

Prevalence of Unsafe Sexual Behavior Among HIV-Infected Individuals: The Swiss HIV Cohort Study

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Summary: Sexual contact is the major mode of HIV transmission. Increased sexual risk taking has been described in HIV-infected individuals receiving potent antiretroviral therapy. A new questionnaire on sexual behavior was introduced into the Swiss HIV Cohort Study on April 1, 2000. We evaluated sexual behavior in all individuals who completed the questionnaire for the first time within 1 year after its introduction. Our primary hypothesis was that self-reported unsafe sexual behavior would be more prevalent among individuals with optimal viral suppression. On April 1, 2000, 4948 individuals were registered in the study, and 4723 (95%) completed the questionnaire. Of these individuals, 12% reported unsafe sex, 78% received antiretroviral therapy, and 25% had optimal viral suppression (HIV RNA level always <50 copies/mL during the preceding 12 months). During the preceding 6 months, 55% of individuals had stable and 19% had occasional partners, and 6% had both types of partners. Sexual intercourse was reported by 82% of individuals with stable and 87% of individuals with occasional partners, and of those reporting sexual intercourse in each group, 76% and 86%, respectively, said that they always used condoms. After adjustment for covariates, reported unsafe sex was not associated with optimal viral suppression (odds ratio, 1.04; 95% confidence interval, 0.81–1.33) or antiretroviral therapy (odds ratio, 0.83; 95% confidence interval, 0.65–1.07), but it was associated with gender, age, ethnicity, HIV transmission group, HIV status of partner, having occasional partners, and living alone. There is no evidence that self-reported unsafe sexual behavior is more prevalent among HIV-infected individuals with optimal viral suppression. However, unsafe sex is associated with other factors. **Key Words:** HIV infections, potent antiretroviral therapy, sexual behavior, communicable disease control

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Worldwide, sexual contact is the major mode of transmission of HIV in adults. Since the introduction of potent antiretroviral therapy in 1995–1996, both morbidity and mortality in HIV-infected individuals with access to therapy have substantially decreased.^{1,2} However, investigators have also found a decrease in the perceived risk of sexual transmission of HIV in patients taking potent antiretroviral therapy.^{3,4} Although plasma HIV RNA concentration is the most important factor in genital HIV

shedding and hence is clearly related to sexual transmission of HIV, cell-associated genital HIV shedding still occurs in those patients who respond well to antiretroviral therapy and have plasma HIV RNA levels of <500 copies/mL.^{5,6} Increases in sexually transmitted diseases in HIV-infected individuals have been described, and several centers have reported an increase in the incidence of new HIV infections.^{7,8}

Knowledge about unsafe sexual behavior of HIV-infected individuals is therefore crucial for the development of specific interventions to reduce sexual HIV transmission. Programs to promote safer sexual behavior are effective and should be widely disseminated.⁹ However, there are a lack of data about sexual behavior in HIV-infected individuals taking potent antiretroviral therapy, especially in groups other than men having sex with men.

We evaluated the sexual behavior of individuals in the Swiss HIV Cohort Study (SHCS). In particular, we looked for any association between unsafe sex and optimal viral suppression.

METHODS

Patients

The SHCS is a prospective cohort study of individuals with HIV infection who are aged 16 years or older.¹⁰ Patients are followed up every 6 months at outpatient clinics in 5 university hospitals, 2 tertiary care centers, and private practices that serve large groups of HIV-infected individuals. On April 1, 2000, a new questionnaire was introduced into the SHCS, with questions on protected or unprotected sexual intercourse, type of partnership (stable partnership or occasional partners), and known or unknown serostatus of a stable partner. Patients were also asked whether they live alone, with relatives or partners, or in institutions. Answers to these questions were voluntary and were recorded on an anonymous form.

Our cross-sectional study included all participants in the SHCS who responded for the first time to the new questionnaire over a period of 12 months after its introduction. During outpatient visits, patients were asked about the following: a stable partnership or occasional partners during the preceding 6 months; sexual intercourse with their partners; use of condoms (always, occasionally, or never); and the HIV serostatus of their stable partner. We defined "reported unsafe sex" as not always using condoms when having sexual intercourse. We defined "denied unsafe sex" as no partner, no sexual intercourse with their partner, or always using condoms when having sexual intercourse. We defined "possible unsafe sex" as neither reported nor denied unsafe sex. We used these definitions to identify a possible reporting bias.

