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Changing epidemiology of HIV anonymous testing in Switzerland for 1996–2006

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Summary

Questions under study: To assess whether the prevalence of HIV positive tests in clients at five anonymous testing sites in Switzerland had increased since the end of the 1990s, and ascertain whether there had been any concurrent change in the proportions of associated risk factors.

Methods: Baseline characteristics were analysed, by groups of years, over the eleven consecutive years of data collected from the testing sites. Numbers of HIV positive tests were presented as prevalence/1000 tests performed within each category. Multivariable analyses, stratified by African nationality and risk group of heterosexuals or men who have sex with men (MSM), were done controlling simultaneously for a series of variables. Odds ratios (ORs) were reported together with their 95% confidence intervals (CI). P values were calculated from likelihood ratio tests.

Results: There was an increase in the prevalence of positive tests in African heterosexuals between 1996–1999 and 2004–2006, rising from 54.2 to 86.4/1000 and from 5.6 to 25.2/1000 in females and males respectively. The proportion of MSM who knew that one or more of their sexual partners was infected with HIV increased from 2% to 17% and the proportion who reported having more than five sexual partners in the preceding two years increased from 44% to 51%.

Conclusions: Surveillance data from anonymous testing sites continue to provide useful information on the changing epidemiology of HIV and thus inform public health strategies against HIV.

Key words: HIV; Switzerland; anonymous testing sites

Introduction

Globally HIV infection has reached pandemic proportions, accounting for over 65 million infections and 25 million deaths to date [1]. The highest prevalence percent in the age group 15–49 years is in sub-Saharan Africa (5.0%) [2].

In western Europe in 2006, the rate of reported newly diagnosed HIV cases was 82.5 per million population; the predominant mode of transmission was heterosexual [3]. Among the 20 European Union countries which have consistently reported HIV data since 1999, the rate of newly diagnosed infections reported nearly doubled from 28.8/million in 1999 to 57.5/million in 2006. This increase was mainly accounted for by heterosexuals and MSM; cases in injection drug users (IDUs) had declined overall [3].

Switzerland is a country with an HIV epidemic that is concentrated in high-risk groups. The rate of reported newly diagnosed infections in 2006 was 104/million population [3]. There is a low prevalence of HIV in the general population (around 0.3%, 2006 estimate) [4]. Surveillance for HIV has been in place since 1985, and HIV has been statutorily notifiable since 1 December 1987 [5]. As part of this surveillance some 30 different sites across Switzerland have provided the Swiss Federal Office of Public Health with epidemiological information on persons presenting for anonymous HIV counselling and tests.

The proportion of recent infections (occurring within the previous six months) in MSM in Switzerland had increased from 19% to 38% between 2001 and 2006 [6, 7]. This substantial increase was unexpected, since the annual numbers from all surveillance sources had shown a declining trend during most of the 1990s.

The present analysis was undertaken to assess, firstly, whether there had been an increase in

Abbreviations

CI	Confidence interval
HIV	Human immunodeficiency virus
IDU/s	Injection drug use/rs
MSM	Men who have sex with men
OR	Odds ratio
STI	Sexually transmitted infection

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the prevalence of HIV positive tests since the end of the 1990s in clients at a sample of the anonymous HIV testing sites, and, secondly, to ascertain whether there had been any concurrent change in the proportions of reported HIV-associated risk factors.

Methods

Questionnaires at the anonymous HIV testing sites are available in German, French or Italian, and are completed anonymously by the clients themselves or in conjunction with their pre-test counsellor. The questions cover information on demographics (e.g., sex, nationality), reasons for requesting an HIV test, results of any previous HIV test and history of injection drug use. Other questions relate to a relevant past sexual or medical history. Questions on sexual history include: types of sexual relationships e.g., MSM or heterosexual, knowledge of a sexual partner's positive HIV status, number of sexual partners in the previous two years, condom use in the preceding two years with occasional sexual partners and history of gonorrhoea or syphilis. Questions relating to the past medical history include whether and in what country they have at any time received a transfusion of blood or blood products. Completed questionnaires are forwarded to the Swiss Federal Office of Public Health where they are transferred to an electronic database for analysis. Missing information cannot be filled in because of client anonymity, and it is impossible to know whether any of the questionnaires refer to the same person.

