

Risk factors for the spread of HIV and other sexually transmitted infections among men who have sex with men infected with HIV in Lima, Peru

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ABSTRACT

Objectives: To assess the prevalence of sexually transmitted infections (STIs), the frequency of sexual risk behaviours, and the relation between knowledge of HIV infection status and sexual risk behaviour among men who have sex with men (MSM) infected with HIV attending an STI clinic in Peru.

Methods: We recruited a convenience sample of 559 MSM from a municipal STI clinic in Lima, Peru.

Participants completed a survey and provided blood for HIV, syphilis and HSV-2 antibody testing, and urine for gonorrhoea and chlamydia nucleic acid testing.

Results: Among 124 MSM with HIV, 72.6% were aware that they were infected with HIV. Active syphilis (RPR \geq 1:8) was diagnosed in 21.0% of men infected with HIV, HSV-2 in 79.8%, urethral gonorrhoea in 1.6% and chlamydia in 1.6%. Among 41 participants reporting insertive anal intercourse with their last sex partner, 34.2% did not use a condom. Of the 86 participants reporting receptive anal intercourse, 25.6% did not use a condom. At least one episode of insertive unprotected anal intercourse (UAI) with a partner uninfected with HIV during the past 6 months was reported by 33.6% (35/104) of participants, and receptive UAI with a partner uninfected by HIV was reported by 44.6% (45/101). There was no difference in frequency of UAI with partners infected or uninfected with HIV observed between men who knew their serostatus compared with those who were previously undiagnosed (all *p* values >0.05).

Conclusions: MSM with HIV in Peru engaged in high-risk behaviours for spreading HIV and STIs. Knowledge of whether someone was infected with HIV was not associated with a decreased frequency of UAI. Additional efforts to reduce risk behaviour after the diagnosis of HIV infection are necessary.

The HIV epidemic in Peru disproportionately affects men who have sex with men (MSM). Although prevalence of HIV infection is below 1% in the total population and less than 5% in female sex workers, prevalence among MSM has been estimated to be as high as 21% with an annual incidence up to 5%.^{1,2} Previous research has looked at the social and biological characteristics that promote HIV transmission in MSM in Peru, including frequent unprotected anal intercourse (UAI) and high prevalences of herpes simplex virus (HSV) 2 and syphilis infections.³⁻⁵ Subsequent interventions have used behavioural and biological strategies to prevent HIV and sexually transmitted infection (STI) acquisition among MSM uninfected with HIV and to transform community

behavioural norms in order to decrease sexual risk behaviour and increase condom use in the population.^{6,7} Yet a key, understudied, factor contributing to the concentrated increase of the HIV epidemic among MSM in Peru is the large number of men with HIV who continue to engage in high-risk sexual behaviour.

Researchers in other countries have begun to address important issues in secondary HIV transmission, including the relation between knowledge of HIV status and reduction of high-risk behaviour; the influence of substance use and mental health on sexual risk behaviour; the presence of STI co-infection and increased biological risk of HIV transmission; the use of harm reduction strategies such as serosorting and seropositive to reduce HIV transmission during unprotected intercourse; and the role of ecosocial analyses in contextualising the web of social, biological and behavioural issues influencing the lives of people living with HIV.⁸⁻¹⁶ However, little research has specifically addressed populations in Latin America infected with HIV and the analytic framework for designing secondary prevention interventions in the region remains underdeveloped.^{17,18} As part of a study of HIV and STIs among MSM in Lima, Peru, we examined a sample of men with HIV to determine the prevalence of behavioural and biological risk factors for HIV transmission and characteristics associated with high-risk sexual behaviour.

