

Trends in HIV Seroprevalence and Risk Among Gay and Bisexual Men Who Inject Drugs in San Francisco, 1988 to 2000

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Objectives: To determine trends in HIV infection and risk behaviors among street-recruited self-identified gay and bisexual male injection drug users (IDUs) in San Francisco.

Methods: Trends in HIV infection and risk behaviors were calculated for gay/bisexual ($n = 1594$ interviews) IDUs in 26 semiannual cross sections from 1988 to 2000.

Results: HIV seroprevalence among gay/bisexual IDUs decreased from the range of 35% to 45% in 1988/1989 to 25% in 1996 and then began to increase, reaching 42% in 2000. In contrast, HIV prevalence among heterosexual male IDUs remained stable during the study period. For gay/bisexual IDUs, injection and sex-related HIV risk behaviors declined modestly throughout the study period. As of the last cross section (July 2000), however, over a third of respondents reported recent syringe sharing or unprotected anal sex.

Conclusions: Gay/bisexual men who inject drugs continue to be at elevated risk for HIV, suggesting that interventions such as amphetamine drug treatment and sexual risk reduction programs targeted at this population are needed.

Key Words: HIV—Gay—MSM—Bisexual—Substance abuse—Injection drug use.

Gay/bisexual men who inject drugs are a subpopulation that is at elevated risk for HIV/AIDS (1,2). Among male injection drug users (IDUs), gay/bisexual individuals have been found to have higher HIV seroprevalence and seroincidence (3–6). Among gay/bisexual men, substance use has been associated with HIV risk taking and infection (7–10). Despite these multiple risks, the proportion of annual AIDS cases attributable to gay/bisexual IDUs has declined from 8% in 1990 to 5% in 1998 (1). Data on AIDS cases can be deceptive because they track where the HIV epidemic has been and not where it is or where it is going. Information on trends in HIV infection

and risk is required to understand the progression of the epidemic among gay/bisexual IDUs.

Since 1986, the Urban Health Study at the University of California, San Francisco has collected data on HIV risk behaviors and infection among street-recruited IDUs in San Francisco through semiannual cross-sectional samples (5,11). Routinely, the men enrolled in this study have included some who identified themselves as gay or bisexual. To determine trends in HIV seroprevalence and risk among gay and bisexual IDUs, we examined data from this subsample collected from 1988 through 2000.

METHODS

Study Procedures

Participants were recruited from street settings in four San Francisco neighborhoods (Bayview/Hunter's Point, Mission, Tenderloin, and

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Western Addition) using targeted sampling methods (12). Eligibility criteria for the study included being 18 years of age or older and either evidence of recent drug injection or prior study participation. New study participants were screened for visible signs of recent subcutaneous or intravenous drug use. Prior participants were screened by confirming personal identification information stored in a relational database on a computer at the research field site.

After informed consent was obtained, risk behavior and demographic data were collected from participants by trained interviewers using a standardized questionnaire administered in a one-on-one interview session. The main variables of interest were defined as follows. To identify gay and bisexual IDUs in our larger sample, participants were asked to report their sexual orientation. Those identifying themselves as gay or bisexual were classified as gay/bisexual in this study. Unprotected anal sex was defined as any anal intercourse without a condom in the 6 months before the interview. Unprotected oral sex was defined as any oral sex without a condom in the 6 months before the interview (data on this item were not available for July 1997). Respondents reporting more than one male or female sex partner in the last 6 months were classified as having multiple sex partners. Receptive syringe sharing was defined as an answer greater than zero to the following question: "In the last 30 days, how many times did you inject using works that you know had been used by anybody else (including a close friend or lover)?" Distributive syringe sharing was assessed (beginning in January 1992) using the following question: "In the last 30 days, how many times did you give or loan syringes/needles that you used to someone else who then used them (including a close friend or lover)?" IDUs reporting syringe exchange program (SEP) use in the 30 days before the interview were considered SEP users.