Statistical analyses

Data included in this analysis were from the five anonymous testing sites based in outpatient centres of the university hospitals in Basel, Bern, Geneva, Lausanne and Zurich, which had provided annual data over the eleven consecutive years under study (1996–2006). We grouped the time period into three categories: 1996–1999, 2000–2003 and 2004–2006. The prevalence of HIV positivity per 1000 was calculated by dividing the number of positive HIV tests by the total number tested within each category and multiplying by 1000. We did this for a series of categorical variables: testing sites, gender, nationality groups, age groups and risk groups (heterosexual males, heterosexual females, MSM and IDUs).

We assessed associations of client characteristics with HIV positivity using multivariable logistic regression analysis with a positive HIV test as the outcome. We conducted separate analyses for male and female heterosexuals and for MSM. The number of tested clients reporting IDU as a risk factor was too small (1063/141 076; 0.75%) to allow separate analysis. We simultaneously monitored for age, nationality, number of occasional sexual partners in the last two years, condom use with occasional sexual partners, knowledge of sexual contact with an HIV-infected person and a history of gonorrhoea or syphilis. Nationality was grouped into Swiss, other European except Swiss and then by continent. African nationalities mainly consisted of countries classified as sub-Saharan Africa. Effect modification was explored by including interaction terms in the logistic regression model. For the multivariable analyses we performed a complete case analysis. In a sensitivity analysis we redid the analysis by including indicators for the missing categories of the variables included.

We report adjusted odds ratios and their 95% confidence intervals (CI) from the logistic regression analyses. P values were calculated from likelihood ratio tests.

All analyses were performed with STATA 9.2 (StataCorp, College Station, Texas).

Ethics and financial support

Data collection at the anonymous HIV test sites is anonymous and all persons who visit these anonymous HIV test sites are free to refuse to answer selected or all questions. Due to the fact that the persons remain anonymous no written informed consent can be obtained. The work on this manuscript was supported financially by a contract of the Swiss Federal Office of Public Health. The data collection at the five anonymous HIV test sites over these eleven years was financially supported by specific contracts of the Swiss Federal Office of Public Health.

Results

Anonymous tests and baseline characteristics of attendees

Table 1 shows that the sites providing the most questionnaires, over the whole 11-year period, were Geneva (38971; 28%) and Zurich (38558; 27%). The total number of clients attending all sites together varied by year with the lowest (10426) attending in 1999 and the highest (15138) in 2003. The majority of tests taken were in those who described themselves as heterosexual (130697, 93%). Swiss nationals accounted for 77% (109092) of the tests, 14% (19886) were of another European nationality, 3% (3902) were from the Americas, 2% (3412) were African and 1% (1141) were Asian. 42% of the persons taking an anonymous HIV test were 25–34 years of age.

Risk factors of individuals attending anonymous test sites

We found evidence of interaction between heterosexuals of African nationality and the variables of age and knowledge of an HIV infected sexual partner. We therefore present a stratified analysis for this group as well. However, Africans made up only 0.9% (88/10103) of MSM, and hence we did not analyse them separately for this risk group. Including missing variables in the multivariable analyses did not change the interpretation of our results. We therefore presented the results from the complete case analyses, but reported the number of questionnaires with missing information on certain items in the tables for discussion purposes.

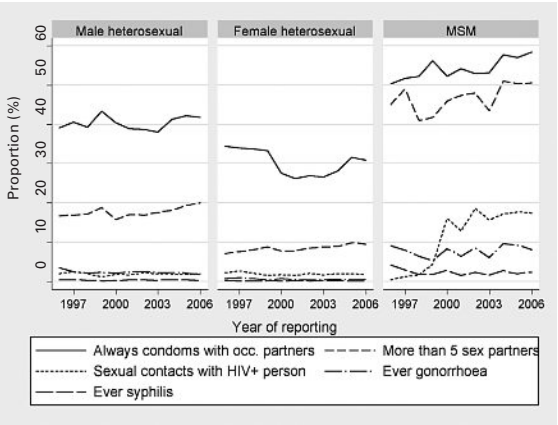
Table 1

Baseline characteristics of those presenting for HIV tests at the five anonymous testing sites based in outpatient centres of the university hospitals in Basel, Bern, Geneva, Lausanne and Zurich (Switzerland): 1996–2006.