METHODS

Study design, population and recruitment

We conducted a study of HIV/STI prevalence and risk behaviours for transmission in a convenience sample of MSM recruited from the Centro de Referencia de ITS (CERITS) Alberto Barton in Lima/Callao, Peru. The CERITS Barton is part of a network of clinics established by the Ministry of Health in Peru to provide STI prevention and treatment services to MSM and female sex workers. A passive recruitment strategy was used: clinic attendees were provided with a flyer that provided basic information about the study and asked patients to inform clinic staff if they were interested in participating. Patients who expressed interest were screened by counsellors during the behavioural risk assessment and counselling session that occurs at the beginning of all clinic visits. Enrollment was limited to patients born anatomically male who reported oral or anal sexual contact with another male in the preceding 12 months. All

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respondents agreeing to participate provided written informed consent.

Data collection

Participants completed a web-based survey during the initial enrollment visit using computer stations in the counsellor's office. Participants were instructed to complete the survey independently and in private, although counsellors were available to provide assistance as needed. Individuals responded to questions in Spanish about sociodemographics, sexual behaviour during the past 6 months and during the last sex act, history of STIs (including prior HIV testing), substance use and exchange of sex for money or goods. Blood and urine specimens were collected by laboratory staff. Urethral swabs were collected from men with urethral discharge by clinic physicians. Participants returned approximately 1 week later to receive results and post-test counselling. Participants diagnosed with an STI were given appropriate antibiotic treatment and advised of the importance of partner notification. In cases of newly diagnosed HIV infection, participants were referred to a designated Ministry of Health facility for ongoing care.

Laboratory methods

All blood, urine and urethral swab samples were analysed at the US Naval Medical Research Center Detachment in Lima, Peru. Blood was screened for syphilis infection by rapid plasma reagin (RPR) assay (RPRnosticon, Biomérieux, Marcy l'Étoile, France) with *Treponema Pallidum* Particle Agglutination (TPPA) confirmation (Serodia, Fujirebio, Tokyo, Japan). TPPA-reactive samples were then diluted to measure the RPR titre. Active syphilis infection was defined as an RPR titre $\geq 1:8$. HIV-1 ELISA (Vironostika, Biomérieux, Marcy l'Étoile, France) was used to screen for the presence of HIV antibodies in all participants. Positive samples were confirmed by Western Blot assay (Genetic Systems, Biorad, Hercules, California, USA).

HSV-2 ELISA (HerpeSelect, Focus Technologies, Cypress, California, USA) was used for serological detection of genital herpes with an index value of ≥ 3.50 defining seropositivity. (Index values ≤ 0.90 were considered seronegative and values between 0.91 and 3.49 indeterminate.) Urine and urethral swab samples underwent nucleic acid testing (Roche Amplicor, Roche Diagnostics, Alameda, California, USA) for gonorrhoea and chlamydia.

Data analysis

The primary analysis was conducted among study participants infected with HIV. Descriptive statistical analysis was conducted to assess differences according to previous knowledge of HIV infection, HIV risk perception and sexual risk behaviour. Risk factors for UAI in the past 6 months were explored using both simple and multivariate robust Poisson regression. Poisson regression was used because of the high prevalence of unprotected sex in the past 6 months (44.6%). Individuals with missing data were excluded from the affected analysis only. Measures of association reported are prevalence ratios. Variables explored as potential risk factors included age (scaled to 5 years), high school education, involvement in compensated sex in the past 6 months and number of male sex partners in the past 6 months.

RESULTS

Study population

A total of 559 MSM were enrolled between May and December 2007; 59.2% (331/559) returned for a follow-up visit to receive their laboratory test results. Among all participants, 124 were infected with HIV (22.2%; 95% CI 18.9 to 25.8%), of whom 34/124 (27.4%) were new diagnoses (table 1). Of the newly diagnosed participants, 32.4% (11/34) reported never having been tested for HIV. While the majority (70.0%; 21/30) of men with undiagnosed HIV considered themselves at "moderate" or "high" risk for HIV/STI, 30.0% (9/30) considered themselves at

Table 1 Risk factors for HIV/STI transmission and STI prevalence in MSM infected with HIV in Lima, Peru, 2007

