

A Case–Control Study of Syphilis Among Men Who Have Sex With Men in New York City

Association With HIV Infection

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Objective: The objective of this study was to determine factors associated with syphilis among men who report sex with other men in New York City.

Design, Setting and Study Subjects: We conducted a case–control study among 88 men who reported sex with men in the previous year, 18 to 55 years old and diagnosed with primary or secondary syphilis during 2001; and 176 control subjects frequently matched by age and type of health provider.

Results: HIV prevalence among syphilis cases was 48% compared with 15% among control subjects ($P < 0.001$). Variables associated with syphilis in a multivariate model were HIV infection (odds ratio [OR], 7.3; 95% confidence interval [CI], 3.5–15.4), income $> \$30,000$ per year (OR, 2.7; CI, 1.4–5.2), and barebacking (OR, 2.6; CI, 1.4–4.8). The median time since HIV diagnosis for HIV-positive was 6 years for cases and 7 years for control subjects ($P = 0.70$). Among HIV-infected participants, syphilis cases were more likely than control subjects to report being on antiretroviral therapy (69% vs. 44%, $P = 0.05$) and to report having undetectable viral load (58% vs. 24%, $P = 0.02$).

Conclusion: HIV infection was strongly associated with syphilis in this study. High-risk behavior reported by both cases and control subjects indicates the potential for increased HIV transmission.

SEXUAL RISK BEHAVIOR AND rates of sexually transmitted diseases (STD) have been rising in recent years among men who have sex with men (MSM). Outbreaks of syphilis and increases in

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gonorrhea have been reported in several U.S. cities,^{1–4} and similar findings have also been documented in Europe.^{5–8} The local outbreaks have already had an impact on the national rates of syphilis; after a constant decline in primary and secondary (P&S) syphilis in the United States since 1990, the rates increased for the first time in 2001, from 2.1 cases per 100,000 persons in 2000 to 2.2 in 2001.⁹

There is particular concern that increasing HIV incidence may accompany the escalating STD rates. Syphilis and other ulcerative STD can augment by 3-fold an individual's susceptibility to HIV and increase by 2- to 3-fold the infectiousness of an HIV-infected individual.¹⁰ The HIV epidemic in the United States continues to disproportionately affect MSM who account for 40% of all new AIDS cases and 54% of new AIDS cases among men.¹¹ Maintaining lower levels of sexual risk-taking in populations with a high prevalence of HIV is 1 of the most important and difficult challenges in AIDS and STD prevention. Even a relatively small increase in sexual risk-taking can yield a new wave of HIV infection in a high-prevalence population, whereas such behavioral changes might not have the same effect in a population with a lower HIV prevalence. The background HIV prevalence among MSM in New York City appears to be higher than that among the general population. A recent study of young MSM reported an overall prevalence of 12%, with a higher prevalence among minorities.¹² Studies in other cities have suggested that HIV incidence among MSM might be on the rise.¹³

After more than a decade of decline, cases of reported P&S syphilis in New York City doubled from 1999 to 2001. Increases continued in 2002; 434 cases of P&S syphilis were reported in New York City, and 94% of these were in men.^{14,15} The Centers for Disease Control and Prevention (CDC) and the New York City Department of Health and Mental Hygiene conducted a case–control study to investigate demographic and behavioral factors associated with infectious syphilis and to inform prevention activities.

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Methods

Study Population and Enrollment

The study was conducted from February to June 2002. A case was defined as a male resident of New York City who received a diagnosis of P&S syphilis from January 2001 to January 2002, age 18 to 55 years of age, and who reported a male sex partner in the previous year. P&S syphilis was defined as having dark field-positive lesions or having reactive serologic test results for syphilis and accompanying symptoms. A control subject was defined as a male resident of New York City, age 18 to 55 years, who reported a male sex partner in the previous year, and who had no history of syphilis and a nonreactive nontreponemal syphilis test at enrollment.

