Steenbergen JE, Tjon G, van den Hoek A, Koek A, Coutinho RA, Bruisten SM. Two years' prospective collection of molecular and epidemiological data shows limited spread of hepatitis A virus outside risk groups in Amsterdam, 2000-2002. J Infect Dis. 2004;189(3):471-82.
13. Tjon G, Xiridou M, Coutinho R, Bruisten S. Different transmission patterns of hepatitis A virus for two main risk groups as evidenced by molecular cluster analysis. J Med Virol. 2007;79(5):488-94.
14. Fonquernie L, Meynard JL, Charrois A, Delamare C, Meyohas MC, Frottier J. Occurrence of acute hepatitis A in patients infected with human immunodeficiency virus. Clin Infect Dis. 2001;32(2):297-9.
15. Laurence J. Hepatitis A and B virus immunization in HIV-infected persons. AIDS Read. 2006;16(1):15-7.
16. Lavanchy D. Worldwide epidemiology of HBV infection, disease burden, and vaccine prevention. J Clin Virol. 2005;34 Suppl 1:S1-3.
17. Van Houdt R, van den Berg CH, Stolte IG, Bruisten SM, Dukers NH, Bakker M, et al. Two decades of hepatitis B infections among drug users in Amsterdam: are they still a high-risk group? J Med Virol 2009; 81(7):1163-1169.
18. Koedijk FDH, Op de Coul ELM, Cremer J, Hahne S, Coutinho RA, Boot HJ, et al. [Incidence and molecular epidemiology of hepatitis B virus, Netherlands, 2004 – 2007]. RIVM Briefrapport 210011001/2008. Dutch.
19. Van Houdt R, Bruisten SM, Geskus RB, Bakker M, Wolthers KC, Prins M, Coutinho RA. Ongoing transmission of a single hepatitis B virus strain among men having sex with men in Amsterdam. J Viral Hepat. 2009 Oct 7. [Epub ahead of print]
20. Koibuchi T, Hitani A, Nakamura T, Nojiri N, Nakajima K, Jyuji T, et al. Predominance of genotype A HBV in an HBV-HIV-1 dually positive population compared with an HIV-1-negative counterpart in Japan. J Med Virol. 2001;64(4):435-40.
21. Sloan RD, Strang AL, Ramsay ME, Teo CG. Genotyping of acute HBV isolates from England, 1997-2001. J Clin Virol. 2009;44(2):157-60.
22. van de Laar T, Pybus O, Bruisten S, Brown D, Nelson M, Bhagani S, et al. Evidence of a large, international network of HCV transmission in HIV-positive men who have sex with men. Gastroenterology. 2009;136(5):1609-17.
23. Sherman M. Strategies for managing coinfection with hepatitis B virus and HIV. Cleve Clin J Med. 2009;76 Suppl 3:S30-3.
24. Terrault NA. Sexual activity as a risk factor for hepatitis C. Hepatology. 2002;36(5 Suppl 1):S99-105.
25. Danta M, Brown D, Bhagani S, Pybus OG, Sabin CA, Nelson M, et al. Recent epidemic of acute hepatitis C virus in HIV-positive men who have sex with men linked to high-risk sexual behaviours. AIDS. 2007;21(8):983-91.
26. Serpaggi J, Chaix ML, Batisse D, Dupont C, Vallet-Pichard A, Fontaine H, et al. Sexually transmitted acute infection with a clustered genotype 4 hepatitis C virus in HIV-1-infected men and inefficacy of early antiviral therapy. AIDS. 2006; 20(2):233-40.
27. van de Laar TJ, van der Bij AK, Prins M, Bruisten SM, Brinkman K, Ruys TA, et al. Increase in HCV incidence among men who have sex with men in Amsterdam most likely caused by sexual transmission. J Infect Dis. 2007;196(2):230-8.
28. Fierer DS, Uriel AJ, Carriero DC, Klepper A, Dieterich DT, Mullen MP, et al. Liver fibrosis during an outbreak of acute hepatitis C virus infection in HIV-infected men: a prospective cohort study. J Infect Dis. 2008;198(5):683-6.

29. Matthews GV, Hellard M, Kaldor J, Lloyd A, Dore GJ. Further evidence of HCV sexual transmission among HIV-positive men who have sex with men: response to Danta et al. AIDS. 2007;21(15):2112-3.
30. Urbanus AT, van de Laar TJ, Stolte IG, Schinkel J, Heijman T, Coutinho RA, et al. Hepatitis C virus infections among HIV-infected men who have sex with men: an expanding epidemic. AIDS. 2009;23(12):F1-7.
31. Giraudon I, Ruf M, Maguire H, Charlett A, Ncube F, Turner J, et al. Increase in diagnosed newly acquired hepatitis C in HIV-positive men who have sex with men across London and Brighton, 2002-2006: is this an outbreak? Sex Transm Infect. 2008;84(2):111-5.
32. Stolte IG, Dukers NH, Geskus RB, Coutinho RA, de Wit JB. Homosexual men change to risky sex when perceiving less threat of HIV/AIDS since availability of highly active antiretroviral therapy: a longitudinal study. AIDS. 2004;18(2):303-9.
33. Turner JM, Rider AT, Imrie J, Copas AJ, Edwards SG, Dodds JP, et al. Behavioural predictors of subsequent hepatitis C diagnosis in a UK clinic sample of HIV positive men who have sex with men. Sex Transm Infect. 2006;82(4):298-300.
34. Briat A, Dulioust E, Galimand J, Fontaine H, Chaix ML, Letur-Konirsch H, et al. Hepatitis C virus in the semen of men coinfected with HIV-1: prevalence and origin. AIDS. 2005;19(16):1827-35.
35. Mattapallil JJ, Douek DC, Hill B, Nishimura Y, Martin M, Roederer M. Massive infection and loss of memory CD4+ T cells in multiple tissues during acute SIV infection. Nature. 2005;434(7037):1093-7.
36. Lackner AA, Mohan M, Veazey RS. The gastrointestinal tract and AIDS pathogenesis. Gastroenterology. 2009;136(6):1965-78.
37. Parsons JT, Schrimshaw EW, Wolitski RJ, Halkitis PN, Purcell DW, Hoff CC, et al. Sexual harm reduction practices of HIV-seropositive gay and bisexual men: serosorting, strategic positioning, and withdrawal before ejaculation. AIDS. 2005;19 Suppl 1:S13-25.
38. Graham CS, Baden LR, Yu E, Mrus JM, Carnie J, Heeren T, et al. Influence of human immunodeficiency virus infection on the course of hepatitis C virus infection: a meta-analysis. Clin Infect Dis. 2001;33(4):562-9.
39. Matthews GV, Hellard M, Haber P, Yeung B, Marks P, Baker D, et al. Characteristics and treatment outcomes among HIV-infected individuals in the Australian Trial in Acute Hepatitis C. Clin Infect Dis. 2009;48(5):650-8.
40. van Houdt R, Bruisten SM, Koedijk FD, Dukers NH, Op de Coul EL, Mostert MC, et al. Molecular epidemiology of acute hepatitis B in the Netherlands in 2004: nationwide survey. J Med Virol. 2007;79(7):895-901.
41. World Health Organization (WHO). Immunization, Vaccines and Biologicals: Hepatitis A vaccine. Geneva: WHO. [Accessed 24 Nov 2009]. Available from: http://www.who.int/vaccines/en/hepatitisa.shtml
42. Jacobs RJ, Meyerhoff AS. Cost-effectiveness of hepatitis A/B vaccine versus hepatitis B vaccine in public sexually transmitted disease clinics. Sex Transm Dis. 2003;30(11):859-65.
43. van Houdt R, Koedijk FD, Bruisten SM, Coul EL, Heijnen ML, Waldhober Q, et al. Hepatitis B vaccination targeted at behavioural risk groups in the Netherlands: does it work? Vaccine. 2009;27(27):3530-5.
44. Zuckerman J, van Hattum J, Cafferkey M, Gjorup I, Hoel T, Rummukainen ML, et al. Should hepatitis B vaccination be introduced into childhood immunisation programmes in northern Europe? Lancet Infect Dis. 2007;7(6):410-9.
45. Xiridou M, Wallinga J, Dukers-Muijers N, Coutinho R. Hepatitis B vaccination and changes in sexual risk behaviour among men who have sex with men in Amsterdam. Epidemiol Infect. 2009;137(4):504-12.
46. Kim HN, Harrington RD, Crane HM, Dhanireddy S, Dellit TH, Spach DH. Hepatitis B vaccination in HIV-infected adults: current evidence, recommendations and practical considerations. Int J STD AIDS. 2009;20(9):595-600.
47. Neilsen GA, Bodsworth NJ, Watts N. Response to hepatitis A vaccination in human immunodeficiency virus-infected and -uninfected homosexual men. J Infect Dis. 1997;176(4):1064-7.
48. Brook G. Prevention of viral hepatitis in HIV co-infection. J Hepatol. 2006;44(1 Suppl):S104-7.
49. Fonseca MO, Pang LW, de Paula Cavalheiro N, Barone AA, Heloisa Lopes M. Randomized trial of recombinant hepatitis B vaccine in HIV-infected adult patients comparing a standard dose to a double dose. Vaccine. 2005;23(22):2902-8.
50. Rey D, Krantz V, Partisani M, Schmitt MP, Meyer P, Libbrecht E, et al. Increasing the number of hepatitis B vaccine injections augments anti-HBs response rate in HIV-infected patients. Effects on HIV-1 viral load. Vaccine. 2000;18(13):1161-5.
51. Veldhuijzen IK, Toy M, Hahne SJ, de Wit GA, Schalm SW, de Man RA, et al. Screening and early treatment of migrants for chronic hepatitis B virus infection is cost-effective. Gastroenterology. 2009 Oct 28. [Epub ahead of print].
52. Sroczynski G, Esteban E, Conrads-Frank A, Schwarzer R, Muhlberger N, Wright D, et al. Long-term effectiveness and cost-effectiveness of screening for hepatitis C virus infection. Eur J Public Health. 2009;19(3):245-53.

The effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe: A systematic review

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Given the need of programme planners and policy makers for descriptions of specific interventions and quantitative estimates of intervention effects to make informed decisions concerning prevention funding and research, there is a need for a systematic review that updates the current knowledge base about HIV/STI preventive interventions targeted at men who have sex with men (MSM) in Europe. The aim was to summarise and assess the effectiveness of HIV/STI prevention interventions for MSM living in Europe, and to identify intervention characteristics associated with effectiveness as well as potential gaps in the evidence base. A systematic search for relevant literature in eight international databases and in reference lists of relevant reviews and included studies was performed. Studies were selected according to pre-specified criteria and appraised for risk of bias. We summarised results using tables and calculated effect estimates for sexual behaviour outcomes. Results from six controlled studies, involving a total of 4,111 participants at entry from four different European countries were summarised. The results showed that there was 'high' or 'unclear' risk of bias in one or more of the assessed domains in all studies. The pooled effect estimate of the four interventions for which data were available suggested that MSM who participate in HIV/STI prevention initiatives may be somewhat less likely to report unprotected anal intercourse (UAI). The evidence base was insufficient to examine characteristics of interventions most closely associated with magnitude of effect and to draw solid conclusions about unique gaps in the evaluation literature. Despite the maturity of the HIV epidemic, rigorous outcome evaluations of any form of behavioural HIV/STI intervention for MSM in Europe are scarce. The results point to possible short term effects of interventions in terms of reductions in the proportion of MSM who engage in UAI, but the paucity of controlled studies demonstrates the need for research in this area. There is an overall deficit in outcome evaluations of interventions aimed at reducing HIV/STI risk behaviour among MSM in Europe. Designing behavioural HIV/STI preventive strategies to avert new infections, and the evaluation of such prevention programmes for MSM is an important component of a comprehensive HIV/STI containment strategy across the continuum of prevention and care.

Introduction

Across Europe, the HIV/AIDS epidemic has caused tremendous human suffering and financial loss as the number of new diagnoses of HIV infections has continued to increase: from 2000 to 2007, the annual rate of reported HIV infection increased from 39 to 75 per million [1]. In Europe, men who have sex with men (MSM) continue to be the population most affected by HIV, and the rate of infections is increasing faster among MSM than among other populations [2,3]. In high-income European countries, MSM remain the group at highest risk for HIV [1], and unprotected sex remains the most frequent mode of transmission. There has been an increase in the rate of MSM who report unprotected anal intercourse (UAI). For example, in London, between 1998 and 2002 there was a doubling in the percentage of MSM reporting UAI with a casual partner of unknown or discordant HIV status, increasing from 7% to 16% [4]. Recent outbreaks of syphilis and gonorrhoea in several major European cities suggest a trend for increased sexual risk taking among MSM [5,6,7].

In the absence of an effective and affordable vaccine and non-curative abilities of current antiretroviral therapies, behavioural and psychosocial prevention with the goal of limiting sexual risk behaviours remains central to the efforts to decrease sexual HIV/STI transmissions among MSM [8]. Further, while antiretroviral therapy treatments have tremendous life-saving potential, they are expensive and carry debilitating side-effects for some people [9]. Behavioural and psychosocial HIV/STI risk reduction interventions to reduce unprotected sex among MSM range from individual-level interventions and group level-programmes, to community-level interventions [10,11]. Such interventions will continue to be vital in the battle against HIV/STI, and therefore it is important to find out whether they help, harm or are ineffective.

The effectiveness of HIV/STI preventive interventions targeted at MSM has been assessed in various publications. Most recently, in 2008 Johnson *et al.* systematic Cochrane review evaluated the effects of behavioural interventions to reduce risk for sexual transmission of HIV among MSM [12]. The review included 58 randomised controlled trials (RCT), of which almost three quarters were from the United States (US). The review concluded that behavioural interventions reduced UAI by 27% compared to minimal or no HIV preventive intervention. A few other reviews have been published about the effectiveness of HIV prevention interventions, but most of these are not specific to MSM. When the target population has comprised MSM, MSM in Europe have not been the focus. Further, the majority of reviews have neither utilised a comprehensive search strategy nor clear inclusion criteria, and many of the reviews are out of date, having been published before or shortly after the year 2000. Therefore, there is a need for a systematic review that incorporates explicit inclusion criteria and that updates the current knowledge base about HIV/STI preventive

interventions targeted at MSM in Europe. The objectives of the systematic review were to

1. Identify and describe outcome studies evaluating the effectiveness of HIV/STI prevention interventions on UAI for MSM living in Europe.
2. Summarise the effectiveness of HIV/STI prevention interventions for MSM in reducing unprotected anal sex, and, if available and possible, HIV/STI infections.
3. Identify intervention characteristics associated with effectiveness.
4. Identify gaps in a) subpopulations targeted, b) intervention characteristics incorporated, c) outcomes evaluated, d) methodological matters.