	Known HIV infection (n)	Unknown HIV infection (n)	Total (n)
Age (median, IQR)	33 (27 to 39)	28.5 (23 to 34)	31.5 (25 to 28.5)
High school graduate	70.0% (63/90)	76.5% (26/34)	71.8% (89/124)
Sexual risk behaviour			
Number of male sex partners in past 6 months (median, IQR)	3 (1 to 10)	2 (1 to 5)	2 (1 to 6)
Provision of compensated sex in past 6 months	31.4% (28/89)	39.4% (13/33)	33.6% (41/122)
Insertive UAI with a male partner uninfected with HIV in past 6 months	31.6% (24/76)	39.3% (11/28)	33.6% (35/104)*
Insertive UAI with a male partner who has HIV or unknown serostatus in past 6 months	21.6% (16/74)	19.2% (5/26)	21.0% (21/100)*
Receptive UAI with a male partner who is uninfected with HIV in past 6 months	45.8% (33/72)	41.4% (12/29)	44.6% (45/101)*
Receptive UAI with a male partner who has HIV or unknown serostatus in past 6 months	22.9% (16/70)	17.9% (5/28)	21.4% (21/98)*
STI prevalence			
HSV-2 positive	81.1% (73/90)	76.5% (26/34)	79.8% (99/124)
Syphilis (any RPR)	32.2% (29/90)	44.1% (15/34)	35.5% (44/124)
Syphilis (RPR $\geq 1:8$)	18.9% (17/90)	26.5% (9/34)	21.0% (26/124)
Chlamydia (urethral)	0% (0/90)	5.9% (2/34)	1.6% (2/124)
Gonorrhoea (urethral)	1.1% (1/90)	2.9% (1/34)	1.6% (2/124)

*Responses not recorded for men who had no male sex partners in the previous 6 months. IQR, interquartile range; MSM, men who have sex with men; RPR, rapid plasma reagin; STI, sexually transmitted infection; UAI, unprotected anal intercourse.

Table 2 Unprotected anal intercourse (UAI) in the past 6 months by male partner serostatus in men who have sex with men with HIV in Lima, Peru, 2007

	Known HIV infection (n)	Unknown HIV infection (n)	p Value
Insertive UAI with a partner uninfected with HIV	31.6% (24/76)	39.3% (11/28)	0.461
Insertive UAI with a partner with HIV or of unknown serostatus	21.6% (16/74)	19.2% (5/26)	0.797
Receptive UAI with a partner uninfected with HIV	45.8% (33/72)	41.4% (12/29)	0.684
Receptive UAI with a partner infected HIV or of unknown serostatus	22.9% (16/70)	17.9% (5/28)	0.586

“minimal” or “no” risk. A total of 47.8% (43/90) of participants with known HIV infection were receiving highly active antiretroviral therapy (HAART) at the time of evaluation. All subsequent analyses were conducted among the 124 participants with HIV.

Prevalence of HIV and STIs

The lifetime prevalence of syphilis infection (any RPR titre) among MSM with HIV was 35.5% (44/124; 95% CI 27.6 to 44.2%) while 21.0% (26/124; 95% CI 14.7 to 29.0%) had a RPR titre of $\geq 1:8$, suggestive of untreated infection. HSV-2 antibodies were detected in 79.8% (95% CI 71.9 to 85.9%), while genital chlamydia and gonorrhoea were each diagnosed in 1.6% of participants infected with HIV (2/124; 95% CI 0.5 to 5.7%).

Sexual risk behaviours

Participants reported a median of 2 (interquartile range (IQR) 1–6) male sex partners during the past 6 months. Among men with HIV who reported at least one male sex partner in the same period, 33.6% (35/104; 95% CI 25.3 to 43.2%) had insertive UAI and 44.6% (45/101; 95% CI 35.2 to 54.3%) had receptive UAI with a male partner uninfected with HIV at least once. Among participants who reported insertive anal intercourse with their last male sex partner, 34.2% (13/38) did not use a condom. None of the participants (0%; 0/72) stated that they did not know where to obtain condoms and only 5.5% (4/72) described cost as a factor in their decision not to use condoms. No significant differences in sexual risk behaviours were noted according to participants' knowledge of their HIV infection status (table 2).