Respondents gave blood for HIV antibody tests, were given pre- and post-HIV test counseling, and were referred to medical and social services as necessary. Blood specimens were analyzed for HIV antibodies using enzyme immunoassay. Repeatedly enzyme immunoassay-positive specimens were confirmed using Western blot assay (13). Study participants were paid \$15 for their contribution to the study. The Committee on Human Research at the University of California, San Francisco approved all study procedures.

Between 1988 and 2000, 6395 male IDUs completed a total of 11,143 HIV risk behavior assessments and HIV tests. Of these 11,143 assessments, 11,004 reported injecting drugs in the 30 days before the interview. From these active IDUs, 1594 observations were collected from 992 respondents who reported either a gay or bisexual sexual orientation.

Statistical Analysis

Two statistical techniques were used to assess whether HIV seroprevalence and risk behavior trends over the 26 semiannual cross sections deviated significantly from a zero slope. For trends in HIV prevalence, we used logistic regression analysis to see whether the downward trend from January 1988 through January 1996 and the upward trend from July 1996 through July 2000 were statistically significant (two separate models). To see if observed trends over time in various risk behaviors were statistically significant, we used the Cochran-Armitage test for trend, which is based on the regression coefficient for the weighted linear regression of the binomial proportions on the scores of the levels of the explanatory variable (14). All bivariate analyses testing differences between gay/bisexual men and heterosexual men used the χ^2 test, Fisher exact test, or Mann-Whitney *U* test. We used $p \leq .05$ as the criterion for significance. All statistics were computed using Statistical Analysis System software version 8.00 for Windows (SAS Institute, Cary, NC, U.S.A.).

RESULTS

The sociodemographic characteristics of the gay/bisexual IDUs in our samples were as follows: 60% white, 23% African American, 7% Hispanic, 2% Native American, 1% Pacific Islander, 1% Asian American, and 6% other. Based on responses from each participant's first interview, the age distribution was as follows: 24% were 29 years of age or younger, 41% were between the ages of 30 and 39 years, and 34% were 40 years of age or older. Gay/bisexual IDUs were more likely than heterosexual male IDUs to be under 30 years old (24% vs. 10%; $p < .05$), to be white (60% vs. 35%; $p < .05$), and to have injected amphetamines in past month (66% vs. 24%; $p < .05$); they were also less likely to be African American (23% vs. 47%; $p < .05$), to have been in drug treatment within the past year (27% vs. 39%; $p < .05$), and to have smoked crack cocaine in the past month (46% vs. 56%; $p < .05$). Gay/bisexual IDUs had also injected for fewer years than heterosexual male IDUs (median [interquartile ranges]: 14.0 [7, 21] vs. 23.0 [14, 29]; $p < .05$).

Figure 1 presents HIV point prevalence for gay/bisexual IDUs and heterosexual male IDUs by cross section. HIV seroprevalence among gay and bisexual IDUs has remained substantially higher throughout the epidemic (ranging from 46% to 23%) compared with HIV seroprevalence among heterosexual male IDUs (ranging from 13% to 5%). In trend analysis, declines were observed among gay and bisexual IDUs from January 1988 through January 1996 (odds ratio [OR] per year = 0.962; 95% confidence interval [CI] = 0.935, 0.991; $p = .01$). HIV prevalence then increased from July 1996 through July 2000 (OR per year = 1.085; CI = 1.02, 1.155; $p = .01$). No statistically significant changes in HIV seroprevalence were observed among heterosexual male IDUs during these periods (1988–1996: OR per year = 0.996; CI = 0.979, 1.014; $p = .68$; 1996–2000: OR per year = 0.972; CI = 0.935, 1.01; $p = .16$).

We examined trends in sex-related HIV risk behaviors among gay and bisexual IDUs (Fig. 2). Statistically significant declines in unprotected anal and oral sex and in multiple sex partners were observed ($p < .05$) over the period. In terms of injection-related HIV risks (Fig. 3), substantial and statistically significant ($p < .05$) increases in SEP use were observed as were declines in syringe sharing ($p < .05$). No change in distributive syringe sharing was detected ($p = .80$).

