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Risk Factors for the Spread of HIV and Other Sexually Transmitted Infections Among HIV-infected Men Who Have Sex with Men in Lima, Peru

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Abstract

Objectives—To assess the prevalence of sexually transmitted infections (STIs), frequency of sexual risk behaviors, and relationship between knowledge of HIV infection status and sexual risk behavior among HIV-infected men who have sex with men (MSM) 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 gonorrhea and chlamydia nucleic acid testing.

Results—Among 124 HIV-infected MSM, 72.6% were aware of their HIV-infected status. Active syphilis (RPR≥1:8) was diagnosed in 21.0% of HIV-infected participants, HSV-2 in 79.8%, urethral gonorrhea 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 86 participants reporting receptive anal intercourse, 25.6% did not use a condom. At least one episode of insertive unprotected anal intercourse (UAI) with an HIV-uninfected partner during the previous six months was reported by 33.6% (35/104) of participants, and receptive UAI with an HIV-uninfected partner by 44.6%

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Key Statements: Many HIV-infected MSM 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 behavior was seen when comparing men with newly diagnosed HIV infection from those who were aware of their HIV infection status.

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(45/101). No difference in frequency of UAI, with HIV-uninfected or HIV-infected partners, was observed between men who knew their serostatus compared with those who were previously undiagnosed (all p-values >0.05).

Conclusions—HIV-infected MSM in Peru engaged in high-risk behaviors for spreading HIV and STIs. Knowledge of HIV-infected status was not associated with a decreased frequency of unprotected anal intercourse. Additional efforts to reduce risk behavior after the diagnosis of HIV infection are necessary.

Keywords

MSM; Peru; HIV; Secondary prevention; Prevention for positives

INTRODUCTION

The HIV epidemic in Peru disproportionately affects men who have sex with men (MSM). While the prevalence of HIV infection is below 1% in the total population and less than 5% in female sex workers, the prevalence among MSM has been estimated to be as high as 21%, with an annual incidence up to 5% [1,2]. Previous research has addressed social and biological characteristics of Peruvian MSM that promote HIV transmission, including frequent unprotected anal intercourse and high prevalences of HSV-2 and syphilis infections [3–5]. Subsequent interventions have employed behavioral and biological strategies to prevent HIV/STI acquisition among HIV-uninfected MSM, and to transform community behavioral norms in order to decrease sexual risk behavior and increase condom use in the population [6,7]. Yet a key, understudied, factor contributing to the concentrated explosion of the HIV epidemic among Peruvian MSM is the large number of HIV-infected men who continue to engage in high-risk sexual behavior.

Investigators in other countries have begun to address important issues in secondary HIV transmission including: the relationship between knowledge of HIV status and reduction of high-risk behavior; the influence of substance use and mental health on sexual risk behavior; the presence of STI co-infection and increased biological risk of HIV transmission; the use of harm reduction strategies such as serosorting and seropositioning to reduce HIV transmission during unprotected intercourse; and the role of ecosocial analyses in contextualizing the web of social, biological, and behavioral issues influencing the lives of people living with HIV [8–16]. However, little research has specifically addressed HIV-infected populations in Latin America, 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 HIV-infected men to determine the prevalence of behavioral and biological risk factors for HIV transmission and characteristics associated with high-risk sexual behavior among HIV-infected MSM.

METHODS

Study Design, Population, and Recruitment

We conducted a study of HIV/STI prevalence and risk behaviors 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 Peruvian Ministry of Health to provide STI prevention and treatment services to MSM and female sex workers. A passive recruitment strategy was employed where clinic attendees were provided with a flyer that provided basic information about the study and requested patients to inform clinic staff if they were interested in participating. Patients who expressed interest were screened by counselors during the behavioral risk assessment and counseling

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 twelve months. All respondents agreeing to participate provided written informed consent. The study protocol was approved by the Committee of Human Subjects Research of the University of California at Los Angeles, the San Francisco Department of Public Health, the Universidad Peruana Cayetano Heredia, and the U.S. Naval Medical Research Center Detachment in Lima, Peru in compliance with all federal regulations regarding the protection of human subjects.