Cases were contacted by phone or by home visit and invited to participate in the study. Cases were classified as having received their diagnosis by either a private provider (private practices and private hospitals) or a public provider (STD clinics and public hospitals). For each case, 2 control subjects were selected and frequency-matched by provider type and age group (10-year ranges). Control subjects were enrolled from 2 public STD clinics (Chelsea Clinic located in Manhattan and Fort Green Clinic in Brooklyn) and 1 primary care private clinic (Callen-Lorde Community Health Center in Manhattan). These clinics were selected for control recruitment because the largest numbers of syphilis cases in 2001 were reported from these locations. Patients attending a clinic for health care were consecutively recruited as control subjects until the numbers needed for each matching category were reached. We did not collect information on reasons for clinic attendance among control subjects, but syphilis diagnosis or a history of was an exclusion criteria. Written, informed consent was obtained from all eligible participants. Participants who consented to enroll in the study completed a 30-minute audio computer-assisted interview (ACASI). We provided nonmonetary compensation for participation (movie tickets and Metro cards).

Participants were offered anonymous or confidential HIV testing and pre- and post-test counseling. Individuals with positive HIV test results were referred for further evaluation and treatment. All control subjects were tested for syphilis, and those with reactive serologic test results were excluded from the analysis. The study protocol was approved by the Institutional Review Board of the New York City Department of Health and Mental Hygiene.

Data Collection and Study Instrument

The questionnaire asked about sociodemographic characteristics, sexual experiences and behaviors, drug use, venues frequented to meet sex partners, commercial sex, HIV status, and HIV care. Participants who reported attending a venue to meet sex partners were also asked about specific sex practices at each venue. The interview included questions about behaviors in the prior 6 months for control subjects and the 6 months before the syphilis diagnosis for cases. No locating information was collected. Participants completed the interview on a laptop computer under the supervision of an interviewer. Software used for ACASI was Questionnaire Development System (QDS) (Nova Research Company, Bethesda, MD).

Definition of Variables

For study purposes, sex clubs and bathhouses were defined as any business whose primary purpose is to provide a place for men to have sex. A private sex party was defined as a private gathering intended only for those invited, the purpose of which is to provide a place for men to have sex. A circuit party was defined as a gathering of mostly gay or bisexual men that is open to the public,

where the main event occurs only once a year and has an emphasis on dancing. Unprotected anal intercourse (UAI) was defined as insertive or receptive anal intercourse without consistent condom use. Barebacking was defined as intentionally deciding to have unprotected anal sex with a man other than a primary partner. Although 1 inclusion criteria was having sex with a man in the last year, participants were asked to self-identify as heterosexual, gay, bisexual, "on the down low," or transgender. Being "on the down low" was defined as having male sex partners but not self-identifying as gay or bisexual. HIV positivity was determined by self-report when evaluating its association with syphilis.

Collection of Specimens and Laboratory Procedures

The nontreponemal serologic test used to screen for syphilis was the rapid plasma reagin (RPR). HIV testing was done using a single enzyme immunoassay (EIA) test and confirmed by Western blot. Both syphilis and HIV tests were performed at the Department of Health laboratory.

Data Analysis

We compared demographic and behavioral variables, which included venue-specific behaviors of cases with those of control subjects to detect factors associated with syphilis. Tests for associations between categorical variables were performed using chi-squared statistics and, where appropriate, the chi-squared test for trend. Analyses of continuous variables were assessed using the independent, 2-sample *t* test. Odds ratios and *P* values were adjusted for age group and provider type to account for the frequency matching.

Before developing an overall logistic regression model using data from all persons interviewed, we constructed a single logistic regression model for each venue using observations from only those who attended a respective venue (data not shown). The results of these models were used to identify potential venue-specific variables for the overall model. The overall multivariate logistic regression analysis was developed by identifying, as potential predictors, all variables that either attained a significance level of less than 0.10 in the analyses described here or were associated with syphilis in other studies. Next, a stepwise forward selection procedure was used to obtain a parsimonious model using a significance level for entry and exit from the model of 0.05. In the last stage of model development, we addressed the possibility of confounding and interactions between the variables that remained in the final model.