Despite these promising trends, substantial proportions of injection- and sex-related HIV risk were reported as of July 2000. Receptive syringe sharing was reported by 34% of gay and bisexual IDUs, 21% reported giving

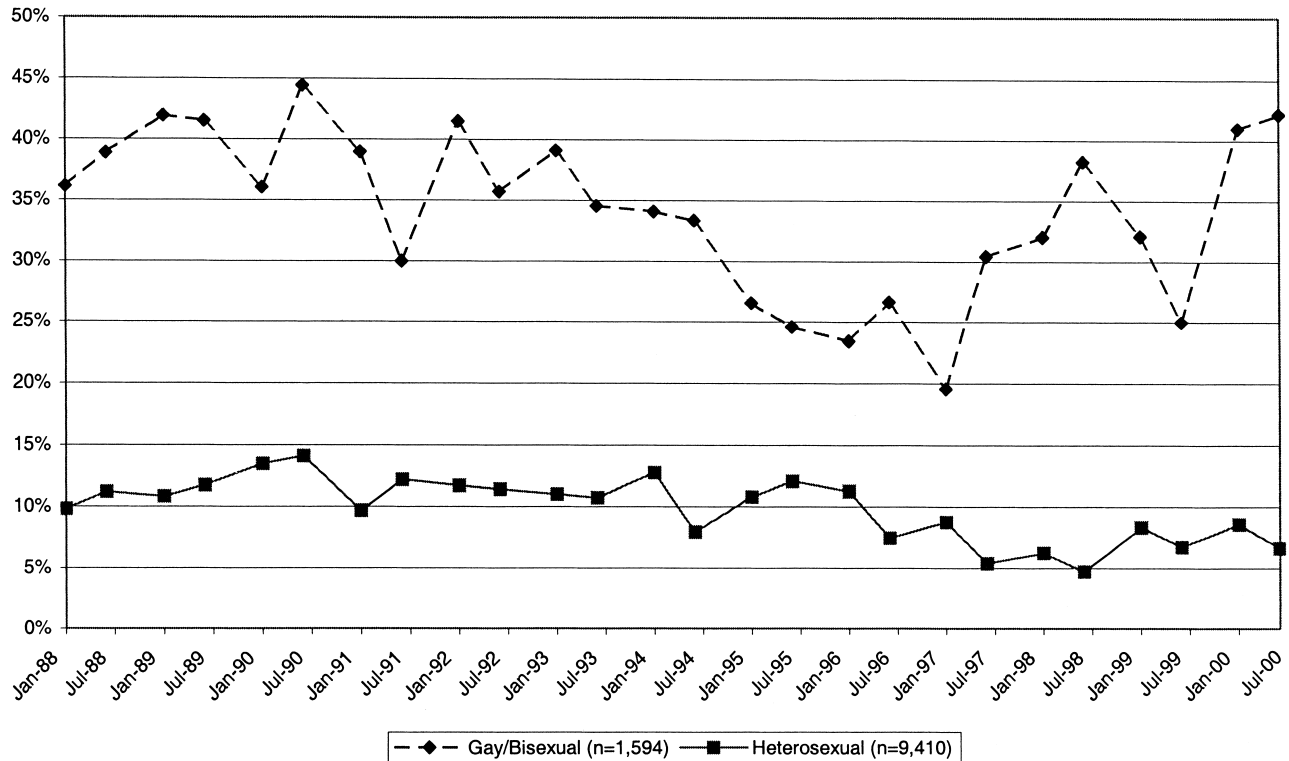


FIG. 1. HIV point prevalence for male injection drug users by sexual orientation, San Francisco, CA, 1988 to 2000.

previously used syringes to other IDUs, 54% reported multiple sex partners, 39% reported unprotected anal sex, and 61% reported unprotected oral sex in the last 6 months.