Data Collection

Participants completed a web-based survey during the initial enrollment visit using computer stations in the counselor's office. Participants were instructed to complete the survey independently and in private, though counselors were available to provide assistance as needed. Individuals responded to questions in Spanish about sociodemographics, sexual behavior during the last six 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 one week later to receive results and post-test counseling. Participants diagnosed with an STI were given appropriate antibiotic therapy 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 analyzed at the U.S. Naval Medical Research Center Detachment in Lima, Peru. Blood was screened for syphilis infection by RPR assay (RPRnosticon, Biomérieux; Marcy l'Étoile, France) with Treponema Pallidum Particle Agglutination (TPPA) confirmation (Serodia, Fujirebio; Tokyo, Japan). TPPA-reactive specimens were then diluted to measure the RPR titer. Active syphilis infection was defined as an RPR titer ≥ 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, CA). HSV-2 ELISA (HerpeSelect, Focus Technologies; Cypress, CA) was used for serologic detection of genital herpes with an index value of ≥3.50 defining seropositivity. (Index values ≤0.90 were considered seronegative and values between 0.91–3.49 indeterminate.) Urine and urethral swab samples underwent nucleic acid testing (Roche Amplicor, Roche Diagnostics; Alameda, CA) for gonorrhea and chlamydia.

Data Analysis

The primary analysis was conducted among HIV-infected study participants. Descriptive statistical analysis was conducted to assess differences according to previous knowledge of HIV infection, HIV risk perception, and sexual risk behavior. Risk factors for unprotected anal sex in the past six months were explored using both simple and multivariate robust Poisson regression. Poisson regression was employed due to 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 five years), high school education, involvement in compensated sex in the past six months, and number of male sex partners in the past six months.

RESULTS

Study Population

A total of 559 MSM were enrolled between May-December, 2007, of whom 59.2% (331/559) returned for a follow-up visit to receive their laboratory test results. Among all participants, 124 were HIV-infected (22.2%; 95% Confidence Interval [CI] = 18.9–25.8%), of whom 34/124 (27.4%) were new diagnoses. 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 infection considered themselves at “moderate” or “high” risk for HIV/STI acquisition, 30.0% (9/30) considered themselves at “minimal” or “no” risk. 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 are conducted among the 124 HIV-infected participants.

Prevalence of HIV and STIs

The lifetime prevalence of syphilis infection (any RPR titer) among HIV-infected MSM was 35.5% (44/124; CI = 27.6–44.2%) while 21.0% (26/124; CI = 14.7–29.0%) had an RPR titer of 1:8 or greater, suggestive of untreated infection. HSV-2 antibodies were detected in 79.8% (CI= 71.9–85.9%), while genital chlamydia and gonorrhea were each diagnosed in 1.6% of HIV-infected participants (2/124; CI = 0.5–5.7%).

Sexual Risk Behaviors

Participants reported a median of 2 (IQR = 1–6) male sex partners during the previous six months. Among HIV-infected men who reported at least one male sex partner in the same period, 33.6% (35/104; CI = 25.3–43.2%) had engaged in insertive unprotected anal intercourse (UAI) and 44.6% (45/101; CI = 35.2–54.3%) had receptive UAI with an HIV-uninfected male partner 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. No 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 behaviors were noted according to participants’ knowledge of their HIV infection status.

Men who had not completed secondary school were more likely to report UAI in the previous six months (p=0.035). No statistically significant association between UAI and age, education level, number of recent sex partners, drug use prior to sex, partner type, antiretroviral treatment status, 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 infection more frequently reported UAI with HIV-uninfected partners than with HIV-infected or unknown serostatus partners. During the six months prior to enrollment, 31.1% (23/74) of men with known HIV infection who reported insertive anal intercourse engaged in UAI only with HIV-uninfected men while 21.6% (16/74) engaged in UAI only with men who were HIV-infected or of unknown status. Findings for receptive UAI were similar, as 43.5% (30/69) of HIV-infected MSM had receptive UAI only with HIV-uninfected partners and 21.7% (15/69) reported UAI only with HIV-infected or unknown status partners.