Methods

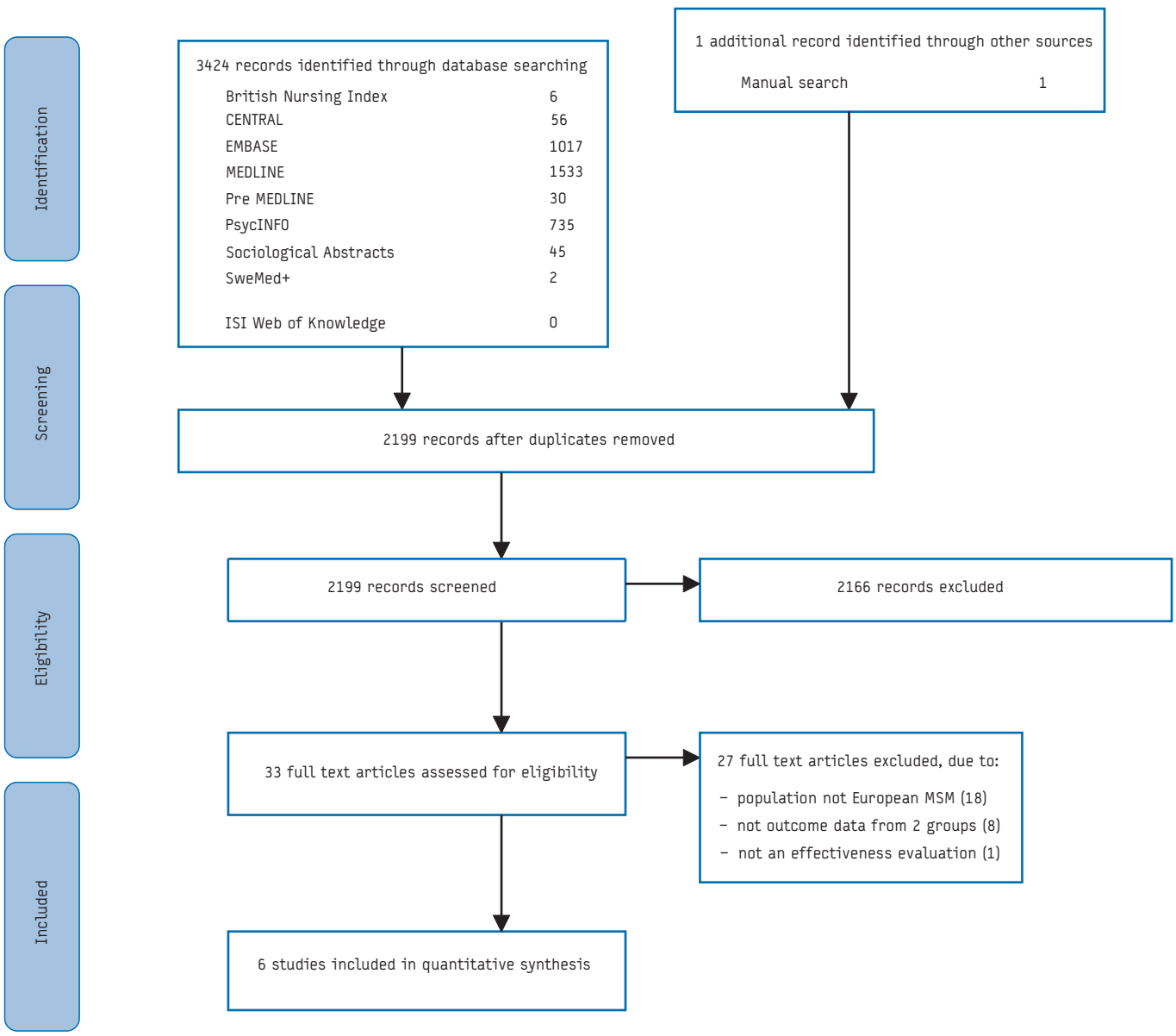
The completion of the systematic literature review was in accordance with the Cochrane Collaboration standards [13].

Search methods for identification of studies

The primary method of study identification was electronic searches. Under the guidance of the author, a research librarian designed and executed the electronic database search. References

Figure 1

PRISMA flow diagram of the literature reviewing process. Literature review on the effectiveness of behavioural and psychosocial HIV/STI prevention interventions for men who have sex with men in Europe. Berg R, 2009



Source: Effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe, 2009. European Centre for Disease Prevention and Control.

in obtained reviews and included primary studies were scanned to identify new leads and included studies were looked up in ISI Web of Knowledge in order to identify further studies.

We applied the population, intervention, comparison, outcome (PICO) model described by Sackett *et al.* with respect to criteria for considering studies [14]. Concerning population, the intervention had to be received by MSM, who resided in the European region. We introduced the regional specification to ensure the included studies were clearly relevant for European-based research and intervention activities. We enforced no other limitations on participant characteristics. All forms of behavioural and psychosocial interventions designed to promote safer sexual risk behaviours among MSM were eligible for inclusion. There were no restrictions in level or mode of delivery. Regarding types of comparisons, we accepted no intervention, minimal intervention, placebo psychotherapy, standard treatment, or other active HIV/STI preventive intervention condition. We viewed studies in scope if they included measurement of sexual behavioural or biological outcome indicative of HIV/STI transmission risk.

With respect to study design, eligible studies were RCT, controlled clinical trials (CCT), and controlled before-and-after (CBA) studies. Lastly, only publications written in English, German, or one of the Scandinavian (Danish, Norwegian, Swedish) languages were included. To ensure that all research included was relatively new, we included only publications that were published in or after the year 2000.

The screening of literature was carried out in a three-stage procedure (screening of title, abstract, full text) whereby each level consisted of increasing scrutiny of the studies based on the inclusion and exclusion criteria of the review, as described above.

Table 1

Description of included studies (n=6). Literature review on the effectiveness of behavioural and psychosocial HIV/STI prevention interventions for men who have sex with men in Europe. Berg R, 2009

Author, year (data collected) (follow up)	Population characteristics				Intervention	Comparison	Outcome
	n	Residency	Age	HIV status			
RCTs							
Amirkhanian, 2005 (2003–2004) (3 months, 12 months follow-up)	276	Russia (St. Petersburg), Bulgaria (Sofia)	Mean 22.5	Not reported	Standard individual HIV risk-reduction educational counselling (20 min) + HIV prevention advice, by trained network leaders. Participants reported mean of 6.1 conversations about AIDS and 8 about safer sex	Wait list control usual care	UAI; UAI with multiple partners
Harding, 2004 (~2000) (2 months, 5 months follow-up)	50	England	Mean 41.5	22% HIV+, 57% HIV-, 20% untested	Course about SM sex. Four group sessions of 7h (total 28h), by volunteers at community-based, volunteer-led organisation	Wait list control	UAI
Imrie, 2001 (1995–1997) (6 months, 12 months follow-up)	343	England (London)	Median 29	Not reported	Standard 20 min sexual risk behaviour counselling + one day cognitive behavioural (group) workshop, by trained counsellors from STI clinic	Standard treatment (20 min counselling)	UAI; new STI
van Kesteren, 2007 (2004–2005) (3 months follow-up)	162	Netherlands	Mean 43.2	100% HIV+	Self-help booklet + motivational interview (face-to-face) + motivational interview (telephone), by HIV specialist nurses	Wait list control usual care	UAI with casual partner; UAI with steady partner
CBAs							
Elford, 2001 (1997–1999) (6 months, 12 months, 18 months follow-up)	1 004	England (London)	Mean 33.0	~15.5% HIV+	Gym-based HIV risk reduction education, by trained popular opinion leaders. 46 peers engaged on average 10 conversations each	No intervention	Status unknown UAI
Flowers, 2002 (1996–1999) (7 months follow-up)	2 276	Scotland (Glasgow, Edinburgh)	Mean 31.7	Not reported	Gay specific GUM services + sexual health info hotline + bar-based sexual health promotion, by trained peers. 42 peer educators interacted with 1 484 men, ~10 min each	No intervention	UAI with casual partner

RCT: Randomised Controlled Trials; CBA: Controlled before-and-after; UAI: Unprotected Anal Intercourse

Source: Effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe, 2009. European Centre for Disease Prevention and Control.