We also assessed variables related to HIV therapy and HIV care among HIV-infected cases and control subjects; this information was not included in the multivariate model. Finally, to estimate the potential for HIV transmission, we evaluated serodiscordant partnerships and high-risk sex among HIV-positive and -negative participants, combining cases and control subjects. All analyses were performed using Statistical Analysis Software (SAS) version 8.01 (SAS Institute, Cary, NC).

Results

Study Population

A total of 88 cases and 176 control subjects were enrolled in the study. Of the 181 MSM P&S syphilis cases reported from January 2001 to January 2002, 60 were unable to be located and 33 refused to participate. Of 227 clinic patients invited to participate as control subjects, 48 refused and 3 had a reactive RPR. Individuals who refused to participate, were unable to be located, or were

TABLE 1. Demographic and Social Characteristics of Study Participants, New York City

Characteristics	Syphilis Cases N = 88	Controls N = 176	P value [†]
Mean age (median)	34.7 (34)	33.9 (33)	0.50
Race ethnicity			
White	34 (40)	105 (60)	0.01
Black	21 (24)	24 (14)	
Hispanic	28 (33)	36 (21)	
Other**	3 (3)	9 (5)	
Education			
High school or lower	20 (23)	24 (14)	0.03
College or higher	68 (77)	152 (86)	
Income (US \$)			
<30,000	36 (41)	99 (56)	0.04
30,001–49,999	29 (33)	39 (22)	
≥50,000	23 (26)	38 (22)	
Employment			
Unemployed	25 (28)	31 (18)	0.80
Employed	57 (65)	124 (70)	
Student/other	6 (7)	21 (12)	
Sexual Orientation			
Heterosexual	1 (1)	2 (1)	0.70
Gay	74 (85)	145 (82)	
Bisexual	9 (10)	23 (13)	
On the down low	3 (4)	6 (3)	

Data are number and percent of participants with characteristic, unless otherwise indicated; missing values are not included in table. [†]P values adjusted for age group and provider type (public vs. private).

**Asian/Pacific Islander, Native American, or persons of multiple racial identity.

excluded from the final analyses were similar to participants in race, age, and borough of residence.

The mean age of participants was 34 years (range, 19–55 years). Half of the participants were diagnosed or enrolled at public STD clinics and half at a primary healthcare private clinic. Cases were more likely to be of a race other than white ($P = 0.01$), have lower education ($P = 0.03$), and to report a higher yearly income ($P = 0.04$) compared with control subjects. Most cases and control subjects self-identified as gay (Table 1).

Variables Associated With Syphilis

Sexual Behavior and Sexually Transmitted Disease. Univariate analysis showed HIV infection to be the most important factor associated with syphilis. HIV prevalence by self-report was 48% among cases and 15% among control subjects ($P < 0.001$) (Table 2). Nearly 50% of cases and control subjects never or rarely discussed HIV before having sex.

Cases and control subjects reported a median of 6 and 5 male sex partners ($P = 0.28$) and 4 and 3 1-time partners ($P = 0.19$), respectively, in the preceding 6 months (Table 2). Although more than 50% of cases and control subjects reported at least 1 lifetime female partner, only 3% and 7% reported having had sex with a woman in the last 6 months. A similar proportion of cases and control subjects had a main or primary partner. However, among those with a main partner, cases were more likely than control subjects to report having had sex with someone other than their main partner. Participants were asked about their ability to contact the sex partners they had had in the previous 6 months (as an indication of anonymous sex); 74% of cases and 57% of control subjects said they were unable to contact half or more of their sex partners ($P = 0.01$). Having recruited partners through the Internet was more common among cases; however, this finding was of

TABLE 2. Selected Characteristics and Behaviors in the Previous 6 Months Among Study Participants, New York City