Clinical and demographic information, including gender, age, ethnicity, education, HIV transmission group, CDC stage, type of potent antiretroviral therapy, and plasma HIV RNA concentration, was prospectively collected within the framework of the SHCS. Plasma HIV RNA level (viral load) was measured using the Roche Amplicor Monitor assay (Roche Diagnostic, Basel, Switzerland), with the modification for ultrasensitive detection.¹¹ Optimal viral suppression was defined as plasma HIV-1 RNA levels of <50 copies/mL at every cohort visit

during the 12 months that preceded the date the sexual behavior questionnaire was completed. Individuals were always told their viral load test results at or after each biannual visit. Our primary hypothesis was that self-reported unsafe sexual behavior would be more prevalent among individuals with optimal viral suppression, because they would perceive themselves as unlikely to infect a sexual partner.

Statistical Analysis

Statistical analysis was by logistic regression using SAS version 8.2. Two response variables were modeled: the first was those individuals who reported unsafe sex versus those who did not, and the second was those who did not deny having unsafe sex versus those that did. The following predictor variables were used in each model: gender, age, ethnicity, education, HIV transmission group, and whether the respondent had a stable partner known to be HIV positive, had occasional partners, lived alone, had an AIDS-defining opportunistic illness (as described in the CDC AIDS surveillance case definition¹²), had intake of any antiretroviral therapy, and achieved optimal viral suppression. Two statistics are presented. The evidence for an association between a response and a predictor was assessed by a hypothesis test based on the difference in the likelihood ratio between the full model and a reduced model without that predictor. The nature of any association between a response and a predictor was assessed by odds ratios (ORs). Confidence intervals (CIs) for ORs were calculated using the profile likelihood method.

RESULTS

On April 1, 2000, 4948 individuals were registered and not known to have left the SHCS. Of these individuals, 4767 (96%) had at least one follow-up visit between April 1, 2000, and March 31, 2001, and 4723 (95%) responded to the sexual behavior questionnaire. The percentage of females, intravenous drug users, and individuals with only basic education was higher among those individuals who did not respond than among those who did respond (Table 1). Of those individuals who responded, 55% had a stable partnership and 19% had occasional partners during the preceding 6 months, and 6% had both types of partners. Of those individuals with stable partners, 82% reported sexual intercourse, and of those reporting sexual intercourse, 76% said that they always used condoms (Table 2). Of those individuals with occasional partners, 87% reported sexual intercourse, and of those reporting sexual intercourse, 86% said that they always used condoms. Overall, 12% of the individuals reported unsafe sex, 81% denied unsafe sex, and the remaining 7% neither reported nor denied unsafe sex (Table 3). Of those individuals who responded, 78% received antiretroviral therapy, and 25% had optimal viral suppression with viral loads of <50 copies/mL during the preceding 12 months (Table 1).

In multivariate analysis, reported unsafe sex was not associated ($P > 0.05$) with optimal viral suppression, antiretroviral therapy, diagnosis of an AIDS-defining

TABLE 1. The Swiss HIV Cohort Study at April 1, 2000: characteristics of those individuals who did and did not respond to the sexual behavior questionnaire

	Responders (n = 4723)	Nonresponders (n = 225)
Gender (%)		
Male	70	64
Female	30	36
Age in y (%)		
≤30	11	13
31–40	49	51
≥41	40	36
Ethnicity (%)		
Other	10	9
White or unknown	90	91
Education (%)		
Higher	67	53
Basic or unknown	33	47
HIV transmission group (%)		
Male to male sex	35	19
IV drug use	28	48
Other or unknown	37	33
ART (%)		
Yes	78	NA
No	22	NA
HIV RNA level always <50 copies/mL during previous 12 mo (%)		
Yes	25	NA
No	75	NA

ART, antiretroviral therapy; NA, not applicable.