Data extraction and analysis

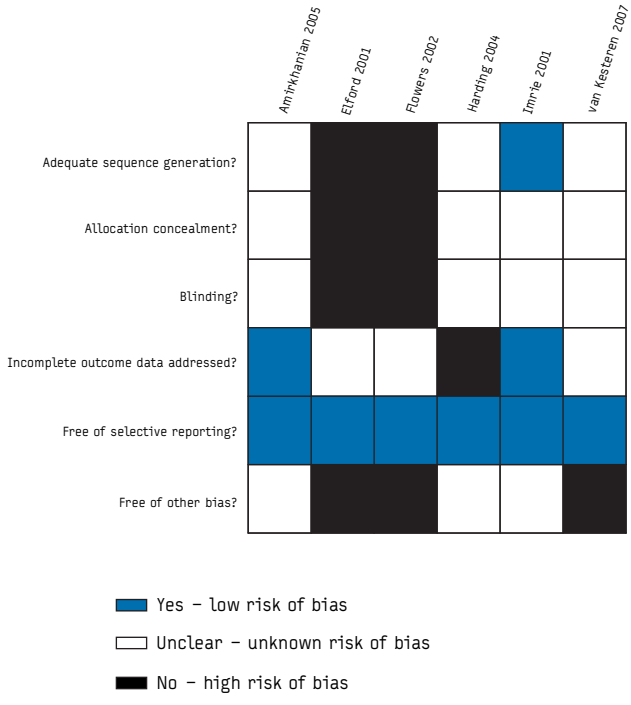
Data from each included study were extracted using a pre-designed data extraction form. All data were entered twice and the accuracy of all data extracted by the main reviewer was checked, including data in tables, before analyses were initiated. With respect to quality of the evidence, we used the Cochrane Collaboration's tool for assessing risk of bias [13]. Two reviewers discussed and agreed about the adequacy of risk of bias for six domains by assigning a judgement of 'yes' indicating low risk of bias, 'no' indicating high risk of bias, and 'unclear' indicating unclear or unknown risk of bias. Criteria set by the Cochrane handbook and adapted to the health promotion field were used to make these judgements. We estimated effects of interventions in two ways for binary outcome measures. One, by the adjusted absolute risk difference (ARD) in which the pre-post change score (in percentage points) in the control group was subtracted from the pre-post change score in the intervention group, and two, by the risk ratio (RR) and 95% confidence interval (CI) (95%CI) based on the post intervention data. We also decided, *a priori*, to perform meta-analyses to estimate intervention effect. We used Mantel-Haenszel random effects meta-analyses because it was assumed that the intervention effects would vary across studies. All analyses were conducted using RevMan5 [15]. Where there were several follow up times, we analysed them separately.

Results

The literature search resulted in 2,199 potentially relevant records (Figure 1).

Figure 2

Result of risk of bias assessment. Literature review on the effectiveness of behavioural and psychosocial HIV/STI prevention interventions for men who have sex with men in Europe. Berg R, 2009



Source: Effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe, 2009. European Centre for Disease Prevention and Control.

We excluded 2,166 records at title or abstract level which were clearly outside the scope of this systematic review (e.g. descriptive studies), leaving 33 potentially relevant records which were read in full text. We included six studies presented in seven publications for our evaluation [16-22]. One study is unpublished but results were made available [23].

Description of studies

Four of the included studies employed a randomised controlled design, including two cluster RCT, and the remaining two included studies were CBA studies [16,21-23]; [16,23]; [17,19] (Table 1).

The included studies involved a total of 4,111 participants at entry (range 50-2,276) from four different European countries: Russia and Bulgaria, the Netherlands, and the United Kingdom [16];[23];[17,19,21,22].

The studies targeted gay and bisexual men of various ages (one study also included 55 women) [16]. One study specifically targeted young MSM, another aimed to promote sexual health in HIV-positive MSM [16];[23]. In the four studies that reported information about ethnic background, the populations were predominantly white (about 90%) [17,21,22,23].

The self-help and motivational enhancement intervention of van Kesteren *et al*. was individual-based and consisted of a self-help guide, a face-to-face motivational interview, and a motivational interviewing telephone call [23]. Two interventions consisted of group sessions; one covered various aspects about sadomasochistic sex [21], while the other was a cognitive behavioural workshop [22]. The remaining three studies were community-based and modelled after the popular opinion leader interventions developed by Kelly *et al*. and Kegeles *et al*. [24,25];[26,27]. In sum, not two interventions were identical, but the three peer-led, social behavioural interventions were similarly modelled and all but one of the interventions were theory-based [16,17,19];[21]. With respect to intensity and duration (dose) of the interventions, this was not clearly ascertained from the texts, but the programmes appeared to have 'intervened' from one peer conversation of about ten minutes duration to about 28 hours of education. Primary mode of delivery was in person, generally one-on-one.

Only one category of comparison was used in the six included studies: Minimal to no intervention. Imrie *et al*. used standard treatment at an STI clinic as comparison [22]. Three studies placed the comparison group on a waiting list to receive the intervention after the study [16,21,23].

With respect to outcome measures, all the included studies had collected self-report data about UAI with men. One study included a biological measure of new sexually transmitted infection [22]. Follow up ranged from two months post intervention to 18 months [21];[17]. Several studies incorporated multiple follow ups [16,17,21,22].

Risk of bias in included studies

The risk of bias assessment comprised six domains and we judged that there was 'high' or 'unclear' risk of bias in one or more of the assessed domains in all studies (Figure 2).

Briefly, with respect to sequence generation, there was insufficient information in all studies, except one, to judge whether it was adequate [22]. The situation was similar for allocation concealment and blinding. The issue of incomplete outcome data

was adequately addressed in two studies [16,22] and unclear or insufficiently addressed in the remaining four studies. All studies were judged to be free of selective reporting. Lastly, we judged other risk of bias, including intervention exposure, which varied greatly among the studies. It was lowest in the gym-based study – 3% of the participants reported having spoken to a peer educator during the intervention [17].

Effects of HIV/STI prevention interventions for MSM

A priori we decided to focus our effectiveness analyses on UAI because it is the most epidemiologically pertinent behaviour for MSM in an HIV risk context, and likely to be included in most studies [28]. UAI was reported as a dichotomous outcome, thus, we calculated ARD and RR with 95% CI based on the post intervention data. Two texts did not provide data in sufficient detail for us to include them in analyses (requested data from the authors were not received in time for inclusion in the analysis) and we reproduced the results of their significance tests [21,23]. With respect to sexual risks, we could calculate effect estimates for six outcomes (multiple assessment points) across four studies (Table 2).

At study level, four of the six included studies reported null effect. While all ARD results indicated that the interventions had positive effect, inspection of the effect estimates show that three quarters of the outcomes failed to reach significance.

We used Mantel-Haenszel random effects meta-analyses to estimate the intervention effect of the four interventions for which we obtained data. Collectively, the four interventions that were measured against minimal to no HIV prevention intervention appeared to reduce the probability of gay-or bisexual identified men engaging in UAI (Figure 3).