Variable	Syphilis Cases N = 88	Controls N = 176	OR (95%CI)*
Sex partners (previous 6 months)			
Mean total male sex partners (median)	15.5 (6)	11.4 (5)	$P = 0.28$
Mean one-time sex partners, (median)	12.1 (4)	9.2 (3)	$P = 0.19$
Mean sex partners of unknown HIV status, (median)	10.2 (3)	8.2 (2)	$P = 0.18$
HIV status			
HIV-positive**	42 (48)	27 (15)	5.7 (3.0,11.1)
Never or rarely discussed HIV before having sex	39 (44)	84 (48)	0.8 (0.5,1.4)
Sexual behaviors			
Regular main male partner	38 (43)	71 (40)	1.1 (0.7,1.9)
Sex outside main relationship [†]	24 (63)	30 (42)	3.4 (0.8, 15.1)
Anonymous sex [‡]	65 (74)	101 (57)	2.0 (1.1,3.6)
Barebacked	47 (53)	50 (28)	2.8 (1.6,4.8)
Used Internet to meet sex partners	42 (48)	63 (36)	1.7 (1.0,2.9)
Drug use			
Crystal methamphetamines	21 (24)	21 (12)	2.3 (1.2,4.5)
Poppers	35 (40)	41 (23)	2.1 (1.3,3.8)
Marijuana	47 (53)	70 (40)	1.7 (1.0,2.9)
Alcohol	50 (57)	122 (69)	0.6 (0.3,1.0)
Viagra	29 (33)	33 (19)	2.1 (1.2,3.8)
Always/almost always used drugs before sex	28 (32)	33 (19)	2.0 (1.1,3.6)

Data are number and percent of participants, unless otherwise indicated; missing values are not included in table. HIV indicates human immunodeficiency virus.

*Odds ratios (OR) and 95% confidence intervals (CI) unless otherwise indicated; adjusted for age group and provider type (public vs. private).

**Self-reported results of most recent serological test for HIV infection; two cases and 4 controls with unknown HIV status are included as negative.

[†]Limited to men who reported having a main or primary partner.

[‡]Defined as not able to contact more than 50% of partners in the last 6 months.

TABLE 3. Venues Attended and Venue-specific Sexual Behaviors in the Previous 6 Months by Study Participants, New York City

Venues and sexual practices*	Syphilis Cases N = 88	Controls N = 176	OR (95% CI)**
Sex-clubs/bathhouses			
Did not attend venue	34 (39)	101 (57)	Reference
Attended venue	54 (61)	75 (43)	2.0 (1.2,3.5)
Met a sex partner at the venue	46 (52)	62 (35)	2.1 (1.2,3.7)
Sex at the venue	40 (46)	58 (33)	1.9 (1.1,3.4)
Unprotected oral sex at venue	39 (44)	55 (31)	1.9 (1.1,3.5)
Unprotected anal sex at venue	23 (26)	16 (9)	4.1 (1.8,9.4)
Private sex parties			
Did not attend venue	59 (67)	147 (84)	Reference
Attended venue	29 (33)	29 (17)	2.4 (1.3,4.4)
Met a sex partner at the venue	27 (31)	21 (12)	3.1 (1.6,6.0)
Sex at the venue	22 (25)	22 (13)	2.3 (1.1,4.5)
Unprotected oral sex at venue	21 (24)	16 (9)	3.0 (1.4,6.3)
Unprotected anal sex at venue	18 (21)	6 (3)	7.3 (2.7,19.9)
Public cruising sites			
Did not attend venue	57 (65)	123 (70)	Reference
Attended venue	31 (35)	53 (30)	1.3 (0.9,1.7)
Met a sex partner at the venue	15 (17)	18 (10)	1.8 (0.8,3.9)
Sex at the venue	24 (27)	34 (19)	1.6 (0.9,3.0)
Unprotected oral sex at venue	27 (31)	36 (20)	1.6 (0.9,2.9)
Unprotected anal sex at venue	11 (13)	2 (1)	13.5 (2.8,64.5)
Gay bars or nightclubs			
Did not attend venue	30 (34)	76 (43)	Reference
Attended venue	58 (66)	100 (57)	1.5 (0.9,2.6)
Met a sex partner at the venue	43 (49)	77 (44)	1.4 (0.8,2.5)
Sex at the venue	6 (7)	15 (9)	1.0 (0.4,3.0)
Unprotected oral sex at venue	5 (6)	13 (7)	1.0 (0.3,3.0)
Unprotected anal sex at venue	2 (2)	0 (0)	
Circuit parties			
Did not attend venue	73 (83)	151 (86)	Reference
Attended venue	15 (17)	25 (14)	1.3 (0.9,1.7)
Met a sex partner at the venue	11 (13)	9 (5)	2.6 (1.0,6.6)
Had sex at the venue	5 (6)	8 (5)	1.3 (0.4,4.3)
Had unprotected oral sex at venue	5 (6)	5 (3)	2.2 (0.6,8.0)
Had unprotected anal sex at venue	3 (3)	2 (1)	3.3 (0.5,20.5)