DISCUSSION

In our samples, HIV seroprevalence among gay and bisexual male IDUs in San Francisco decreased slightly from 1988 to 1996 and then increased thereafter through 2000. This increase is unusual. Trend analyses of HIV seroprevalence among IDUs have found stable or declining seroprevalence in Newark, New Jersey; New York, New York; San Juan, Puerto Rico; and San Francisco, California (11,15–20). In addition, the 40% HIV point prevalence among gay and bisexual IDUs in July 2000 is higher than the HIV point prevalence among young gay men in a recent seven-city study (2). It is also higher than the HIV point prevalence among young gay men recruited from high-risk sex venues in San Francisco (M. Pendo, M. P. H., written communication, June 2001) and higher than that of a four-city probability sample of gay and bisexual men tested in 1997 (10). The increasing HIV seroprevalence among gay/bisexual IDUs in our samples and the high point prevalence estimate in July

2000 may be evidence of a resurgence of the HIV epidemic after years of apparent decline among gay/bisexual men and IDUs.

Among gay/bisexual IDUs, statistically significant declines were observed in all HIV risk behaviors, with the exception of distributive syringe sharing. HIV risk behaviors persisted among over a third of the gay/bisexual IDUs in our study despite nearly two decades of prevention efforts. Given the high HIV seroprevalence in this population, efforts to identify strategies to lower HIV risk among those who continue to engage in risky behaviors are needed.

Using SEPs to reach this population is one option. Like their heterosexual counterparts (21), gay/bisexual IDUs in our samples seem to have quickly adopted SEP use. Although few studies have reported any association between SEP use and a lower likelihood of sexual risk taking (22,23), SEPs could be an important recruitment site for HIV prevention interventions designed to address the needs of gay/bisexual IDUs. In addition, the high relative prevalence of amphetamine use among this population (66% vs. 24% for heterosexual IDUs) suggests the importance of increasing the availability of drug treatment for amphetamine users. Studies indicate that drug treatment modalities presently used for cocaine users can be expected to be equally effective among