The pooled effect estimate of the four interventions suggested that MSM who participated in HIV/STI prevention initiatives were 10% less likely to report UAI (RR 0.90, 95%CI 0.83-0.96). The total MSM sample in these four interventions was 3,777. One study included 2,380 MSM, and consequently, the study contributed disproportional weight (84.9%) to the pooled effect estimate [19]. In subgroup analyses the pooled effect estimate showed that the result of the two interventions with design of highest internal

Table 2

Sexual risk behaviour outcomes at baseline and follow up, and effect estimates for included studies.). Literature review on the effectiveness of behavioural and psychosocial HIV/STI prevention interventions for men who have sex with men in Europe. Berg R, 2009

Author, year	Outcomes (follow-up)	Intervention		Control		Adjusted ARD	RR	95% CI for RR
		Pre (%)	Post (%)	Pre (%)	Post (%)			
RCTs								
Amirkhanian, 2005[a]	UAI (3 months)	57.3	35.5	54.5	57.7	25.0	0.62	0.47–0.81
	UAI with multiple partners (3 months)	22.6	9.7	17.4	16.2	11.7	0.60	0.31–1.17
	UAI (12 months)	57.3	39.5	54.5	50	13.3	0.79	0.59–1.05
	UAI with multiple partners (12 months)	22.6	7.6	17.4	16.1	13.7	0.47	0.22–0.99
Harding, 2004	UAI	Not stated		Not stated		_	No significant differences[b]	
Imrie, 2001	UAI (6 months)	37	24	30	32	15	0.74	0.50–1.10
	UAI (12 months)	37	27	30	32	12	0.86	0.58–1.29
	New STI (12 months)		31		21		1.66	1.00–2.74[c]
van Kesteren, 2007	UAI with casual partner	Not stated		Not stated		_	No significant differences[b]	
CBA studies								
Elford, 2001	Status unknown UAI (6 months)	13	11	15	14	1	0.79	0.57–1.10
	Status unknown UAI (12 months)	13	14	17	16	-2	0.88	0.63–1.23
	Status unknown UAI (18 months)	14	12	15	15	2	0.81	0.49–1.33
Flowers, 2002	UAI with casual partner (7 months)	38.9	35.4	36.3	37.4	4.6	0.95	0.78–1.11

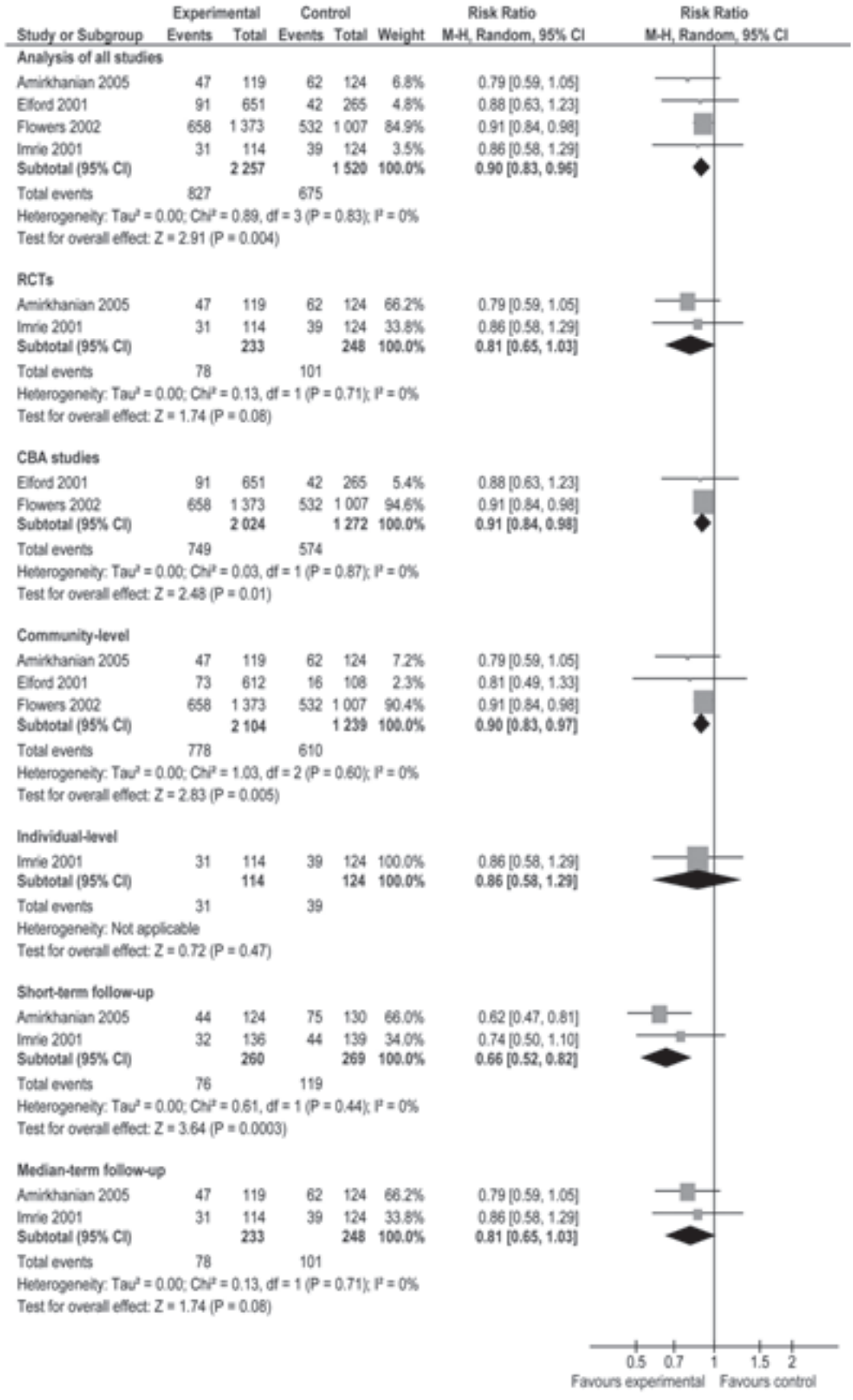
RCT: Randomised Controlled Trials; CBA: Controlled before-and-after

Note: Pre- and post scores are reproduced from the study publication. We calculated change scores in percentage points, adjusted absolute risk difference (ARD) and relative risk (RR) with 95% confidence interval (CI).
Legend:
[a] n for various groups and outcomes were not given in Amirkhanian (2005) table1, therefore n is assumed as stated in text: at baseline, n=133 for intervention group and n=143 for comparison group; at three-month follow-up, n=124 for intervention group and n=130 for comparison group; at 12-month follow-up, n=119 in intervention group and n=124 for comparison group;
[b] stated in study publication;
[c] adjusted odds ratio reproduced from publication.

Source: Effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe, 2009. European Centre for Disease Prevention and Control.

FIGURE 3

Forest plot of effect sizes, main effect and subgroup analyses for unprotected anal intercourse (UAI). Literature review on the effectiveness of behavioural and psychosocial HIV/STI prevention interventions for men who have sex with men in Europe. Berg R, 2009



Source: Effectiveness of behavioural and psychosocial HIV/STI prevention interventions for MSM in Europe, 2009. European Centre for Disease Prevention and Control.

validity (RCT) became non-significant (RR 0.81, 95%CI 0.65-1.03), while the result of the CBA studies was significant (RR 0.91, 95%CI 0.84-0.98), with one study contributing disproportional weight (94.6%) to the pooled effect estimate. Similarly, the pooled effect estimate of the three community-level interventions reached significance (RR 0.90, 95%CI 0.83-0.97), with one study contributing disproportionate weight (90.4%).

In subgroup analyses, the pooled effect estimate for the short-term effects (three-six months) of the two RCT with least risk of bias suggested that MSM participating in HIV/STI interventions were 34% less likely to report engaging in UAI (RR 0.66, 95%CI 0.52-0.82). The effect was not significant at medium-term follow up (12 months) (RR 0.81, 95%CI 0.65-1.03).

The evidence base was insufficient to examine characteristics of interventions most closely associated with magnitude of effect and to draw solid conclusions about unique gaps in the evaluation literature on HIV/STI interventions for MSM in Europe.

Discussion

This is the first systematic review to summarise and assess the effectiveness of HIV/STI prevention interventions for MSM living in Europe. The main finding of the review is the dearth of HIV/STI prevention interventions for European MSM which have been evaluated in such a way as to enable reliable conclusions about effectiveness. Among the six studies identified and included the proportion of information from studies at high risk of bias was sufficient to affect the interpretation of results.