Data are number and percent of participants with characteristic; odds ratios (OR), 95% confidence intervals (CI).

*Behaviors at each venue are not mutually exclusive.

**Adjusted for age group and provider type (public vs. private).

borderline significance ($P = 0.06$). Cases were also more likely than control subjects to report barebacking (53% vs. 28%, $P = 0.001$).

Drug Use. Drug use was common in our study population. Use of crystal methamphetamines, poppers, and marijuana was more commonly reported by syphilis cases (Table 2). Use of other illegal drugs was reported by a small percentage of participants and did not differ between cases and control subjects. Alcohol use was reported less by cases than control subjects. Viagra use was reported by 33% of cases and 19% of control subjects ($P = 0.01$). Of cases, 32% always or almost always used drugs before having sex compared with 19% of control subjects ($P = 0.02$).

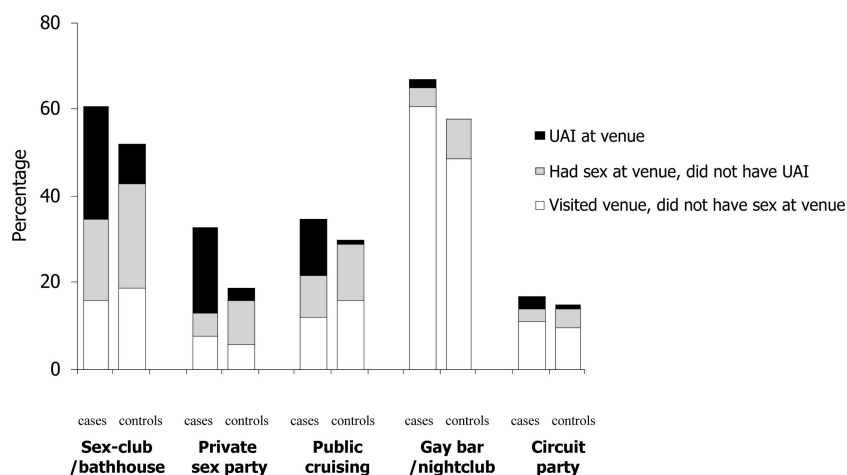
Venues for Meeting Sex Partners. Overall, 80% of participants reported visiting at least 1 venue. Most participants reported having attended multiple venues; this was more common among cases (68%) than control subjects (53%) ($P = 0.05$). Cases were more likely to have attended sex clubs/bathhouses ($P = 0.01$) and private sex parties ($P = 0.005$). A particular bathhouse, Bathhouse X, was visited by a higher proportion of cases (23%) than control subjects (11%, $P = 0.01$). Attendance at circuit parties ($P = 0.44$),

gay bars/nightclubs ($P = 0.11$), and public cruising sites ($P = 0.41$) was not associated with a greater risk of syphilis (Table 3).

Participants were questioned about specific sexual behaviors at each venue (Fig. 1). Among those visiting venues, cases were more likely than control subjects to report unprotected anal intercourse at sex clubs/bathhouses, private sex parties, and public cruising areas.