DISCUSSION

HIV-infected MSM in Lima, Peru reported frequent unprotected anal intercourse with both HIV-infected and HIV-uninfected sex partners, had a high prevalence of syphilis and HSV-2 infections, and did not show evidence of engaging in strategies to reduce risk of HIV transmission during unprotected intercourse. Frequent reports of high-risk sexual behavior among men already diagnosed with HIV infection point to 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 HIV-infected MSM in the U.S., Europe, and the Caribbean [18,20–23]. The remarkable aspect of our study is the large number of HIV-infected MSM who specified recent high-risk sexual practices with HIV-uninfected partners, coupled with the absence of any discernible harm-reduction strategies. Insertive unprotected anal intercourse (UAI) with an HIV-uninfected male partner, a practice where estimated risk for HIV transmission is 0.82% per-act [24], was reported by 33.6% of all HIV-infected MSM during the previous six months. Men who knew they were HIV-infected were equally as likely as undiagnosed men to engage in insertive UAI with an HIV-uninfected male partner. In addition, MSM with known HIV infection were more likely to engage in both insertive and receptive UAI exclusively with HIV-uninfected men than with HIV-infected or unknown serostatus men. These observations probably represent the indiscriminate practice of unprotected intercourse with all sex partners regardless of their HIV status in a society where HIV-infected men 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 Peruvian MSM 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 can not be advocated as effective methods of HIV prevention, informed discussion of these concepts can assist HIV-infected Peruvian men 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 HIV-infected MSM 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 behavior, among MSM in Peru [4,25]. Given the endemic nature of these STIs in Peruvian MSM populations, it is difficult to differentiate their role in augmenting secondary HIV transmission by HIV-infected MSM from their role in increasing primary HIV acquisition by HIV-uninfected men. Biological strategies for STI prevention and management among MSM in Peru are necessary to address the epidemiologic context where STIs disproportionately, though not exclusively, involve HIV-infected MSM. Routine care of HIV-infected and high-risk uninfected MSM should include regular and frequent STI screening, including testing for syphilis, gonorrhea and chlamydia (at all anatomic sites of sexual contact), as well as HSV-2 antibody testing and consideration of HSV-2 antiviral therapy [26,27].

Although not directly addressed by our findings, social norms and epidemiologic patterns present in Lima's urban neghborhoods provide the context for individual behavioral and biological risk factors for secondary HIV transmission observed among MSM in our study. Community behavioral norms neglecting condom use are reflected in individuals' patterns of