Men who had not completed secondary school were more likely to report UAI in the past 6 months ($p = 0.035$) (table 3). No statistically significant association between UAI and age, education level, number of recent sex partners, drug use prior to sex, partner type, antiretroviral treatment or involvement in compensated sex were observed in multivariate analysis (all p values >0.05).

Serosorting practices

No evidence of partner protective serosorting or seropositioning was observed. Men who were previously diagnosed with HIV more frequently reported UAI with partners uninfected with HIV than with partners infected with HIV or with unknown serostatus. During the 6 months prior to enrollment, 31.1% (23/74) of men with known HIV infection who reported insertive anal intercourse had UAI only with men uninfected with HIV while 21.6% (16/74) had UAI only with men who were infected with HIV or of unknown status. Findings for receptive UAI were similar, as 43.5% (30/69) of MSM with HIV had receptive UAI only with partners uninfected with HIV and 21.7% (15/69) reported UAI only with partners infected with HIV or with unknown status.

DISCUSSION

MSM with HIV in Lima, Peru, reported frequent UAI with both sex partners infected with HIV and those uninfected, had a high prevalence of syphilis and HSV-2 infections, and did not show evidence of engaging in strategies to reduce the risk of HIV transmission during unprotected intercourse. Frequent reports of high-risk sexual behaviour among men already diagnosed with HIV highlight the need for “prevention for positives” interventions that specifically target secondary HIV transmission among MSM.^{8 12–14 19}

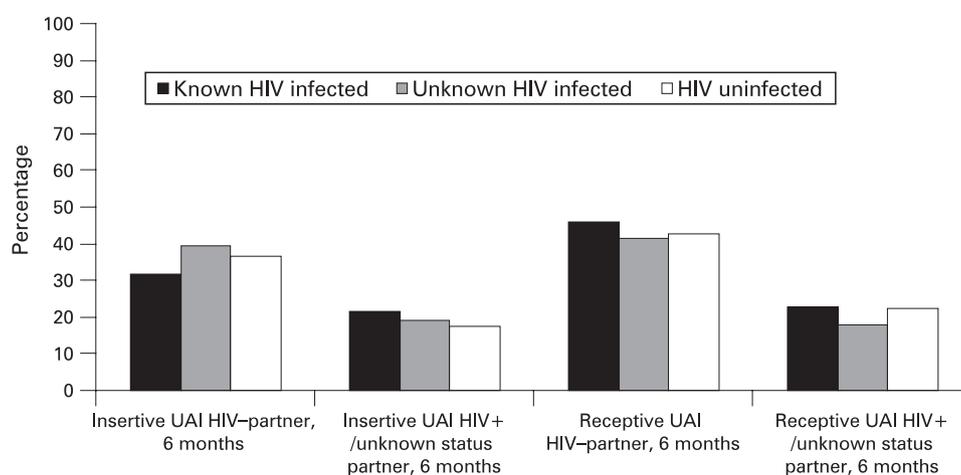
Our findings are consistent with other studies that have shown high rates of unprotected intercourse among MSM with HIV in the USA, Europe and the Caribbean.^{18 20–23} The remarkable aspect of our study is the large number of MSM with HIV who had recent high-risk sexual practices with partners uninfected with HIV coupled with the absence of any discernible harm-reduction strategies. Insertive UAI with a male partner uninfected with HIV (a practice where estimated risk for HIV transmission is 0.82% per act)²⁴ was reported by 33.6% of all MSM with HIV during the past 6 months. Men who knew they were infected with HIV were equally as likely as undiagnosed men to engage in insertive UAI with a male