Multivariate Logistic Regression. Variables evaluated for the overall multivariate model were age, race/ethnicity, income, education, number of partners, inability to locate partners (anonymous sex), sex outside main relationship, alcohol use, drug use, Viagra use, use of drugs before sex, HIV status, barebacking, use of the Internet to recruit sex partners, and attendance at specific venues to meet sex partners. In venue-specific models, we identified that anal sex at sex clubs/bathhouses, anal sex at private parties, and anal sex at cruising sites were significantly associated with syphilis after adjusting for other practices in the venue. However, these variables were highly associated with barebacking and we did not include them in the multivariate model. We retained age, provider type, and race in the model to adjust for confounding and to account for the frequency-matching design. Variables that re-

Figure 1. Attendance and sexual activity at venues to meet sex partners by case-control status of participants.



The total bar represents the proportion of men attending a venue, the shaded and black segments of the bar represent men having sex at a venue, the black segment of the bar represents men having unprotected anal intercourse (UAI) at the venue. The proportion of cases and controls reporting UAI at sex clubs/bathhouses, private sex parties and public cruising sites were significantly different (p values for each venue were <0.001).

maintained in the multivariate model were: age (odds ratio [OR], 1.0; 95% confidence interval [CI], 0.9–1.0), provider type (OR, 0.6; CI, 0.3–1.2), race (OR, 1.5; CI, 1.1–2.1), HIV infection (OR, 7.3; CI, 3.5–15.4), income $> \$30,000$ per year (OR, 2.7; CI, 1.4–5.2), and barebacking (OR, 2.6; CI, 1.4–4.8).

HIV Care and Related Behaviors

HIV Care. We collected information on HIV infection to determine whether HIV may have been acquired at the same time as syphilis infection, and to characterize access to HIV care. According to self-report, there were 42 (48%) HIV-infected cases and 27 (15%) HIV-infected control subjects. HIV status by self-report was confirmed by laboratory testing for 84% of cases and 50% of HIV-negative control subjects. However, most participants had a recent HIV test; among HIV-negative participants, the median time since the most recent HIV test was 0.7 years (mean, 1.7 years). Among HIV-positive participants, the median time since HIV diagnosis was 6 years for syphilis cases and 7 years for control subjects ($P = 0.70$). For 5 cases and 4 control subjects, HIV diagnosis was made less than 1 year ago. Two cases and 4 control subjects were diagnosed with HIV at the time of the study interview. One case and 6 control subjects had never been tested for HIV and were not tested at the time of the study.

Information on antiretroviral therapy (ART) was available for 35 HIV-infected syphilis cases and 27 HIV-infected control subjects. Of these, 69% (24) of cases and 44% (12) of control subjects were receiving ART ($P = 0.06$). A larger percentage of cases (58%) than control subjects (24%) reported an undetectable viral load ($P = 0.04$), but there was no difference in reported CD4 count. Of participants, 92% of cases and 80% of control subjects had CD4 counts greater than 200 cells/mm³, including 51% of cases and 28% of control subjects with counts greater than 500 cells/mm³ ($P = 0.15$). Among those receiving ART, 67% of cases and 33% of control subjects reported improved physical well-being after having started therapy ($P = 0.06$). Only 23% HIV-infected cases and 35% HIV-infected control subjects always told their sex partners about their HIV status. A high proportion of HIV-infected participants thought that the risk of transmitting HIV was lower while taking ART (59%).

HIV-Related Behaviors. We found that among both cases and control subjects, HIV-infected participants were more likely to

report drug use and high-risk sex behaviors in certain venues. Unprotected anal intercourse in sex clubs/bathhouses was reported by 37% of HIV-infected control subjects compared with 9% HIV-negative control subjects, and by 61% of infected cases compared with 26% of those uninfected. Similar findings were seen for those attending private parties. HIV-positive cases and control subjects were more likely to report crystal methamphetamine use (36% and 19%, respectively) compared with HIV-negative cases and control subjects (13% and 10%, respectively). Use of poppers was more likely among HIV-positive cases (57%) than HIV-negative cases (24%).

To assess the potential for transmission of HIV, we evaluated whether the high rates of unprotected sex occurred in the context of HIV-serodiscordant partnerships. Because we found no major differences between cases and control subjects, we present results for HIV-infected and HIV-negative participants, regardless of case-control status.