Characteristic	Number tested (prevalence HIV positive per 1000)			Total number tested	Total number HIV positive (prevalence per 1000)
	1996–1999	2000– 2003	2004–2006		
Total	45 971	53 584	41521	141076	516 (3.7)
Center					
Basel	7181 (4.2)	6152 (2.3)	3533 (4.2)	16866	59 (3.5)
Bern	4830 (3.1)	6084 (2.6)	6274 (2.9)	17188	49 (2.9)
Geneva	11544 (2.9)	15624 (4.6)	11803 (4.2)	38971	156 (4.0)
Lausanne	10379 (3.7)	10857 (3.0)	8257 (4.6)	29493	109 (3.7)
Zurich	12037 (5.2)	14867 (2.6)	11654 (3.5)	38558	143 (3.7)
Nationality					
Swiss	36048 (3.1)	41155 (1.7)	31889 (1.9)	109092	243 (2.2)
Europe without Switzerland	6580 (4.1)	7395 (3.2)	5911 (3.2)	19886	70 (3.5)
Africa	851 (22.3)	1459 (36.3)	1102 (50.8)	3412	128 (37.5)
Americas	1156 (9.5)	1557 (8.3)	1189 (13.5)	3902	40 (10.3)
Asia	352 (11.4)	467 (10.7)	322 (9.3)	1141	12 (10.5)
Missing	984 (6.1)	1551 (5.8)	1108 (7.2)	3643	23 (6.3)
Age group					
16 – 24	14565 (1.6)	16399 (1.7)	11809 (1.3)	42773	67 (1.6)
25 – 34	19710 (4.4)	22160 (3.2)	17036 (4.0)	58906	227 (3.9)
35 – 44	7231 (6.4)	9362 (5.9)	7737 (6.9)	24330	154 (6.3)
>=45	4012 (4.7)	4989 (3.4)	4249 (4.9)	13250	57 (4.3)
Missing	453 (8.8)	674 (3.0)	690 (7.2)	1817	11 (6.0)
Risk group					
Male heterosexual	23669 (2.4)	27712 (2.4)	21596 (2.0)	72977	167 (2.3)
Female heterosexual	18407 (3.0)	21741 (2.1)	16785 (3.9)	56933	169 (2.9)
MSM	3336 (16.8)	3807 (14.2)	2960 (16.9)	10103	161 (15.9)
IDU	559 (19.7)	324 (24.7)	180 (11.1)	1063	21 (19.8)

Figure 1

Proportion of risk factors and other medical history information for clients tested at the five anonymous testing sites based in outpatient centres of the Swiss university hospitals of Basel, Bern, Geneva, Lausanne and Zurich: 1996–2006.



With respect to risk factors, the proportion of MSM reporting that they had had more than five sexual partners in the last two years rose from 44% in 1996–1999 to 51% in 2004–2006 (fig. 1). Also in MSM, sexual contact with a known HIV-infected partner rose from around 2% to 17% over the same time period. Reporting a history of ever having had syphilis or gonorrhoea remained fairly stable over the eleven years in all three risk groups studied. However, the proportion of both of these sexually transmitted infections (STIs) reported in MSM was higher than in heterosexuals over the same time period (fig. 1).