disease, or education (Table 3). However, reported unsafe sex was associated with gender, age, ethnicity, HIV transmission group, HIV status of the stable partner, having occasional partners, and living alone. After adjusting for all other covariates, the OR for reported unsafe sex in individuals with optimal viral suppression was 1.04 (95% CI, 0.81–1.33). Males (OR, 0.58; 95% CI, 0.45–0.75), individuals aged 41 years or older (OR, 0.64; 95% CI, 0.50–0.80), and individuals living alone (OR, 0.50; 95% CI, 0.39–0.64) were less likely to report unsafe sex. Individuals from ethnic groups other than white (OR, 1.50; 95% CI, 1.07–2.08), intravenous drug users (OR, 1.73; 95% CI, 1.33–2.26), individuals with HIV-infected partners (OR, 15.2; 95% CI, 12.1–19.1), and those with occasional partners (OR, 4.04; 95% CI, 3.07–5.31) were more likely to report unsafe sex.

With unsafe sex not denied as the response, there was less evidence of associations with age and occasional partners and more evidence of associations with education and antiretroviral therapy (Table 3). Most ORs suggest that the nature of any association was similar for both responses. For both reported and not denied unsafe sex, ORs were lower for individuals receiving antiretroviral therapy and for individuals with higher education. However, ORs differed between the two responses for men having sex with men and for those with occasional

partners. Compared with other HIV transmission groups, men having sex with men were no more likely to report unsafe sex (OR, 0.96; 95% CI, 0.71–1.31) but were more likely to not deny unsafe sex (OR, 1.66; 95% CI, 1.32–2.10). Individuals with occasional partners were more likely to report unsafe sex (OR, 4.04; 95% CI, 3.07–5.31) but were no more likely to not deny unsafe sex (OR, 1.18; 95% CI, 0.95–1.47).

We evaluated the interaction of gender and drug use because female drug users may sell unsafe sex for drugs. As a replacement for gender in the multivariate analysis, female drug users were more likely to report unsafe sex (OR, 2.12; 95% CI, 1.49–3.01) and not to deny unsafe sex (OR, 1.71; 95% CI, 1.29–2.29). With this interaction included, gender was then not associated with either response.

DISCUSSION

In this study of a large, well-described HIV-infected population, there was no evidence of an association between unsafe sexual behavior and optimal viral suppression. This is in contrast to other studies reporting increased rates of unprotected sex among individuals taking potent antiretroviral therapy¹³ and among those with suppressed HIV RNA.^{14,15}

This study showed that unsafe sexual behavior is relatively uncommon in individuals of the SHCS compared with other studies of HIV-positive or HIV-negative individuals.^{14,16} There is no evidence from this cohort study to support the hypothesis that individuals taking antiretroviral therapy and those with optimal viral suppression are more likely to have unsafe sex. Other researchers have found that safer sexual behavior is related to adherence to antiretroviral therapy,¹⁷ and this suggests that individuals who take care of themselves by adhering to potent antiretroviral therapy are also more likely to take care of others and protect them from infection.

We identified, however, additional factors that were associated with unsafe sexual behavior. Individuals with HIV-infected stable partners were more likely to report unsafe sex. A number of experts still recommend safer sexual behavior if both partners are HIV positive to

TABLE 2. Sexual behavior in the preceding 6 months for individuals in the Swiss HIV Cohort Study

Type of partnership	Sexual intercourse, N (%)	Always used condoms, N (%)
Stable partner (n = 2595)	2117 (82)	1602/2117 (76)
Occasional partners (n = 882)	771 (87)	664/771 (86)

TABLE 3. Association between demographic and treatment characteristics and unsafe sexual behavior in the Swiss HIV Cohort Study