Among HIV-infected participants, half had at least 1 partner of known HIV-negative status in the last 6 months and 19% reported UAI with such a partner. Most HIV-infected participants (71%) had a partner of unknown HIV status and 42% reported UAI with such a partner. Among HIV-negative participants, fewer reported a serodiscordant partnership; 22% reported 1 or more partners of known HIV-positive status, and only 9% had UAI with an HIV-infected partner. Many HIV-negative men (67%) had a partner of unknown HIV status and 24% reported UAI with such a partner (Fig. 2).

Discussion

This study describes the demographic characteristics and sexual behaviors of a subset of men who have sex with men in New York City and documents risky behaviors among both cases with syphilis and control subjects. During the 1990s, syphilis outbreaks often affected economically disadvantaged minorities with poor access to health care and were commonly associated with heterosexual transmission, drug use, and exchange of sex for money or drugs. In contrast, our study shows that infectious syphilis cases in New York City mainly occurred in MSM with higher income, many HIV-infected who were aware of their status, with high rates of partner change. Many of these men were attending venues that facilitate casual partner acquisition and reported substantial recre-

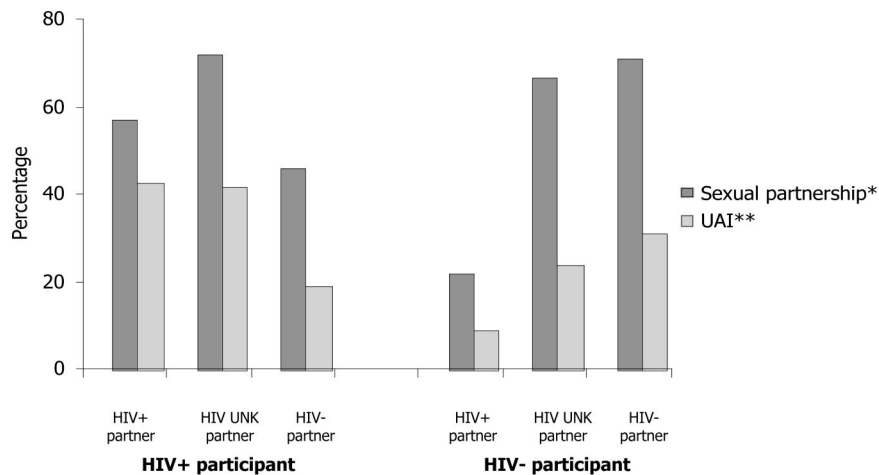


Figure 2. Sexual activity and HIV status of partners by HIV status of participants.

*Proportion with a sex partner

**Proportion reporting unprotected anal intercourse with partners of positive, unknown and negative HIV status

ational drug use. We found that HIV infection, higher income, and barebacking were the characteristics most strongly associated with syphilis. We also found a higher proportion of white men among control subjects compared with cases; we believe that this finding was mainly the result of our recruiting strategy. Of the 3 clinics used to recruit control subjects, 2 were located in Manhattan and served mainly a white population.

Half of the syphilis cases in our study were HIV-infected, and after adjusting for other factors, HIV was the factor most strongly associated with syphilis. Self-reported testing histories suggest that nearly all HIV infections were acquired years before the syphilis diagnoses. Although our data does not allow us to distinguish between behavioral and biologic factors, we believe that the strong association we found between HIV status and syphilis was mainly the result of behaviors among HIV-infected participants. We found that both HIV-positive cases and control subjects were more likely to report UAI and drug use than those HIV-uninfected. It is likely that HIV infection was a marker for risky behaviors, including those we were not able to measure such as partners' behaviors.