Risk factors for an HIV-positive test (stratified multivariable analyses)

Non-African heterosexuals & MSM

In MSM, those aged 35–44 years had 1.7 times higher odds (95% CI: 1.2–2.5) of testing HIV positive than those aged 25–34 years (table 2). Female heterosexuals aged 45 years and over had 2.8 times higher odds (95% CI: 1.4–5.8) of testing HIV positive compared with those aged 25–34 years. They also had higher odds of testing positive in 1996–1999 (OR 3.1; 95% CI 1.5–6.6) and 2004–2006 (OR 2.3; 95% CI 1.1–4.6) than in 2000–2003. Compared with Swiss nationals, Asian nationals had the highest odds of testing HIV positive for male heterosexuals and MSM, with an OR of 6.1 (95% CI: 2.5–15.2) and 6.0 (95% CI: 2.3–15.7) respectively. For female heterosexuals, the highest odds of HIV positivity were in subjects from the Americas (OR 5.9, 95% CI: 3.1–11.3). When including centre in these analyses, no statistically significant heterogeneity by centre was found.

With respect to risk factors and other medical history information for MSM, those with a maximum of one new partner in the last two years had 3.2 times higher odds (95% CI: 1.7–6.3) of HIV positivity compared with those who reported be-

Table 2

Stratified multivariable logistic regression analyses for non-African heterosexual and men who have sex with men clients at the five anonymous testing sites based in outpatient centres of the university hospitals in Basel, Bern, Geneva, Lausanne and Zurich (Switzerland): 1996–2006.

Characteristic	Heterosexual males*			Heterosexual females*			MSM		
	No. tested	Prevalence HIV positive per 1000	Adjusted Odds Ratio (95% CI)†	No tested	Prevalence HIV positive per 1000	Adjusted Odds Ratio (95% CI)†	No tested	Prevalence HIV positive per 1000	Adjusted Odds Ratio (95% CI)†
Total	70895			55700			10103		
Agegroup									
16–24	17235	1.3	0.90 (0.54–1.49)	22806	0.75	0.62 (0.32–1.17)	1698	6.5	0.47 (0.23–0.96)
25 – 34	31029	1.8	Ref	21 602	1.5	Ref	4226	14.9	Ref
35 – 44	13657	2.4	1.34 (0.84–2.15)	7025	2.7	1.40 (0.71–2.75)	2652	24.5	1.72 (1.17–2.54)
>=45	8227	1.6	0.86 (0.44–1.69)	3446	4.9	2.85 (1.40–5.80)	1397	13.6	1.03 (0.59–1.81)
missing	747	1.3	–	821	1.2	–	130	23.1	–
			P = 0.4409			P = 0.0034			P = 0.0004
Year									
1996–1999	23136	2.3	1.35 (0.86–2.12)	18112	2.2	3.15 (1.51–6.57)	3336	16.8	1.15 (0.73–1.79)
2000–2003	26799	1.7	Ref	21231	0.75	Ref	3807	14.2	Ref
2004–2006	20960	1.2	0.78 (0.46–1.31)	16357	1.8	2.28 (1.12–4.62)	2960	17.2	1.08 (0.71–1.64)
			P = 0.0962			P = 0.0039			P = 0.8318
Nationality									
Swiss	55880	1.6	Ref	44991	1.2	Ref	7436	11.8	Ref
Europe without CH	10948	1.7	0.82 (0.46–1.44)	7058	1.3	1.01 (0.45–2.25)	1686	21.4	1.71 (1.12–2.60)
Africa	excluded	excluded	excluded	excluded	excluded	excluded	88	45.5	3.17 (0.95–10.57)
Americas	1572	3.2	1.14 (0.36–3.63)	1858	8.1	5.89 (3.07–11.31)	447	44.7	3.25 (1.83–5.74)
Asia	574	8.7	6.13 (2.47–15.24)	468	2.1	1.84 (0.25–13.66)	93	53.8	6.03 (2.32–15.69)
missing	1921	2.6	–	1325	6.8	–	353	22.7	–
			P = 0.0160			P = 0.0001			P <0.001
Number of partners in the last two years									
0–1	9894	1.8	1.16 (0.64–2.09)	11470	3.0	1.66 (0.93–2.98)	797	22.6	3.25 (1.67–6.33)
2–5	46746	1.6	Ref	38273	1.0	Ref	4283	10.3	Ref
>5	12631	2.3	1.33 (0.84–2.12)	4713	1.5	1.33 (0.55–3.21)	4730	19.2	1.45 (0.98–2.16)
missing	1624	1.8	–	1244	4.8	–	293	27.3	–
			P = 0.4655			P = 0.2213			P = 0.0028
Knowledge of HIV-infected sexual partner									
Yes	1274	9.4	5.55 (2.85–10.82)	1040	17.3	8.02 (4.14–15.54)	1180	35.6	2.40 (1.57–3.68)
No	69621	1.6	Ref	54660	1.2	Ref	8923	13.3	Ref
			P <0.001			P <0.001			P = 0.0001
Condom use with occasional partners									
Always	28616	1.7	Ref	16866	1.4	Ref	5486	12.6	Ref
Sometimes	22831	2.1	1.19 (0.77–1.82)	17454	1.3	0.97 (0.53–1.78)	2703	24.8	2.07 (1.44–2.99)
Never	4143	1.9	1.05 (0.46–2.40)	4088	1.5	0.63 (0.23–1.73)	588	15.3	1.14 (0.52–2.48)
No occasional partner in the last two years	13092	1.2	0.91 (0.48–1.73)	14998	1.5	0.97 (0.46–2.02)	974	8.2	0.40 (0.16–1.00)
Missing	2213	2.3	–	2294	4.8	–	352	22.7	–
			P = 0.8246			P = 0.8120			P = 0.0001
History of gonorrhoea									
Yes	1577	5.1	1.79 (0.70–4.54)	278	7.2	1.77 (0.24–13.26)	784	37.0	2.31 (1.45–3.67)
No	68056	1.7	Ref	54214	1.4	Ref	9060	13.6	Ref
Missing	1262	4.0	–	1208	5.8	–	259	34.7	–
			P = 0.2576			P = 0.6072			P = 0.0009
History of syphilis									
Yes	184	10.9	6.53 (1.53–27.89)	62	0.0	–	233	38.6	1.49 (0.65–3.38)
No	69255	1.7	Ref	54 445	1.4	–	9545	15.1	Ref
Missing	1456	5.5	–	1193	5.9	–	325	24.6	–
			P = 0.0460						P = 0.3659