Effectiveness of HIV/STI prevention interventions for MSM

The meta-analysis results of four studies showed that one pooled effect size is most valid. The subgroup analysis for the short-term effects of the interventions by Amirkhanian *et al*. and Imrie *et al*. suggested that MSM participating in HIV/STI interventions were significantly less likely to report engaging in UAI than MSM in the control groups at short-term follow up [16]; [22]. An effect size associated with significant reduction in UAI was not found at 12 months follow up. The findings mirror other high-quality reviews showing that effects of non-US interventions are limited and become attenuated over time [18,12,29]. In stratified analyses of rate ratios for small group and individual-level interventions, a recent Cochrane review found that while studies performed in the US yielded a net reduction of 22% in unprotected sex, studies performed elsewhere in the world showed a much smaller net reduction that was not statistically significant [12]. Nonetheless, the findings in the current systematic review give cause for guarded optimism. The controlled studies included in this systematic review demonstrate that it is possible to successfully conduct rigorous HIV/STI prevention trials for MSM in Europe, and there may be some effect of interventions aimed at reducing HIV/STI risk behaviour among this population.

Gaps

It is not presently possible to know which unique gaps in the evaluation literature on HIV/STI interventions for MSM in Europe exist. However, it should be noted that all but one of the six included studies are from Western Europe; four of them were set in the United Kingdom. Further, the samples included mainly white MSM. Non-white MSM appear to be underserved. Only one study included a biological outcome measure.

Implications for future behavioural HIV/STI interventions for MSM

Almost thirty years into the HIV epidemic, it is disheartening to find so few behavioural HIV/STI prevention interventions that have been rigorously evaluated for MSM in Europe. The paucity of controlled studies demonstrates the need for research in this area: more and better outcome evaluations of HIV/STI prevention interventions for MSM living in Europe are warranted. While there is no other reliable substitute for evaluating the effect of interventions than controlled trials, other designs such as interrupted time series designs can also be used [30,13,31]. Researchers who are concerned about the ethics of allocation to experimental groups can use waiting list controls whereby the control group receives the potential beneficial intervention post data collection. The drawback is the difficulty of establishing long-term effectiveness of the intervention [32]. It also remains important to integrate process assessment into the evaluation design in order to learn about feasibility, acceptability, practical constraints, and related issues. Implementation and adherence are typically difficult to measure in multi-component intervention programmes, but provide critical information [33]. For example, Elford *et al*. process evaluation helped explain the likely reasons for lack of programme effectiveness [34]. Researchers and journal editors should strive to disseminate also null findings and related issues in intervention research [35].

As far as possible, prevention professionals should incorporate clinical HIV/STI outcomes, and not just rely on self-reported changes in cognitions and behaviours. Cognitive processes are not necessarily pre-requisites for behaviours and as self-reported behavioural outcomes, tend to overestimate intervention benefits [31,36]. Further, because risk assessment for HIV transmission by self-report covers a wide range of behaviours it would be important to specify UAI according to partner type and partners' serostatus, as done by two of the included studies [17,19]. One alternative suggested by Newman *et al*. is to use new technology, such as computer assisted self-assessment, to improve the truthfulness of self-reported sexual behaviours [37]. Biological outcomes reliably assess potential harms as well as benefits. Of the six included studies in this systematic review, only one included clinical outcomes and it found that incidence of STI significantly increased in the intervention group compared to the control group. Imrie *et al*. state that screening of asymptomatic infection was not part of the original study protocol because they believed it would affect recruitment, but the return of specimens by post worked well [22]. Lastly, multiple follow up assessments allow for an evaluation of the longevity of effectiveness and should be attempted. Several of the included studies in this systematic review did, but the longest follow up was 18 months. Ideally, since incidence of HIV/STI infections is the most important and reliable outcome and changes cannot be reliably measured in a short time period, long-term follow up of several years is desirable.

Strengths and limitations of this review

This systematic literature review was conducted according to the Cochrane Collaboration standards [13]. A further strength is that controlled studies were evaluated, i.e. studies that can reliably say something about effects of interventions. Additionally, meta-analyses were conducted to synthesise independent and diverse studies to derive an overall estimate of effectiveness of interventions, allowing also for an exploration of differences across studies. However, findings must be viewed within the context of the limitations of the systematic review. The reviewer was not at any screening level blinded to the authors or other information about the publication when assessing the studies. Only recent publications

in five languages were included in the literature search because of resource limitations. While it is possible that the resulting search may have excluded relevant studies, this does not seems likely because the reviewer inspected 14 related literature reviews, which had no publication year- or language restrictions (see literature list) and no other behavioural HIV/STI outcome evaluations for MSM in Europe were identified.

Conclusion

The main finding of this systematic review is that despite 30 years into the HIV epidemic, rigorous outcome evaluations of any form of behavioural HIV/STI intervention for MSM in Europe are scarce. Evaluating the effectiveness of interventions poses significant challenges to the scientific community, but if one were to have evidence-based policies and practices to prevent HIV/STIs among MSM in the future, additional behavioural interventions with accompanying outcome evaluations should be implemented. Interventions should target both individuals, groups, and communities, strive for biological outcomes alongside behavioural measures, and include multiple follow up assessments. Evidence from this systematic review demonstrates that it is possible to successfully conduct rigorous HIV/STI prevention studies for MSM in Europe which meet these criteria, they indicate sexual risk behaviour change, and such studies should to a greater extent become part of a comprehensive continuum of behavioural and biomedical HIV/STI prevention and care.