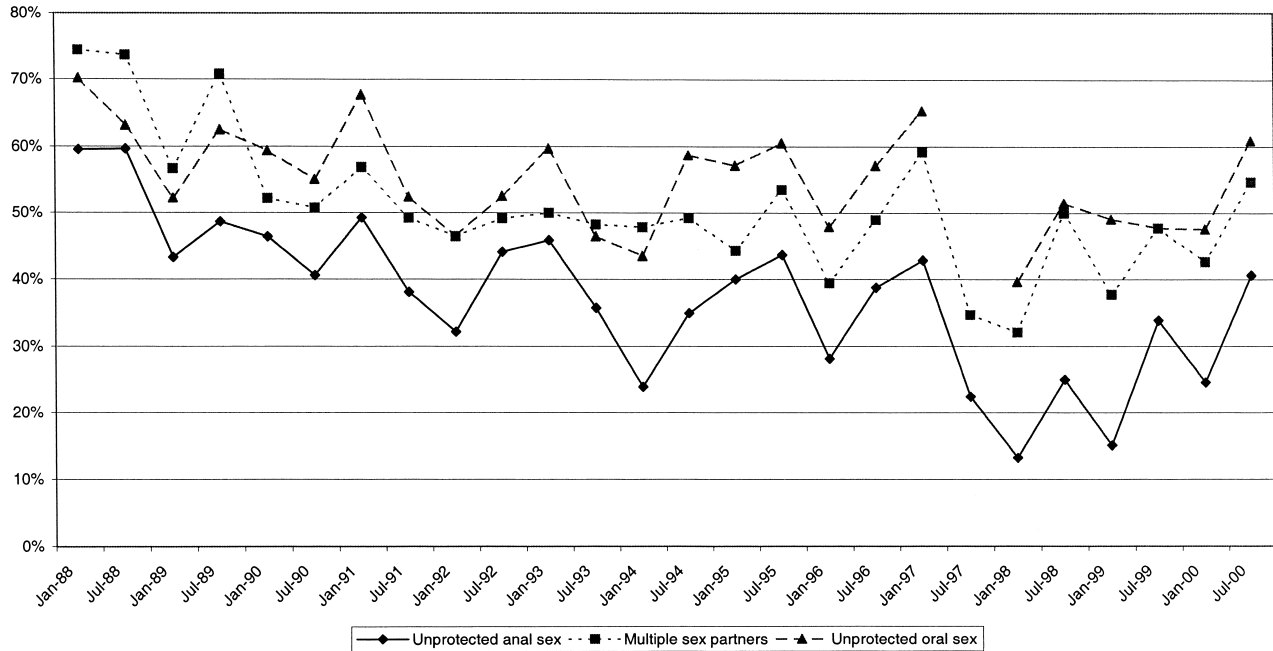


FIG. 2. HIV sex risk for gay/bisexual injection drug users, San Francisco, CA, 1988 to 2000 (n = 1594).

amphetamine users (24–26). In addition, drug treatment enrollment reduced sex-related HIV risk among amphetamine users in one study (27); thus, treatment interventions for gay/bisexual IDUs may have an impact on the primary modes of HIV exposure in this population.

The results of this study should be viewed in light of the following limitations. Our sample size was small, with a range of 46 to 72 participants identifying as gay or bisexual in each cross section. This small sample size results in estimates that are not precise. The observed

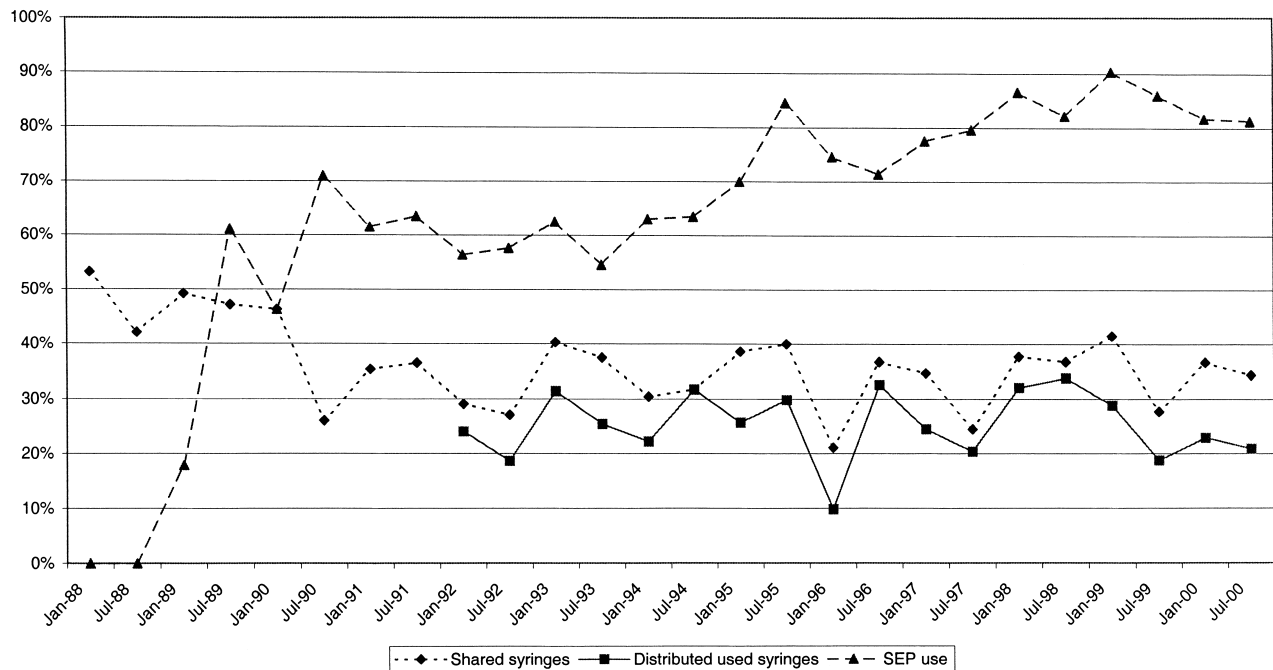


FIG. 3. Injection-related HIV risk and syringe exchange program use among gay/bisexual injection drug users, San Francisco, CA, 1988 to 2000 (n = 1594).