All variables listed in the table were entered in the logistic regression models by incorporating appropriately constructed indicator variables.
* Excludes African nationals; † Missings excluded from the multivariable analysis; P values from likelihood ratio tests

tween two and five new partners in the last two years. Knowledge of an HIV-infected sexual partner was also associated with testing HIV positive, with an odds ratio of 5.5 (95% CI: 2.8–10.8) in male heterosexuals, 8.0 (95% CI: 4.1–15.5) in female heterosexuals and 2.4 (95% CI: 1.6–3.7) in MSM. Compared with those who always used condoms with occasional sexual partners, MSM with "sometimes" use of condoms had higher odds of testing HIV positive (OR 2.1, 95% CI: 1.4–2.99). Male heterosexuals who reported a history of syphilis had higher odds of testing HIV positive (OR 6.5, 95% CI: 1.5–27.9) than those who did not report a history of syphilis. For MSM, a history of gonorrhoea was significantly associated with testing positive for HIV (OR 2.3, 95% CI: 1.4–3.7). In 2004–2006 the proportion of those testing positive who had had a history of

Table 3

Stratified multivariable logistic regression analyses for African heterosexual clients at the five anonymous testing sites based in outpatient centres of the university hospitals in Basel, Bern, Geneva, Lausanne and Zurich (Switzerland): 1996–2006.

