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Access and Utilization of HIV Treatment and Services Among Women Sex Workers in Vancouver's Downtown Eastside

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ABSTRACT *Many HIV-infected women are not realizing the benefits of highly active antiretroviral therapy (HAART) despite significant advancements in treatment. Women in Vancouver's Downtown Eastside (DTES) are highly marginalized and struggle with multiple morbidities, unstable housing, addiction, survival sex, and elevated risk of sexual and drug-related harms, including HIV infection. Although recent studies have identified the heightened risk of HIV infection among women engaged in sex work and injection drug use, the uptake of HIV care among this population has received little attention. The objectives of this study are to evaluate the needs of women engaged in survival sex work and to assess utilization and acceptance of HAART. During November 2003, a baseline needs assessment was conducted among 159 women through a low-threshold drop-in centre servicing street-level sex workers in Vancouver. Cross-sectional data were used to describe the sociodemographic characteristics, drug use patterns, HIV/hepatitis C virus (HCV) testing and status, and attitudes towards HAART. High rates of cocaine injection, heroin injection, and smokeable crack cocaine use reflect the vulnerable and chaotic nature of this population. Although preliminary findings suggest an overall high uptake of health and social services, there was limited attention to HIV care with only 9% of the women on HAART. Self-reported barriers to accessing treatment were largely attributed to misinformation and misconceptions about treatment. Given the acceptability of accessing HAART through community interventions and women specific services, this study highlights the potential to reach this highly marginalized group and provides valuable baseline information on a population that has remained largely outside consistent HIV care.*

KEYWORDS *Antiretroviral therapy, HIV/AIDS, Injection drug use, Women sex workers.*

INTRODUCTION

Highly active antiretroviral therapy (HARRT) has led to a significant reduction in morbidity and mortality as well as an enhanced quality of life for many HIV-positive individuals in the developed world.[1,2] Despite these successes, many HIV-infected individuals are still not seeing the benefits of HAART because of issues of access and an inability to adhere to medication regimes. Those individuals least likely to

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access HAART are among the hardest-to-reach populations, struggling with issues of social instability, addiction, sex work involvement, and psychiatric health issues.[3] HIV-positive women engaged in injection drug use and survival sex work have been shown to have low uptake of HAART.[4–7] There are many barriers to providing adequate health care to this population including the dispensation of complex HAART therapies. Physicians may be reluctant to initiate therapy if they cannot be reasonably certain of adherence as inconsistent use is associated with an elevated risk of loss of virologic control, development of drug resistance, and enhanced morbidity and mortality.[8,9]

Women engaged in survival sex work in Vancouver's Downtown Eastside (DTES) are particularly marginalized and face multiple vulnerabilities including violence, predation, and increased likelihood of engaging in high-risk sexual and drug-related harms.[10,11] In addition, the illegal and clandestine nature of sex trade work in Canadian cities increasingly renders street-entrenched women to the outskirts of society, limiting their access and uptake of supportive health services.[12] Recent studies have also shown that women intravenous drug users (IDUs) who exchange sex for money, shelter, or drugs are at a heightened risk of sexually acquired HIV because of multiple sexual partners and limited condom use with intimate partners.[13,14]

Although a growing body of literature has highlighted the gender differentials in enhanced vulnerabilities to HIV transmission among women IDUs,[11–16] the existing literature to date surrounding women sex workers and HIV infection has been almost exclusively limited to injection users. Given the immense difficulty in accessing this population, research through a low-threshold urban drop-in centre servicing street-based sex workers offers a unique opportunity to assess the lifestyle patterns and needs of this population. This study was designed to collect baseline information on women engaged in street-level sex work in Vancouver and to assess utilization and acceptance of antiretroviral therapy and other HIV-specific services.