Predictor	Unsafe sexual behavior, N			Adjusted OR (95% CI)†			
	Denied (n = 3817)	Possible* (n = 344)	Reported (n = 562)	Unsafe sex reported		Unsafe sex not denied	
Gender					<i>P</i> < 0.01		<i>P</i> < 0.01
Male	2729	256	329	0.58 (0.45–0.75)		0.70 (0.57–0.86)	
Female	1088	88	233	1.00 Reference		1.00 Reference	
Age in y					<i>P</i> < 0.01		<i>P</i> = 0.06
≤30	383	38	75	0.89 (0.64–1.23)		0.98 (0.75–1.27)	
31–40	1840	156	336	1.00 Reference		1.00 Reference	
≥41	1594	150	151	0.64 (0.50–0.80)		0.81 (0.68–0.97)	
Ethnicity					<i>P</i> = 0.02		<i>P</i> = 0.03
Other	359	34	81	1.50 (1.07–2.08)		1.34 (1.02–1.75)	
White or unknown	3458	310	481	1.00 Reference		1.00 Reference	
Education					<i>P</i> < 0.25		<i>P</i> = 0.01
Higher	2599	217	349	0.88 (0.70–1.10)		0.79 (0.67–0.94)	
Basic or unknown	1218	127	213	1.00 Reference		1.00 Reference	
HIV transmission group					<i>P</i> < 0.01		<i>P</i> < 0.01
Male to male	1346	160	156	0.96 (0.71–1.31)		1.66 (1.32–2.10)	
IV drug use	1059	80	194	1.73 (1.33–2.26)		1.42 (1.15–1.76)	
Other or unknown‡	1412	104	212	1.00 Reference		1.00 Reference	
HIV-infected partner					<i>P</i> < 0.01		<i>P</i> < 0.01
Yes	289	32	296	15.19 (12.1–19.1)		6.78 (5.60–8.22)	
No or unknown	3528	312	266	1.00 Reference		1.00 Reference	
Occasional partners					<i>P</i> < 0.01		<i>P</i> = 0.13
Yes	725	22	135	4.04 (3.07–5.31)		1.18 (0.95–1.47)	
No or unknown	3092	322	427	1.00 Reference		1.00 Reference	
Lives alone					<i>P</i> < 0.01		<i>P</i> = 0.01
Yes	1695	159	117	0.50 (0.39–0.64)		0.79 (0.66–0.94)	
No or unknown	2122	185	445	1.00 Reference		1.00 Reference	
AIDS					<i>P</i> = 0.81		<i>P</i> = 0.34
Yes	941	68	129	1.03 (0.80–1.32)		0.91 (0.75–1.10)	
No or unknown	2876	276	433	1.00 Reference		1.00 Reference	
ART					<i>P</i> = 0.15		<i>P</i> < 0.01
Yes	3005	251	412	0.83 (0.65–1.07)		0.75 (0.62–0.91)	
No	812	93	150	1.00 Reference		1.00 Reference	
Optimal suppression§					<i>P</i> < 0.77		<i>P</i> = 0.31
Yes	937	89	133	1.04 (0.81–1.33)		1.10 (0.91–1.34)	
No or unknown	2880	255	429	1.00 Reference		1.00 Reference	

* Neither reported nor denied unsafe sex.

† Adjusted for all other predictors listed in the table.

‡ Heterosexual, 90.5%; other, 5.8%; unknown, 3.7%.

§ HIV RNA level always <50 copies/mL during the preceding 12 months.

avoid transmission of a resistant virus, but as yet there is little evidence to support this recommendation.¹⁸ Intravenous drug users and females were also more likely to report unsafe sexual behavior. Female drug users were more likely to report unsafe sex and not to deny unsafe sex, and when this factor was added into the multivariate analysis, gender was then not associated with either response. It could be that female drug users have difficulty negotiating condom use or sell unsafe sex for drugs.¹⁹

Individuals of ethnic groups other than white were more likely to report unsafe sex. In our data, the percentage of individuals with unknown ethnicity was high (41%), but of those with unknown ethnicity, 93% gave their nationality as a country in south or northwest Europe. This suggests that most individuals in the category “white or unknown” were in fact white. Other investiga-

tors have found that ethnicity is associated with unprotected sex in individuals with HIV infection^{20,21} and that ethnic groups other than white may be at a higher risk of acquiring HIV infection.²² There is evidence that in high-income countries, HIV infection is moving into poorer and more deprived communities, including ethnic minorities.²³