Characteristic	Heterosexual males			Heterosexual females		
	No. tested	Prevalence HIV positive per 1000	Adjusted Odds Ratio (95% CI)* n = 1436	No tested	Prevalence HIV positive per 1000	Adjusted Odds Ratio (95% CI)† n = 1015
Total	2082			1233		
Age group						
16–24	439	9.1	0.53 (0.15–1.89)	391	28.1	0.18 (0.07–0.43)
25–34	983	15.3	Ref	558	93.2	Ref
35–44	496	32.3	1.98 (0.90–4.34)	217	55.3	0.42 (0.18–0.95)
>=45	131	38.2	1.04 (0.22–4.84)	40	125	0.89 (0.25–3.19)
Missing	33	0.0	–	27	111.1	–
			P = 0.1362			P <0.001
Year						
1996–1999	533	5.6	0.10 (0.01–0.77)	295	54.2	0.97 (0.42–2.23)
2000–2003	913	23.0	Ref	510	58.8	Ref
2004–2006	636	25.2	1.02 (0.48–2.14)	428	86.4	1.58 (0.85–2.92)
			P = 0.0067			P = 0.2575
Number of partners in the last two years						
0–1	388	25.8	1.24 (0.49–3.11)	426	70.4	1.04 (0.56–1.94)
2-5	1318	18.2	Ref	650	56.9	Ref
>5	240	0.0	–	79	63.3	1.08 (0.35–3.35)
Missing	136	44.1	–	78	141.0	–
			P = 0.6542			P = 0.9836
Knowledge of HIV-infected sexual partner						
Yes	71	98.6	7.82 (2.92–20.90)	32	66.6	2.73 (0.75–9.96)
No	2011	16.4	Ref	1201	93.7	Ref
			P = 0.0005			P = 0.1672
Condom use with occasional partners						
Always	766	13.0	Ref	247	44.5	Ref
Sometimes	520	23.1	1.65 (0.66–4.13)	255	70.6	1.84 (0.78–4.38)
Never	128	7.8	excluded†	117	42.7	0.90 (0.25–3.18)
Had no occasional partner in the last two years	541	24.0	1.07 (0.42–2.72)	498	64.3	1.62 (0.68–3.90)
Missing	127	31.5	–	116	146.5	–
			P = 0.5293			P = 0.3578
History of gonorrhoea						
Yes	100	50.0	1.53 (0.41–5.74)	8	125	2.05 (0.23–18.63)
No	1893	17.4	Ref	1157	60.5	Ref
Missing	89	22.5	–	68	176.5	–
			P = 0.5457			P = 0.5511
History of syphilis						
Yes	32	62.5	6.85 (1.35–34.87)	12	83.3	2.54 (0.30–21.56)
No	1962	18.3	Ref	1158	60.4	Ref
Missing	88	22.7	–	63	190.5	–
			P = 0.0528			P = 0.4442

All variables listed in the table were entered in the logistic regression models by incorporating appropriately constructed indicator variables. * Missings excluded from the multivariable analysis; P values from likelihood ratio tests. † Only 1 positive HIV result in this category and excluded when missings excluded from multivariable analysis, therefore unable to compute this category

gonorrhoea almost doubled compared with 2000–2003, rising to 25% (13/51) from 13% (7/54).

African heterosexuals

There was an increase in the proportion of HIV positive tests for male heterosexuals, rising from 5.6 to 25.2/1000 between 1996–1999 and 2004–2006. The odds of testing positive were much lower in 1996–1999 (OR 0.01, 95% CI: 0.01–0.8) than 2004-2006 (OR 1.01, 95% CI: 0.5–2.1) (table 3). Knowledge of an HIV-infected sexual partner was also associated with higher odds of testing HIV positive (OR 7.8, 95% CI: 2.9–20.9), as was a history of having been infected with syphilis (OR 6.8, 95% CI: 1.3–34.9).

For female heterosexuals the proportion of HIV positive tests increased from 54.2 to 86.4/1000 between 1996–1999 and 2004–2006. Compared to those aged 25–34, all other age-groups had lower odds of testing positive for HIV.

Discussion

Our findings showed that between 1996 and 2006 there was an increase in the prevalence of HIV positive tests for male and female African heterosexuals at the five anonymous testing sites that we studied. A published study on the HIV epidemic in western Europe between 1997 and 2002, based on twelve countries, showed that the number of newly diagnosed infections increased greatly (122%) in heterosexuals, largely as a result of infections in persons from countries with generalised epidemics such as sub-Saharan Africa [8].