METHODS

Baseline Needs Assessment Among Women Sex Workers

The Women's Information and Safe House (WISH) Drop-In Centre Society has been in operation since 1987, providing hot meals, showers, personal hygiene care, and a point of safety and respite for women engaged in survival sex work in the DTES. Despite the largely under-serviced and hard-to-reach nature of this population, the WISH Drop-In is a low threshold service that connects with an estimated 200 women sex workers per night. WISH therefore offers a valuable—and sometimes the only—place to reach a large number of women actively engaged in street level sex work in Vancouver.

During November 2003, a total of 159 women sex workers attending the WISH Drop-In Centre participated in a baseline survey conducted by trained interviewers. Participants were recruited through random allocation of referral cards during evening drop-in hours. The questionnaires were administered to women onsite and ascertained sociodemographic characteristics, illicit drug use, HIV/hepatitis C virus (HCV) testing and status, previous use of antiretroviral medications, and attitudes towards access, acceptability, and adherence to therapy.

Variables of interest in this study included age, ethnicity, housing status, level of education, sex work involvement, health status, service use, and drug use

frequency. Unstable housing was defined as living arrangements that included transitional living, single room occupancies (SROs), and no fixed address/living on the street. Injection drug use behaviours included frequency in injection of cocaine, heroin, and crystal methamphetamine. Noninjection drug-use variables included frequency of marijuana, crack cocaine, alcohol, and crystal methamphetamine use. Consistent with previous work,[5] "any drug use" was reported as any use in last 6 months at the time of interview and "frequent drug use" was reported as daily or most days. Polysubstance use was defined as the self-reported use of two or more substances. All health service and drug use behaviours were self-reported using a 6-month reference point at the time of interview. Participants were asked to self-report any previous HIV/HCV testing and the most recent test outcomes. Among those reporting known HIV infection, participants were asked to report previous experience with HAART medications and if applicable, reasons for discontinuation. Attitudes towards access, acceptability, and adherence to therapy were assessed using 3- and 5-point Leikart Scales. For example, responses pertaining to barriers to HAART were graded as "strongly agree," "somewhat agree," "neutral," "somewhat disagree," and "strongly disagree."

This analysis was cross-sectional in nature, and thus, descriptive statistics were used to describe sociodemographic characteristics, health and addiction service use, drug use patterns, and previous diagnostic testing. Mean averages were used to describe normally distributed variables, and median averages were used to describe skewed variables. The University of British Columbia/Providence Healthcare Research Ethics Board approved this study.

RESULTS

As summarized in Table 1, the median age of women was 39 years (range 21–61 years). Seventy-eight (49%) women were of Aboriginal ancestry, 69 (43%) White, and 12 (8%) Other. Of the total, 145 (91%) women reported actively working in the sex trade, with median years engaged in sex work as 9, and a range of 1–35 years. Most of the women (81%) were on income assistance, and 130 (82%) women reported living in unstable housing.

Active drug use in the past 6 months was reported by all but one of the participants. Of the total, 84 (53%) of the women had fixed or smoked illicit drugs on the day of the interview, 36 (23%) the previous day, and 19 (12%) in the past 2–6 days. Fifty-seven percent reported injecting drugs and 97% reported noninjection drug use. Eighty-five percent of women were polysubstance users. As summarized in Table 2, of the total, 30% reported frequent cocaine injection, 30% frequent heroin injection, and 80% frequent smokeable crack cocaine use.

Overall, women reported a high uptake of health services, as summarized in Table 3. In addition, self-reported diagnostic testing for HIV and hepatitis C infection exceeded 95%. Among those women tested, 34 (23%) women reported testing positive for HIV and 101 (66%) reported testing positive for hepatitis C. Of the total, 23 (15%) women reported ever having initiated antiretroviral medications (HAART), of which only 14 were currently on treatment. Women identified high rates of barriers to accessing HAART including a fear of side effects (72%), not knowing enough about the treatment (68%), inability to adhere to daily medication regimes (48%), inability to make regular medical appointments (55%), and a fear that others would suspect their HIV status (46%).