increase in HIV point prevalence since 1996 may be the result of a number of extraneous factors. Chief among these factors is the impact of antiretroviral treatment on HIV-specific mortality and morbidity. In our samples, only 4 gay/bisexual IDUs reported using antiretroviral treatment since it became available in 1996. Further, we have used self-identification to classify respondents as gay or bisexual. This may result in an underestimate of individuals who engage in same-sex male contact, because some men who do engage in same-sex male contact do not identify themselves as gay or bisexual (4). The targeted sampling technique used to recruit respondents makes it impossible to generalize our findings to the overall population of IDUs in San Francisco or elsewhere (12). Because of the clandestine nature of drug use, no sampling technique can draw drug users at random. It is also not possible to derive true refusal rates, because much of the refusal takes place informally outside the research venues. Another limitation concerns biases of self-reported drug use and risk behavior data as a result of social desirability, recall, psychologic functioning, and intoxication (28). Previous multicenter survey research has shown high validity in self-report among drug users recruited outside clinical settings, however (29–31).

Gay and bisexual men who inject drugs continued to be at elevated risk for HIV infection. The persistence of HIV risk in this population suggests that neither gay/bisexual-centered nor IDU-focused prevention providers are adequately addressing the complex prevention needs of this population. Multisite qualitative research indicates that gay/bisexual IDUs may be socially isolated from other drug users and other gay or bisexual men (32), suggesting that targeted interventions are required to reach this population.