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References

References [16-23] are to the studies included

1. European Centre for Disease Prevention and Control/WHO Regional Office for Europe. (2008). HIV/AIDS surveillance in Europe 2007. Stockholm, European Centre for Disease Prevention and Control.
2. Joint United Nations Programme on IV/AIDA (UNAIDS) and World Health Organization (WHO) 2006. 2006 AIDS epidemic update: special report on HIV?AIDS: December 2006. Geneva: UNAIDS/WHO; 2006. Available from: http://data.unaids.org/pub/EpiReport/2006/2006_EpiUpdate_en.pdf
3. Catania JA, Morin S F, Canchola J, Pollack L, Chang J, Coates T J. (2000). U.S. priorities - HIV prevention. Science. 2000;290(5492):717
4. Elford J, Sherr L, Bolding G, Serle F, Maguire M. Peer-led HIV prevention among gay men in London: process evaluation. AIDS Care. 2002;14(3):351-60.
5. Johansen JD, Smith E. Gonorrhoea in Denmark: high incidence among HIV- infected men who have sex with men. Acta Derm. Venereol. 2002;82(5):365-8.
6. MacDonald N, Dougan S, McGarrigle CA, Baster K, Rice BD, Evans BG, et al. (2004). Recent trends in diagnosis of HIV and other sexually tranmitted infections in England and Wales among men who have sex with men. Sexually Transm Infect. 2004;80(6):492-7.
7. Simms I, Fenton KA, Ashton M, Turner KM, Crawley-Boevey EE, Gorton R, et al. The re-emergence of syphilis in the United Kingdom: the new epidemic phases. Sexually Transm Dis. 2005;32(4): 220-6.
8. *Herbst JH, Sherba RT, Crepaz N, Deluca JB, Zohrabyan L, Stall RD, et al. A meta-analytic review of HIV behavioral interventions for reducing sexual risk behavior of men who have sex with men. J Acquir Immune Defic Syndr. 2005;39(2):228-41.
9. Conant M. Losing the war on AIDS. J Am Acad Dermatol. 2004;51(1 suppl):S47-8.
10. Elford J, Hart G. If HIV prevention works, why are rates of high-risk sexual behaviour increasing among MSM? AIDS Educ Prev. 2003;15(4):294-308.
11. *Herbst JH, Beeker C, Mathew A, McNally, Passin WF, Kay LS, et al. The effectiveness of individual-, group-, and community-level HIV behavioural risk-reduction interventions for adult men who have sex with men: a systematic review. Am J Prev Medicine. 2007;32(4 Suppl):S3867.
12. *Johnson WD, Diaz RM, Flanders WD, Goodman M, Hill AN, Holtgrave D, et.al. Behavioral interventions to reduce risk for sexually transmission of HIV among men who have sex with men. Cochrane Database of Syst Rev. 2008;(3):CD001230.
13. Higgins JP, Green S. (editors). Cochrane handbook for systematic reviews of interventions. Version 5.0.1 (updated September 2008). The Cochrane Collaboration, 2008. Available from: http://www.cochrane-handbook.org/
14. Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB. Evidence based medicine: how to practice and teach EBM. New York: Churchill Livingstone,2000.
15. Cochrane Collaboration. Review Manager (RevMan) [Computer program]. Version 5.0. Copenhagen: The Nordic Cochrane Centre. The Cochrane Collaboration, 2008.
16. Amirkhanian YA, Kelly JA, Kabakchieva E, Kirsanova AV, Vassileva S, Takacs J, et al. (2005). A randomized social network HIV prevention trial program with young men who have sex with men in Russia and Bulgaria. AIDS. 2005;19(16):1897-905.
17. Elford J, Bolding G, Sherr L. Peer education has no significant impact on HIV risk behaviours among gay men in London. AIDS. 2001;15(4):531-8.
18. Supplemental publication to Elford et al. (2001): Elford J, Sherr L, Bolding G, Maguire M., Serle F. Peer-led HIV prevention among gay men in London (the 4 gym project). Intervention and evaluation (pp. 205-230) in J. Watson & S. Platt (2000) Researching health promotion. London: Rutledge.
19. Flowers P, Hart GJ, Williamson LM, Frankis JS, Der GJ. Does bar-based, peer-led sexual health promotion have a community-level effect amongst gay men in Scotland? Int J STD AIDS 2002;13(2):102-8.
20. Supplemental publication to Flowers et al. (2002): Flowers P, Frankis J, Hart G. Evidence and the evaluation of a community-level intervention (pp. 102-24), in J. Watson. Platt S. (2000) Researching health promotion. London: Rutledge.
21. Harding R, Bensley J, Corrigan N, Franks L, Stratman J, Waller Z, Warner J. Outcomes and lessons from a pilot RCT of a community-based HIV prevention multi-session group intervention for gay men. AIDS Care. 2004;16(5):581-5.
22. Imrie J, Stephenson JM, Cowan FM, Wanigaratne S, Billington AJ, Copas AJ, et al. (A cognitive behavioural intervention to reduce sexually transmitted infections among gay men: randomised trial. BMJ. 2001;322(7300):1451-6.
23. van Kesteren NM, Kok HJ, van Brukelen G, Kok G. Evaluation of a self-help and motivational enhancement intervention to promote sexual health in HIV-positive men who have sex with men. [In submission]
24. Kelly JA. St Lawrence JS, Stevenson LY, Hauth AC, Kalichman SC, Diaz YE, et al. (1992). Community AIDS/HIV risk reduction: the effects of endorsements by popular people in three cities. Am J Public Health. 1992;82(11):1483-9.
25. Kelly JA, Murphy DA, Sikkema KJ, McAuliffe TL, Roffman RA, Solomon LJ, et al. Randomised, controlled, community-level HIV-prevention for sexual-risk behaviour among homosexual men in US cities. Lancet. 1997;350(9090):1500-5.
26. Kegeles SM, Hays RB, Coates TJ. The MPowerment Project: a community-level HIV prevention intervention for young gay men. Am J Public Health. 1996;86(8):1129-36.
27. Kegeles SM, Hays RB, Pollack LM, Coates TJ. Mobilizing young gay and bisexual men for HIV prevention: a two-community study. AIDS.1999;13(13):1753-62.
28. O'Leary A, DiClemente RJ, Aral SO. Reflections on the design and reporting of STD/HIV behavioral intervention research. AIDS Educ Prev. 1997;9 (suppl 1):1-14.
29. *Kalichman SC, Carey MP, Johnson BT. Prevention of sexually transmitted HIV infection: A meta-analytic review of the behavioural outcome literature. Annals of Behavioral Medicine. 1996;18, 6-15.
30. Gold RS. Evaluation of interventions for gay men: two desiderata. AIDS Care. 2002;14(3): 425-9.
31. *Stephenson J, Imrie J, Sutton SR. Rigorous trials of sexual behaviour interventions in STD/HIV prevention: what can we learn from them? AIDS. 2000;14 Suppl 3:S115-124.
32. *Oakley A, Fullerton D, Holland J. Behavioural interventions for HIV/AIDS prevention. AIDS 1995;9(5):479-86.
33. Armstrong R, Waters E, Doyle J. (editors) Chapter 21: Reviews in health promotion and public health. In JPT Higgins & S Green (editors). Cochrane Handbook for Systematic Reviews of Interventions. The Cochrane Collaboration, 2008.
34. Elford J, Bolding G, Sherr L. High-risk sexual behaviour increases among London gay men between 1998-2001: What is the role of HIV optimism. AIDS, 2002;16(11):1537-44.
35. *Kegeles SM, Hart GJ. Recent HIV-prevention interventions for gay men: individual, small group, and community based studies. AIDS. 1998;12 Suppl A:S209-15.
36. Stephenson J, Imrie J. Why do we need randomised controlled trials to assess behavioural interventions ? BMJ. 1998;316(7131):611-3
37. Newman J C, Des Jarlais DC, Turner CF, Gribble J, Cooley P, Paone D. (2002). The differential effects of face-to-face and computer interview methods. Am J Public Health. 2002; 92(2):294-7.

References below and those marked with an asterisk in the above reference list are to literature reviews which literature were screened for leads

- Choi KH, Coates TJ. (1994). Prevention of HIV infection. AIDS. 1994;8(10):1371-89.
- Ellis S, Barnett-Page E, Morgan A, Taylor L, Walters R, Goodrich J. HIV prevention: A review of reviews assessing the effectiveness of interventions to reduce the sexual risk of HIV transmission. 2003. Retrieved 20 July, 2009, from http://www.nice.org.uk/niceMedia/documents/HIV_review.pdf
- Johnson BT, Carey MP, Chaudoir SR, Reid AE. Sexual risk reduction for persons living with HIV. Research synthesis of randomized controlled trials, 1993 to 2004. J Acquir Immune Defic Syndr.2006;41(3):642-50.
- Oakley A, Oliver S, Peersman G, Mauthner M. Review of effectiveness of health promotion interventions for MSM. 1996. London: London University Institute of Education, EPPI Unit.
- Vergidis RI, Falagas ME. Meta-analyses on behavioral interventions to reduce the risk of transmission of HIV. Infectious Disease Clinics of North America, 2009;23:309-314.
- Weinhardt LS, Carey M, Johnson B, Bickham NL. Effects of HIV counselling and testing on sexual behaviour: A meta-analytic review of published research, 1985-1997. Am J Public Health. 1999;89(9):1397-1405.
- Wolitski R J, McGowan R, Higgins D, Jorgensen C. (1997). The effects of HIV counselling and testing on risk-related practices and help-seeing behavior. AIDS Educ Prev. 1997;9 (s3 Suppl):52-67.

Additional references

- Fennema JS, Cairo I, Coutinho RA. [Substantial increase in gonorrhoea and syphilis among attenders of the Amsterdam Sexually Transmitted disease clinic]. Ned Tijdschr Geneeskd. 2000;144(13):602-3.