Table 3 Risk factors associated with recent UAI in MSM with HIV in Lima, Peru, 2007

	No UAI in past 6 months (n)	UAI in past 6 months % (n)	p Value*
Age (median IQR)	30 (24 to 36)	30.5 (25 to 37)	0.930
Graduated high school			
No	24.1% (7/29)	75.9% (22/29)	
Yes	46.8% (36/77)	53.3% (41/77)	0.035
Male sex partners in past 6 months (median IQR)	3 (1 to 7)	3 (1 to 7)	0.729
Use of drugs prior to sex in past 6 months			
No	30.0% (6/20)	70.0% (14/20)	
Yes	43.0% (37/86)	57.0% (49/86)	0.285
Exchange of sex for money/goods in past 6 months			
No	46.2% (18/39)	53.8% (21/39)	
Yes	36.9% (24/65)	63.1% (41/65)	0.353

*All p values >0.05 on multivariate analysis. IQR, interquartile range; MSM, men who have sex with men; UAI, unprotected anal intercourse.

Figure 1 Risk behaviours for the spread of HIV/sexually transmitted infections among men who have sex with men in Lima, Peru, 2007. HIV−, HIV negative; HIV+, HIV positive; UAI, unprotected anal intercourse.



partner uninfected with HIV. In addition, MSM with known HIV were more likely to engage in both insertive and receptive UAI exclusively with men uninfected with HIV than with men infected with HIV or with unknown serostatus. These observations probably represent the indiscriminate practice of unprotected intercourse with all sex partners regardless of their HIV status in a society where men with HIV rarely disclose their HIV status to sex partners (fig 1). Yet the implications of these unprotected serodiscordant partnership patterns for HIV transmission in the community cannot be ignored. Prevention interventions for MSM in Peru that address routine condom use during intercourse with partners of discordant or unknown HIV serostatus should also introduce concepts of disclosure of HIV status, harm reduction and negotiated safety. Although serosorting and seropositioning cannot be advocated as effective methods of HIV prevention, informed discussion of these can help men with HIV in Peru to begin to openly acknowledge and negotiate the impact of HIV and STIs on their sexuality and sexual practices.

Although unsurprising, the high prevalence of co-infection with syphilis or HSV-2 in the study sample has important implications for secondary HIV transmission in the population. While the number of infections diagnosed among all MSM in the study was high (55.0% HSV-2 seropositive; 10.0% with active syphilis), the rate of infections in the subset of MSM with HIV was substantially higher (79.8% HSV-2 seropositive; 21.0% with active syphilis; $p < 0.001$). Previous studies have highlighted the link between syphilis or HSV-2 infection and HIV acquisition, independent of sexual risk behaviour, among MSM in Peru.^{4, 25} Given the endemic nature of these STIs in MSM populations in Peru, it is difficult to differentiate their role in augmenting secondary HIV transmission by MSM with HIV from their role in increasing primary HIV acquisition by men uninfected with HIV. Biological strategies for STI prevention and management among MSM in Peru are necessary to address the epidemiological context where STIs disproportionately, though not exclusively, involve MSM with HIV. Routine care of MSM with HIV and high-risk MSM uninfected with HIV should include regular and frequent STI screening, including testing for syphilis, gonorrhoea and chlamydia (at all anatomic sites of sexual contact), as well as HSV-2 antibody testing and consideration of HSV-2 antiviral treatment.^{26, 27}