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REFERENCES

- Centers for Disease Control. HIV/AIDS among men who have sex with men and inject drugs—United States, 1985–1998. *MMWR Morb Mortal Wkly Rep* 2000;49:465–70.
- Centers for Disease Control. HIV incidence among young men who have sex with men—seven U.S. cities, 1994–2000. *MMWR Morb Mortal Wkly Rep* 2001;50:440–3.
- Deren S, Estrada A, Stark M, Williams M, Goldstein M. A multisite study of sexual orientation and injection drug use as predictors of HIV serostatus in out-of-treatment male drug users. *J Acquir Immune Defic Syndr Hum Retrovirol* 1997;15:289–95.
- Lewis D, Watters JK. Sexual behavior and sexual identity in male injection drug users. *J Acquir Immune Defic Syndr Hum Retrovirol* 1994;7:190–8.
- Kral AH, Bluthenthal RN, Lorvick J, Gee L, Bacchetti P, Edlin BR. Sexual transmission of HIV-1 among injection drug users in San Francisco, USA: risk-factor analysis. *Lancet* 2001;357:1397–401.
- Strathdee SA, Galai N, Safaiean M, et al. Sex differences in risk factors for HIV seroconversion among injection drug users. *Arch Intern Med* 2001;161:1281–8.
- Greenwood GL, White EW, Page-Shafer K, et al. Correlates of heavy substance use among young gay and bisexual men: the San Francisco Young Men's Health Study. *Drug Alcohol Depend* 2001;61:105–12.
- Klitzman RL, Pope HGJ, Hudson JI. MDMA ("Ecstasy") abuse and high-risk sexual behaviors among 169 gay and bisexual men. *Am J Psychiatry* 2000;157:1162–4.
- McNall M, Remafedi G. Relationship of amphetamine and other substance use to unprotected intercourse among young men who have sex with men. *Arch Pediatr Adolesc Med* 1999;153:1130–5.
- Catania JA, Osmond D, Stall RD, et al. The continuing HIV epidemic among men who have sex with men. *Am J Public Health* 2001;91:907–14.
- Watters JK. Trends in risk behavior and HIV seroprevalence in heterosexual injection drug users in San Francisco. *J Acquir Immune Defic Syndr Hum Retrovirol* 1994;7:1276–81.
- Watters JK, Biernacki P. Targeted sampling: options for the study of hidden populations. *Soc Probl* 1989;36:416–30.
- Centers for Disease Control. Interpretive criteria used to report Western blot results for HIV-1-antibody testing—United States. *MMWR Morb Mortal Wkly Rep* 1991;40:692–5.
- Agresti A, Mehta CR, Patel NR. Exact inference for contingency tables with ordered categories. *J Am Stat Assoc* 1990;85:453–8.
- Iguchi MY, Bux DA, Lidz V, Kushner H, French JF, Platt JJ. Interpreting HIV seroprevalence data from a street-based outreach program. *J Acquir Immune Defic Syndr Hum Retrovirol* 1994;7:491–9.
- Des Jarlais DC, Friedman SR, Sotharan JL, et al. Continuity and change within an HIV epidemic: injecting drug users in New York City, 1984 through 1992. *JAMA* 1994;271:121–7.
- Des Jarlais DC, Perlis T, Friedman SR, et al. Declining seroprevalence in a very large HIV epidemic: injecting drug users in New York City, 1991 to 1996. *Am J Public Health*. 1998;88:1801–6.
- Friedman SR, Chapman TF, Perlis TE, et al. Similarities and differences by race/ethnicity in changes of HIV seroprevalence and related behaviors among drug injectors in New York City, 1991–1996. *J Acquir Immune Defic Syndr* 1999;22:82–91.
- Des Jarlais DC, Friedman SR, Perlis T, et al. Risk behavior and HIV infection among new drug injectors in the era of AIDS in New York City. *J Acquir Immune Defic Syndr* 1999;20:67–72.
- Deren S, Robles R, Andia J, Colon HM, Kang SY, Perlis T. Trends in HIV seroprevalence and needle sharing among Puerto Rican drug injectors in Puerto Rico and New York: 1992–1999. *J Acquir Immune Defic Syndr* 2001;26:164–9.
- Watters JK, Estilo MJ, Clark GL, Lorvick J. Syringe and needle exchange as HIV/AIDS prevention for injection drug users. *JAMA* 1994;271:115–20.
- Paone D, Caloir S, Shi Q, Des Jarlais DC. Sex, drugs, and syringe exchange in New York City: women's experience. *J Am Med Womens Assoc* 1995;50:109–14.
- Drucker E, Lurie P, Wodak A, Alcabes P. Measuring harm reduction: the effects of needle and syringe exchange programs and methadone maintenance on the ecology of HIV. *AIDS* 1998;12 (Suppl A):S217–30.
- Huber A, Ling W, Shoptaw S, Gulati V, Brethen P, Rawson R. Integrating treatments for methamphetamine abuse: a psychosocial perspective. *J Addict Dis* 1997;16:41–50.
- Rawson R, Huber A, Brethen P, et al. Methamphetamine and co-

- caine users: differences in characteristics and treatment retention. *J Psychoactive Drugs* 2000;32:233-8.
26. Copeland AL, Sorensen JL. Differences between methamphetamine users and cocaine users in treatment. *Drug Alcohol Depend* 2001;62:91-5.
 27. Shoptaw S, Reback CJ, Frosch DL, Rawson RA. Stimulant abuse treatment as HIV prevention. *J Addict Dis* 1998;17:19-32.
 28. Huang KHC, Watters JK, Case P. Psychological assessment and AIDS research with intravenous drug users: challenges in measurement. *J Psychoactive Drugs* 1988;20:191-5.
 29. Dowling-Guyer S, Johnson ME, Fisher DG, et al. Reliability of drug users' self-reported HIV risk behaviors and validity of self-reported recent drug use. *Assessment* 1994;1:383-92.
 30. Watters JK, Needle R, Brown B, Weatherby N, Booth R, Williams M. The self-reporting of cocaine use [letter]. *JAMA* 1992;268:2374-5.
 31. Weatherby N, Needle RH, Cesari H, et al. Validity of self-reported drug use among injection drug users recruited through street outreach. *Eval Program Plann* 1994;17:347-55.
 32. Rhodes F, Deren S, Wood MM, et al. Understanding HIV risks of chronic drug-using men who have sex with men. *AIDS Care* 1999; 11:629-48.