Men having sex with men were no more likely to report unsafe sex but were more likely to not deny unsafe sex. This suggests a reporting bias. A second reporting bias is likely for questions on occasional partners. Most of those individuals who neither reported nor denied unsafe sex did not report occasional partners. Unsafe sex with occasional partners is a concern since this behavior may contribute to more rapid transmission of HIV infection. In several countries, the incidence of sexually trans-

mitted diseases is increasing.^{24,25} In Switzerland, the number of new cases of gonorrhea and chlamydial infection reported each year increased between 2000 and 2002, from 5.8 to 7.4 and 32.2 to 43.3 per 100,000, respectively.²⁶ Some countries that have a stable or decreasing rate of HIV infection could therefore soon be facing a new increase in the rate of HIV infection.

Our study has several limitations. First, information about sexual behavior was self-reported, and patients were interviewed by their physician or study nurse. Patients may have underreported unsafe sexual behavior because they are expected to practice safe sex. Second, we have no information on the number of partners, an additional risk factor for unsafe sexual behavior.²⁷ Third, individuals who responded to the questionnaire were different from those who did not respond, which suggests that this study may underestimate the prevalence of unsafe sexual behavior. Fourth, participants in the SHCS are intensively followed by the study centers and may therefore not be representative of all HIV-infected patients in Switzerland or elsewhere. Again this suggests that the study may underestimate the prevalence of unsafe sexual behavior in the wider community.

However, the study has several strengths. First, we considered not just reported unsafe sex but whether unsafe sex was denied. This allowed us to explore to some extent the possibility of reporting bias. Similar ORs were seen for both responses, except for individuals with occasional partners and for men having sex with men. Second, we included in our modeling a total of 10 confounding variables. Since these variables tend to be correlated to some degree, missing variables such as the number of partners are unlikely to affect estimates of the relationship between unsafe sex and optimal viral suppression. Third, although this study may underestimate the prevalence of unsafe sex, differences between those individuals who respond and those who do not and between those in the cohort and those outside will not necessarily affect estimates of the relationship between unsafe sex and optimal viral suppression. We achieved a very high response rate (95%), which makes this cross-sectional study highly representative for those in the SHCS. Fourth, with such a large cohort, the power to detect relevant differences is high.

CD4 cell count was not used in our analysis although it is a measure of the success of antiretroviral therapy. Sexual behavior is a concern because of its implications for HIV transmission, and hence plasma HIV load is a better measure of successful antiretroviral therapy because it is directly linked to HIV transmission and probably linked to the perceived risk of infectiousness.

In conclusion, the present study underlines the importance of epidemiologic data on sexual behavior in HIV-infected populations. In the SHCS, 4 of 5 HIV-infected individuals report safer sexual behavior with their partners. Individuals receiving potent antiretroviral therapy and those with optimal viral suppression do not seem more likely to engage in unsafe sex. However, unsafe sex is more likely in some subgroups of individuals with HIV infection. Sexual health programs targeting these subgroups should complement programs aimed at the general population.