Health Protection Agency publishes Annual Evidence Update focussing on HIV in children and adolescents

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The United Kingdom NHS Evidence-infections have produced an Annual Evidence Update (AEU) on HIV in children and adolescents to coincide with World AIDS day on 1 December. This update which contains evidence that has emerged in the last year is accompanied by commentaries from experts in the field.

Worldwide, there are an estimated 33 million people living with HIV, with children making up over two million of the total. The United Nations Joint Programme on HIV/AIDS (UNAIDS) and the World Health Organization (WHO) estimate that 2.9 million lives have been saved by the availability of antiretroviral therapy (ART), with better access leading to a decline in HIV related deaths by around 10% in the last 5 years [1].

Despite this, there were still 2.7 million new infections of HIV worldwide, with over half of these in young people aged 15-24. Of these new HIV infections, 420,000 are in children, with 1,200 children globally acquiring HIV every day and the majority of these being acquired by mother to child transmission (MTCT). Approximately half of all the children infected by MTCT would die by the age of two without access to ART [1].

New figures from the Health Protection Agency show that the very low MTCT transmission in the UK of around 1% overall is the result of the very high uptake of HIV screening (95%) in the antenatal setting [2,3]. At least 90% of women with HIV are diagnosed prior to delivery, and an estimated 200,000 new infections in children have been prevented since 2001 resulting from HIV positive mothers using ART to avoid transmitting the virus to their children. Consequently, the average age of perinatally infected children is now over 10, meaning that many of these children in the UK are now entering adolescence and transitioning from paediatric to adult services, which brings with it added clinical and psychosocial complexities [4].

One comment to the report stresses that HIV testing needs to be accepted as part of routine screening in order to prevent MTCT and address the one third of 7,298 people diagnosed in 2008 who presented late in the course of their illness, and contributed to half of all the deaths in HIV infected individuals last year [2].

References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS) and World Health Organization (WHO), 2009 AIDS epidemic update. December 2009. Geneva: UNAIDS/WHO; 2009. Available from: http://data.unaids.org/pub/Report/2009/2009_epidemic_update_en.pdf
2. Health Protection Agency. HIV in the United Kingdom: 2009. London: Health Protection Agency; November 2009. Available from: http://www.hpa.org.uk/web/HPAwebFile/HPAweb_C/1259151891830
3. Townsend CL, Willey BA, Cortina-Borja M, Peckham CS, Tookey PA. Antiretroviral therapy and congenital abnormalities in infants born to HIV-infected women in the UK and Ireland, 1990-2007. AIDS. 2009;23(4):519-24.
4. Foster C. Management of HIV in children and adolescents. Available from: http://www.library.nhs.uk/INFECTIONS/ViewResource.aspx?resID=330326&pgID=1 [cited on 3 December 2009]

National Bulletins

AUSTRIA

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http://www.bmgfj.gv.at/cms/site/standard.html?channel=CH0954&doc=cms1229425348542

BELGIUM

Vlaams Infectieziektebulletin
Department of Infectious Diseases Control, Antwerp.
Quarterly, print and online. In Dutch, summaries in English.
http://www.infectieziektebulletin.be

Bulletin d'information de la section d'Epidémiologie
Institut Scientifique de la Santé Publique, Brussels
Monthly, online. In French.
http://www.iph.fgov.be/epidemio/epifr/episcoop/episcoop.htm

BULGARIA

Bulletin of the National Centre of Infectious and Parasitic Diseases, Sofia.
Print version. In Bulgarian.
http://www.ncipd.org/

CYPRUS

Newsletter of the Network for Surveillance and Control of Communicable Diseases in Cyprus
Medical and Public Health Services, Ministry of Health, Nicosia
Biannual, print and online. In Greek.
http://www.moh.gov.cy

CZECH REPUBLIC

Zprávy EM (Bulletin of epidemiology and microbiology)
Státní zdravotní ústav (National Institute of Public Health), Prague
Monthly, print and online. In Czech, titles in English.
http://www.szu.cz/publikace/zpravy-epidemiologie-a-mikrobiologie/rocnik-18-rok-2009

Infekce v ČR - EPIDAT (Notifications of infectious diseases in the Czech Republic)
Státní zdravotní ústav (National Institute of Public Health), Prague
http://www.szu.cz/data/infekce-v-cr

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Department of Epidemiology, Statens Serum Institut, Copenhagen.
Weekly, print and online. In Danish and English.
http://www.ssi.dk

FINLAND

Kansanterveys
Department of Infectious Disease Epidemiology, National Public Health Institute, Helsinki.
Monthly, print and online. In Finnish.
http://www.ktl.fi/portal/suomi/julkaisut/kansanterveyslehti

FRANCE

Bulletin épidémiologique hebdomadaire
Institut de veille sanitaire, Saint-Maurice Cedex.
Weekly, print and online. In French.
http://www.invs.sante.fr/beh/default.htm

GERMANY

Epidemiologisches Bulletin
Robert Koch-Institut, Berlin
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http://www.rki.de/DE/Content/Infekt/EpidBull/epid__bull__node.html

HUNGARY

Epinfo (az Országos Epidemiológiai Központ epidemiológiai információs hetilapja)
National Center For Epidemiology, Budapest.
Weekly, online. In Hungarian.
http://www.oek.hu/oek.web?to=839,1572&nid=41&pid=9&lang=hun

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Health Protection Surveillance Centre, Dublin.
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http://www.ndsc.ie/hpsc/EPI-Insight

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Istituto Superiore di Sanità, Reparto di Malattie Infettive, Rome.
Monthly, online. In Italian.
http://www.iss.it/publ/noti/index.php?lang=1&tipo=4

Bolletino Epidemiologico Nazionale (BEN)
Istituto Superiore di Sanità, Reparto di Malattie Infettive, Rome.
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http://www.epicentro.iss.it/ben

LATVIA

Epidemiologijas Biletens
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Online. In Latvian.
http://www.sva.lv/epidemiologija/biletens

LITHUANIA

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Center for Communicable Disease Prevention and Control, Vilnius.
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http://www.ulpkc.lt/ulpkc.laikrastis.php

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National Institute of Public Health and the Environment, Bilthoven
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http://www.rivm.nl/cib/publicaties/bulletin

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http://www.folkehelsa.no/nyhetsbrev/msis

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http://www.pzh.gov.pl/epimeld/index_p.html#01

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Direcção-Geral da Saúde, Lisbon.
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http://www.dgs.pt

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Info Epidemiologia
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National Centre of Communicable Diseases Prevention and Control, Institute of Public Health, Bucharest.
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http://www.cpcbt.ispb.ro

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http://www.ivz.si/index.php?akcija=podkategorija&p=89

SPAIN

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SWEDEN

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http://www.smittskyddsinstitutet.se/publikationer/smis-nyhetsbrev/epi-aktuellt

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Northern Ireland
Communicable Diseases Monthly Report
Communicable Disease Surveillance Centre, Northern Ireland, Belfast.
Monthly, print and online. In English.
http://www.cdscni.org.uk/publications

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Health Protection Scotland, Glasgow.
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Norwegian Institute of Public Health, Folkehelseinstituttet, Oslo, Norway
Published four times a year in English and Russian.
http://www.epinorth.org

OTHER LINKS

European Union
"Europa" is the official portal of the European Union. It provides up-to-date coverage of main events and information on activities and institutions of the European Union.
http://europa.eu

European Commission - Public Health
The website of European Commission Directorate General for Health and Consumer Protection (DG SANCO).
http://ec.europa.eu/health/index_en.htm

Health-EU Portal
The Health-EU Portal (the official public health portal of the European Union) includes a wide range of information and data on health-related issues and activities at both European and international level.
http://ec.europa.eu/health-eu/index_en.htm

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