We found that barebacking was independently associated with a higher risk of syphilis. Although any unprotected anal sex places people at risk for sexually transmitted infections, people who self-identify as barebackers likely also have other risky behaviors. In our study, this behavior was common among control subjects and higher than what has been previously reported among other MSM populations.¹⁶ Intentional unprotected sex is a health concern for gay communities not only because of the risk of transmitting HIV or other STD to uninfected men, but also for the potential of superinfection in men who are already HIV-infected.¹⁷

Our study suggests that sex venues play an important role in the sexual lives of some MSM in New York City; nearly 80% of study participants visited at least 1 venue for the purpose of meeting a sex partner, and most participants visited multiple venues. Private sex parties appear to be a new phenomenon in New York City, and little is known about the availability of condoms and safer sex messages at these settings. Although sex clubs and bathhouses were not found to have a significant association with syphilis, we found that unprotected sex was common at these venues, similar to what has been reported by previous studies.¹⁸ Although some health professionals advocate closing bathhouses to prevent further HIV transmission,¹⁹ this may drive men likely to transmit HIV infection to locations beyond the reach of public health efforts such as private venues and temporary settings.²⁰ Although a vari-

ety of strategies may be needed in different localities, education and intervention programs need to be developed along with strict enforcement of condom use at sex venues.

The increasing rate of syphilis among MSM is not unique to New York City; since 1997, syphilis outbreaks among MSM have occurred in other U.S. cities, including Seattle, Chicago, San Francisco, Los Angeles, and Miami.^{2,3} In each of these outbreaks, the rates of HIV coinfection were high, ranging from 20% to 73%. Several factors may be associated with a recent trend of increased sexual risk behavior among MSM. The availability of highly active antiretroviral therapy has been identified as a possible factor.^{6,21–23} Some studies²⁴ have suggested that treatment optimism alone cannot explain the recent increases in high-risk sexual behavior. However, ART has significantly reduced AIDS-related mortality and is responsible for improved physical well-being, which may allow higher rates of sexual activity. Another factor contributing to increased sexual risk-taking may be “AIDS burnout,” associated with years of exposure to prevention messages and long-term efforts to maintain safer-sex practices.²⁵

We found that the potential for transmission of HIV was substantial. Importantly, almost half of HIV-infected participants reported UAI with a partner of unknown or negative status, and nearly one third of those HIV-infected never or rarely disclosed their HIV status to new sex partners. Although there is little data to indicate HIV incidence is increasing, HIV transmission may also lag behind community-wide behavior changes, and associated increases in infection may not become manifest for a few years.²⁶

Our study had several limitations. Because participants were recruited from a clinic setting, they may not be representative of the MSM community in New York City. Case-control studies for STD pose a challenge for the selection of appropriate control groups. Our control group selected from STD clinics might overestimate the prevalence of risk behaviors compared with population-based recruitment of MSM. This control group would create a bias toward the null hypothesis and prevent us from identifying associated variables. Nevertheless, our study did find several factors associated with syphilis. Our data are also subject to recall bias; however, the use of computer-assisted interviews may have reduced socially desirable responses. Another limitation was the low participation rate among cases (50%) as a result of the difficulties in locating them. This could have resulted in some selection bias; cases with higher risk behavior may have been harder to locate. Nevertheless, this would have resulted in a bias toward the

null. Finally, HIV status was based on self-report, which is commonly misreported. However, we were able to confirm HIV status by laboratory testing for 80% of cases and 50% of HIV-negative control subjects.

Despite extensive efforts of the New York City Department of Health to control the syphilis outbreak, increases in syphilis rates have continued.¹⁵ A similar pattern has been seen in Los Angeles, where syphilis transmission among MSM continued for several years.²⁷ The high rates of partner change and anonymous partnerships severely limit the ability to notify and treat partners, 1 of the main prevention modalities for syphilis.

The response to the syphilis outbreaks among MSM needs to include strengthening of activities in several areas. As a result of the importance of surveillance data in planning prevention efforts, there is an urgent need to address gaps in our ability to monitor changes in HIV, STD, and sexual practices among MSM. There is also a need for additional research to develop interventions for MSM, particularly those engaging in risky behaviors. One of the most immediate interventions should be improving communication between health providers and their patients to emphasize safe sex behavior.²⁸ Furthermore, our findings clearly support the need for STD screening of sexually active MSM, especially those with HIV infection.²⁹ The involvement of the MSM community in the early stages of the HIV epidemic had a tremendous impact on modifying behavior. Communities are the key to reaching people at risk with effective messages. Their involvement is essential to maintain 2 decades of achievements in HIV and syphilis control.

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