behavior, 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 is HIV-infected [9,29]. Poverty and socioeconomic marginalization of gay men leads many to engage in compensated sex for economic survival [30]. A high baseline prevalence of STIs heightens risk for the continued spread of HIV and STIs in the community [31]. Deficiencies in public health resources limit access to the diagnostic, treatment, and public health services (such as third-party partner notification and expedited partner therapy) that could reduce the spread of HIV and other STIs in the population [32]. In addition to modifying individual risk behaviors, 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 that may limit their generalizability. Participants were recruited from an STI clinic setting and are by definition a high-risk subpopulation. The prevalence of sexual risk behaviors and STIs in this group is likely to be higher than that of HIV-infected MSM in the general population. In addition, though information was collected on specific sexual practices in the last six months and during the last sex act, we do not have detailed information on behavior with different partner types or in different contexts. As many people consider unprotected intercourse less risky in the setting of a stable relationship or when on stable antiretroviral therapy, knowledge of the specific circumstances in which behaviors are practiced can be as important as the behavior 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 behavior during the time period immediately following a diagnosis of HIV infection [36]. Analysis of sexual risk behavior among MSM with known HIV infection according to the length of time since diagnosis could further illuminate the risk practices outlined in our report. Similarly, the study instrument was not specifically designed to assess serosorting or seropositioning practices among HIV-infected MSM. In order to assess risk of HIV acquisition for uninfected MSM, all participants were asked how often they had unprotected intercourse with “HIV-negative partners” and with “HIV-positive or unknown serostatus partners,” resulting in a loss of depth and subtlety in thoroughly understanding risk reduction behaviors of the HIV-infected participants. 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 behavioral and biological risk profiles of Peruvian HIV-infected MSM reported here indicate significant risk for continued HIV transmission and expansion of the HIV epidemic among MSM in Peru. Although we cannot make determinations regarding the effectiveness of counseling and testing programs for modifying high-risk sexual behavior [15,16], it is clear that in this population knowledge of HIV-infected status is not associated with a significant reduction in sexual risk behavior. 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 with problems of sexuality in the context of HIV infection that Peruvian MSM should be encouraged to address. Finally, population-level interventions that target community behavioral 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 HIV-infected MSM are located. Secondary HIV prevention strategies that specifically address the needs of HIV-infected MSM should be developed in Peru as part of larger efforts to alter the behavioral and biological dynamics of HIV/STI transmission in the population, and need to be introduced immediately.

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Table 1

Risk Factors for HIV/STI Transmission and STI Prevalence; HIV-infected MSM, Lima, Peru 2007

	Known HIV Infection	Unknown HIV Infection	Total
Age (Median, IQR)	33 (27 – 39)	28.5 (23 – 34)	31.5 (25 – 28.5)
High School Graduate	70.0% (63/90)	76.5% (26/34)	71.8% (89/124)
Sexual risk behavior			
Number of Male Sex Partners, 6 months (Median, IQR)	3 (1 – 10)	2 (1 – 5)	2 (1 – 6)
Provision of Compensated Sex, 6 months	31.4% (28/89)	39.4% (13/33)	33.6% (41/122)
Insertive UAI with an HIV- Male Partner, 6 months	31.6% (24/76)	39.3% (11/28)	33.6% (35/104)*
Insertive UAI with an HIV+ or unknown serostatus Male Partner, 6 months	21.6% (16/74)	19.2% (5/26)	21.0% (21/100)*
Receptive UAI with an HIV- Male Partner, 6 months	45.8% (33/72)	41.4% (12/29)	44.6% (45/101)*
Receptive UAI with an HIV+ or unknown serostatus Male Partner, 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)
Gonorrhea (Urethral)	1.1% (1/90)	2.9% (1/34)	1.6% (2/124)

*Responses not recorded for men who denied any male sex partners in the previous 6 months.

Table 2

Unprotected Anal Intercourse (UAI) in the Previous 6 Months by Male Partner Serostatus; HIV-infected MSM, Lima, Peru 2007

	Known HIV Infection % (n/N)	Unknown HIV Infection % (n/N)	p-value
Insertive UAI with an HIV-uninfected Partner	31.6% (24/76)	39.3% (11/28)	0.461
Insertive UAI with an HIV-infected or Unknown Serostatus Partner	21.6% (16/74)	19.2% (5/26)	0.797
Receptive UAI with an HIV-uninfected Partner	45.8% (33/72)	41.4% (12/29)	0.684
Receptive UAI with an HIV-infected or Unknown Serostatus Partner	22.9% (16/70)	17.9% (5/28)	0.586

Table 3

Risk Factors Associated with Recent Unprotected Anal Intercourse; HIV-infected MSM, Lima, Peru 2007

		No UAI, 6 months % (n/N)	UAI, 6 months % (n/N)	p-value*
Age (Median IQR)		30 (24 – 36)	30.5 (25 – 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**
No. of Male Sex Partners 6 months (Median IQR)		3 (1 – 7)	3 (1 – 7)	0.729
Use of Drugs Prior to Sex, 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 Six 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.