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REFERENCES

1. Ledergerber B, Egger M, Opravil M, et al. Clinical progression and virological failure on highly active antiretroviral therapy in HIV-1 patients: a prospective cohort study. *Swiss HIV Cohort Study. Lancet.* 1999;353:863–868.
2. Palella FJ Jr, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV outpatient study investigators. *N Engl J Med.* 1998;338:853–860.
3. Kravcik S, Victor G, Houston S, et al. Effect of antiretroviral therapy and viral load on the perceived risk of HIV transmission and the need for safer sexual practices. *J Acquir Immune Defic Syndr Hum Retrovirol.* 1998;19:124–129.
4. Kelly JA, Hoffman RG, Rompa D, et al. Protease inhibitor combination therapies and perceptions of gay men regarding AIDS severity and the need to maintain safer sex. *AIDS.* 1998;12:F91–F95.
5. Quinn TC, Wawer MJ, Sewankambo N, et al. Viral load and heterosexual transmission of human immunodeficiency virus type 1. Rakai Project Study Group. *N Engl J Med.* 2000;342:921–929.
6. Kovacs A, Wasserman SS, Burns D, et al. Determinants of HIV-1 shedding in the genital tract of women. *Lancet.* 2001;358:1593–1601.
7. Yamey G. San Francisco's HIV infection rate doubles. *BMJ.* 2001;322:260.
8. Kent G. HIV infections hit a record high in United Kingdom. *BMJ.* 2001;322:260.
9. NIH Consensus Statement. *Interventions to prevent HIV risk behaviours.* 1997;15(2):1–41.
10. Sudre P, Rickenbach M, Taffe P, et al. Clinical epidemiology and research on HIV infection in Switzerland: the Swiss HIV Cohort Study 1988–2000. *Schweiz Med Wochenschr.* 2000;130:1493–1500.
11. Morandi PA, Schockmel GA, Yerly S, et al. Detection of human immunodeficiency virus type 1 (HIV-1) RNA in pools of sera negative for antibodies to HIV-1 and HIV-2. *J Clin Microbiol.* 1998;36:1534–1538.
12. Centers for Disease Control and Prevention. 1993 Revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. *MMWR Morb Mortal Wkly Rep.* 1992;41:961–962.
13. Scheer S, Chu PL, Klausner JD, et al. Effect of highly active antiretroviral therapy on diagnoses of sexually transmitted diseases in people with AIDS. *Lancet.* 2001;357:432–435.
14. Dukers NH, Goudsmit J, de Wit JB, et al. Sexual risk behaviour relates to the virological and immunological improvements during

- highly active antiretroviral therapy in HIV-1 infection. *AIDS*. 2001;15:369–378.
15. Kalichman SC, Rompa D, Austin J, et al. Viral load, perceived infectivity, and unprotected intercourse. *J Acquir Immune Defic Syndr*. 2001;28:303–305.
 16. Khan WA, Richardson C, Mandalia S, et al. Safer sex in HIV infected patients in London: practices and risks. *Sex Transm Infect*. 2001;77:394.
 17. Wilson TE, Barron Y, Cohen M, et al. Adherence to antiretroviral therapy and its association with sexual behavior in a national sample of women with human immunodeficiency virus. *Clin Infect Dis*. 2002;34:529–534.
 18. Vernazza PL, Bernasconi E, Hirschel B. HIV superinfection: myth or reality? *Schweiz Med Wochenschr*. 2000;130:1101–1104.
 19. Pulerwitz J, Amaro H, De Jong W, et al. Relationship power, condom use and HIV risk among women in the USA. *AIDS Care*. 2002;14:789–800.
 20. Do AN, Hanson DL, Dworkin MS, et al. Risk factors for and trends in gonorrhea incidence among persons infected with HIV in the United States. *AIDS*. 2001;15:1149–1155.
 21. Buchacz K, van der Straten A, Saul J, et al. Sociodemographic, behavioral, and clinical correlates of inconsistent condom use in HIV-serodiscordant heterosexual couples. *J Acquir Immune Defic Syndr*. 2001;28:289–297.
 22. Gras MJ, Weide JF, Langendam MW, et al. HIV prevalence, sexual risk behaviour and sexual mixing patterns among migrants in Amsterdam, The Netherlands. *AIDS*. 1999;13:1953–1962.
 23. UNAIDS/WHO. AIDS epidemic update 2001. http://www.unaids.org/epidemic_update/report_dec01.
 24. Stolte IG, Dukers NH, de Wit JB, et al. Increase in sexually transmitted infections among homosexual men in Amsterdam in relation to HAART. *Sex Transm Infect*. 2001;77:184–186.
 25. Johnson AM, Mercer CH, Erens B, et al. Sexual behaviour in Britain: partnerships, practices, and HIV risk behaviours. *Lancet*. 2001;358:1835–1842.
 26. Bundesamt für Gesundheit. BAG Bulletin 2003. URL:www.bag.admin.ch/dienste/publika/bulletin/d/2_03d.pdf.
 27. Kelly JA, Sikkema KJ, Winett RA, et al. Factors predicting continued high-risk behavior among gay men in small cities: psychological, behavioral, and demographic characteristics related to unsafe sex. *J Consult Clin Psychol*. 1995;63:101–107.

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