In MSM, we found higher odds of testing positive in those aged 35–44 years (OR 1.7) compared to those aged 25–34. These findings are largely within the age-group, of 15–49 years, reported to have the highest HIV prevalence in western Europe [2]. For heterosexual females not of African nationality we found higher odds of testing positive (OR 2.8) in the older age group of >=45 years than those aged 25–34. Further analysis (not shown) revealed that the majority of this group who tested positive were Swiss, had a known HIV positive sexual partner, never used condoms with their regular partner and knew that they were at risk. For African females, all age-groups had lower odds (ORs <1) of testing positive than the reference group (25–34). This is supported by global reports of the highest prevalence percent of HIV occurring in younger African women, particularly from sub-Saharan countries [2].

On the basis of the data collected it is not possible to explain the difference in odds of testing HIV positive by nationality group for heterosexuals who were not African and MSM. However, it could be speculated that persons from Asia and the Americas included a large number of commercial sex workers, information on whom was not specifically requested in the questionnaire.

Swiss national surveillance data have shown that MSM had the highest proportion of recently acquired infections (within the preceding six months), rising from 19% in 2001 to 38% in 2006 [6, 7, 9]. Unfortunately we had no data to assess the proportion of infections that had been acquired in the preceding six months. We did have data, however, related to risk factors for acquisition of HIV. Our analysis showed that almost half (47%; 4730/10103) of MSM had had more than five sexual partners in the preceding two years and that around 12% (1180/10103) reported having had sexual contact with an HIV-infected partner. Knowledge of an HIV positive sexual partner increased substantially in MSM over the eleven years covered in this analysis, rising from 2% to 17%, and we also found higher odds of testing positive if they knew their sexual partner was infected (OR 2.4). The increase in proportions of these two risk factors could have contributed to the recent increase in newly diagnosed HIV infections in MSM. A "Gay Survey" done in Switzerland in 2004 showed that MSM had increased their risk-taking behaviour not only in having a larger number of sexual partners in the preceding twelve months but also undertaking anal penetration with regular or occasional partners and fewer using condoms with occasional partners, particularly in men aged below 20 years [10]. The CH.A.T survey (Swiss AIDS Transmission Survey) also identified that preventive measures were not always being used, particularly among MSM, because of an apparent lack of concern about HIV [11, 12]. We also found significantly higher odds of testing positive in non-African heterosexuals and male heterosexuals of African nationality, if they knew their sexual partner was infected, which in addition to the same finding in MSM implies a substantial risk of transmission in discordant sexual partnerships.

Interestingly, for the question relating to number of sexual partners in the preceding two years, the prevalence of positive HIV tests was highest in the "missings" category for all risk groups apart from non-African male heterosexuals. This suggests that this category could include persons who had had at least five sexual partners but who for some reason did not want to tick the appropriate box in the questionnaire. We also found that, for MSM, the odds of testing positive were higher in the category of 0–1 partners (OR 3.2) than >5 partners. This is difficult to interpret, but it may represent a group of people already at a stage of illness that affected their lifestyle, which included them having fewer sexual partners. Alternatively it could represent those whose stable partners have multiple other sexual partners, thus putting them at increased risk of acquiring HIV from their stable partner.

Our analysis showed that a history of gonorrhoea increased the odds of testing HIV positive by a factor of around two in MSM. National surveillance data for STIs in Switzerland, based on data from six dermatology policlinics serving the major cities in Switzerland, showed that between 1997 and 2003 MSM accounted for most of the cases of gonorrhoea (43%) and an increasing proportion of syphilis (9%, 2/24 in 1997 to 48%, 24/50 in 2003) [13]. Sexually transmitted infections, either current or past, enhance the risk of acquiring and transmitting HIV [14, 15]. An increase in the prevalence of STIs combined with an increase in risky sexual behaviour in a population that already has a high prevalence of HIV has the potential to increase HIV transmission in this risk group.

We also found that the odds of testing positive for HIV in the presence of a history of syphilis were around seven times higher for heterosexual males of both African and non-African nationalities. This finding is consistent with the findings for a history of gonorrhoea.