Although not directly addressed by our findings, social norms and epidemiological patterns present in Lima's urban neighbourhoods provide the context for individual behavioural

and biological risk factors for secondary HIV transmission observed among MSM in our study. Community behavioural norms, such as not using a condom, are reflected in individuals' patterns of behaviour, independent of their HIV status.²⁸ Stigma against people with HIV inhibits disclosure of HIV infection to sex partners and deters initiation of condom use or other safer sex practices that might suggest a person has HIV.^{9, 29} Poverty and socioeconomic marginalisation of MSM leads many to engage in compensated sex for economic survival.³⁰ A high baseline prevalence of STIs heightens the risk for the continued spread of HIV and STIs in the community.³¹ Deficiencies in public health resources limit access to diagnosis, treatment and public health services (such as third-party partner notification and expedited partner treatment) that could reduce the spread of HIV and other STIs in the population.³² In addition to modifying individual risk behaviours, interventions to reduce secondary transmission of HIV must account for and address the larger ecological context of MSM in Peru.^{33–35}

Our findings have several limitations for generalising. Participants were recruited from a STI clinic setting and are by definition a high-risk subpopulation. The prevalence of sexual risk behaviours and STIs in this group is likely to be higher than that of MSM with HIV in the general population. In addition, although information was collected on specific sexual practices in the past 6 months and during the last sex act, we do not have detailed information on behaviour with different partner types or in different contexts. As many people consider unprotected intercourse less of a risk in a stable relationship or when on antiretroviral treatment, knowledge of the specific circumstances in which behaviours are practiced can be as important as the behaviour itself. We also did not collect information on the time since initial diagnosis for men with known HIV infection. This information is potentially important in that there is often a transient decrease in high-risk sexual behaviour during the time period immediately following a diagnosis of HIV infection.³⁶ Analysis of sexual risk behaviour among MSM with known HIV infection according to the length of time since diagnosis could further highlight the risk practices outlined in our report. Similarly, the study was not specifically designed to assess serosorting or seropositioning practices among MSM with HIV. In order to assess the risk of HIV acquisition for MSM uninfected with HIV, all participants were asked how often they had unprotected intercourse with "HIV-negative

Key messages

- ▶ A high proportion of men who have sex with men (MSM) with HIV in Peru engage in sexual practices that carry a high risk of HIV transmission to uninfected partners.
- ▶ In a sample of MSM with previously diagnosed HIV infection, no evidence of serosorting or seropositioning harm reduction strategies was observed.
- ▶ No difference in the prevalence of high-risk sexual behaviour was seen when comparing men with newly diagnosed HIV infection from those who were aware of their HIV infection status.

partners” and with “HIV-positive or unknown serostatus partners”, which resulted in a loss of depth and subtlety in thoroughly understanding risk reduction behaviours of the participants with HIV. Despite these limitations, our findings provide important information for understanding secondary HIV transmission among MSM in Peru and suggest important areas for additional research and analysis.

The behavioural and biological risk profiles of MSM with HIV in Peru reported here indicate significant risk for continued HIV transmission and an increase in the HIV epidemic among MSM in Peru. Although we cannot determine the effectiveness of counselling and testing programmes for modifying high-risk sexual behaviour,^{15 16} it is clear that in this population knowledge of HIV status is not associated with a significant reduction in sexual risk behaviour. In addition, there was no evidence of harm reduction practices, such as serosorting and seropositioning. Although these strategies are not reliable methods for HIV prevention, they do represent an open engagement about HIV infection that MSM in Peru should be encouraged to address. Finally, population-level interventions that target community behavioural norms of condom use and public health issues of STI control in Peru are critical to modifying the contexts in which risk factors for HIV/STI transmission of individual MSM with HIV are located. Secondary HIV prevention strategies that specifically address the needs of MSM with HIV should be developed in Peru as part of larger efforts to alter the behavioural and biological dynamics of HIV/STI transmission in the population, and need to be introduced immediately.

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Contributors: Study concept and design was provided by JLC, KAK and HJS under the guidance of CFC, JDK and TJC. Data collection was coordinated by ERS with the participation of JLC, HJS and SRL. Laboratory analysis of specimens was managed by SRL and ERH. Data analysis was completed by JLC and KAK. JLC took primary responsibility for drafting the manuscript, with the contribution and final approval of all of the authors.

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