The results presented are based on data collected over eleven consecutive years at the five largest anonymous HIV testing centres in Switzerland. These centres have been operational since 1985 and have over two decades of experience in collecting data for analysis via questionnaires. The questionnaire itself has only been slightly revised, once over the years covered by this analysis, and did not undergo significant changes in classification of those variables collected in the earlier version. Hence the variables described were directly comparable over the analysis period.

There are also clear limitations to this type of data and their analysis. The information is self-reported, so it may have been subject to over-reporting of socially acceptable behaviours and under-reporting of those that were socially unacceptable. In addition, persons with high risk behaviour may prefer to be tested elsewhere, such as specialist clinics. This may have resulted in underestimation of the influence of risk factors and behaviours associated with testing HIV positive. Another limitation, mentioned earlier, was that results could be distorted by the same persons repeatedly attending an anonymous testing site, which could not be accounted for in the analysis as the questionnaires were anonymous. Data for reported HIV diagnoses do not represent HIV incidence, but include many persons found to be HIV positive who were infected at some time in the past. The prevalence of those testing positive also depends on the uptake of HIV testing and the prevalence of HIV in those being tested, which may have varied over time and between persons with different combinations of risk factors. For example, studies have reported that since the advent of highly active antiretroviral therapy, which was introduced in Switzerland in 1996, an increased number of MSM have been tested [16]. In the data included here, the mean annual number of tests performed in MSM increased steadily from 834 in 1996–1999 to 987 in 2004–2006. Part of the "HIV in Europe 2007" initiative is to increase the number of persons who are tested so that antiretroviral therapy (ART) can be started earlier in the course of disease (www.hiveurope 2007.eu). Anonymous HIV testing may contribute to earlier diagnosis and thus to treatment of HIV earlier in the course of HIV disease. Several recently published studies have shown significantly lower mortality rates in those initiating ART when CD4 cell counts are >= 200 cells/μL than in those who initiate therapy later in the course of the disease, when CD4 counts are <50–100 cells/μL [17, 18].

The data analysed came from university hospital sites serving the largest urban centres in Switzerland and were unlikely to be representative of the whole of Switzerland. In addition, we were unable to perform any meaningful analysis of persons reporting IDU, who are also an important risk group for HIV infection. A cross-sectional telephone survey in Switzerland showed that clientele of anonymous HIV test centres tended to be younger, single and with a higher proportion reporting a new steady partner in the preceding year compared with those taking tests in the general population [19, 20]. Our data were in accordance with this in that the majority being tested were under 35 years of age and most had had at least one new partner in the previous two years. Because each test costs around $30, this may have caused further biases in selecting only those persons able to afford the test, who may also have differed in other socio-demographic and risk-taking behaviours from the wider MSM and heterosexual populations.

Conclusions

The finding of a high and increasing prevalence of positive tests in African heterosexuals, who were chiefly from countries of sub-Saharan Africa, was in accordance with western European findings [8]. Even if the majority of these infections occurred in their countries of origin, there is still the risk of acquisition and transmission of HIV once in Switzerland. Hence culturally sensitive public health interventions at all levels (primary, secondary and tertiary) are required in this risk group [4, 9, 21].

On the basis of an analysis of our data, we can put forward a number of hypotheses relating to risk factors associated with acquisition of HIV in-

fection, which could also explain why the figures for recently acquired HIV infections have undergone a disturbing increase in MSM in Switzerland in recent years. Firstly, more MSM were engaging in sexual relationships with partners who were known to be HIV positive. Secondly, the proportion of those testing HIV positive who reported a history of gonorrhoea increased, which would have presented a higher risk of transmitting HIV. Finally, there was an increase in the proportion of MSM who reported that they had had more than five sexual partners in the preceding two years. Given that the probability of meeting an infected partner is many times higher in the gay than in the heterosexual population, having more sexual partners presents a very real risk of acquiring HIV among MSM in discordant relationships, especially if there is a reduction in the use of preventive methods as has been reported in the Swiss Gay Survey [10, 20].

This study shows that anonymous HIV test site data, together with surveillance data from other sources, continue to provide useful information for monitoring of HIV and realignment of HIV prevention activities.

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