TABLE 1. Sociodemographic characteristics of women sex workers

Characteristic	n	%
Age		
Median in years (range)	39 (21–61)	
Years in sex trade		
Median in years (range)	9 (1–35)	
Ethnicity		
Aboriginal	78	49
White	69	43
Other	12	8
Housing		
Unstable	130	82
Stable	19	18
Level of education		
High school not completed	86	54
High-school graduate	42	26
Any college/university	31	20
Martial status		
Single/never married	83	52
Divorced/widowed	46	29
Married/common law	30	19
Income source		
Income assistance		
Yes	128	81
No	31	19

In response to preferable ways to access HAART treatment, 75% responded favourably to accessing medications through daily home delivery, 74% at WISH centre during extended daytime hours, 69% at WISH during dinnertime, 66% at a clinic for women only, and 52% through daily delivery at a discrete location on the street. Less favourable methods of accessing HAART included a community pharmacy (52% acceptable vs. 40% unacceptable) and a clinic for both men and women (38% acceptable vs. 42% unacceptable).

DISCUSSION

Women participating in sex work in the DTES are at an extremely high risk of developing serious acute (drug-related infections/overdose) and chronic health conditions (HIV/HCV), are frequently faced with unstable living conditions, and are highly likely to engage in illicit drug use. Despite low reported uptake of HAART as well as high rates of barriers to accessing treatment, there was a high acceptability among this group to accessing HAART through community-driven approaches, such as home-delivery or an urban drop-in centre.

High reported rates of unstable housing, income assistance, and low education levels among WISH participants reflect the chaotic lifestyle patterns of this population. In addition, approximately half the women (49%) were of Aboriginal ancestry and thus faced with the additional barriers associated with the multigenerational

TABLE 2. Drug use patterns of women sex workers in the last 6 months

Drug use behaviour	N	%
Cocaine injection		
Any use*	72	45
Frequent use†	48	30
Heroin injection		
Any use*	58	36
Frequent use†	46	30
Crystal methamphetamine injection		
Any use*	9	6
Frequent use†	5	3
Crack cocaine use		
Any use*	145	91
Frequent use†	127	80
Alcohol use		
Any use*	90	57
Frequent use†	50	31
Marijuana use		
Any use*	74	46
Frequent use†	47	30
Crystal methamphetamine use		
Any use*	16	10
Frequent use†	6	4

*Refers to any self-reported use in the last 6 months.
†Refers to self-reported use as daily, most days.

TABLE 3. Health and addiction service utilization of women sex workers in the last 6 months

Health/addiction service use*	n	%
Primary health clinic	115	72
Mobile health van	138	87
Emergency room	62	39
Community worker	82	52
Counsellor	47	30
Needle exchange	73	46
Methadone maintenance therapy	44	28
Narcatics Anonymous/Cocaine Anonymous/ Alcoholics Anonymous	30	19
Detox	23	15
Drug treatment/recovery house	16	11

*Refers to self-reported service use in the last 6 months.

effects of discrimination, social dislocation, and entrenched poverty. Although Aboriginal people represent only 2.8% of the general population in Canada and approximately 4–5% of the total population of British Columbia,[17] earlier research has identified a significant overrepresentation of people of Aboriginal ancestry among IDUs and women residing in the DTES.[10,18] Although this finding may well

be unique to Vancouver, previous literature within urban sex worker communities across North America have consistently documented a heightened presence of visible minority populations engaged in sex work and associated risk factors.[19] Given the preliminary findings, further research is needed to explore the specific risk factors of this population.

Among drug use patterns, women reported high levels of both injection and noninjection drugs. Of the total, 85% were polysubstance users. Over half the women were injection drug users, with cocaine being the most commonly injected drug, followed by heroin. Cocaine injection has been shown to be associated locally with HIV seroconversion in a dose-dependant fashion; among female IDUs in the DTES, cocaine injection once or more daily was an independent predictor of time to HIV seroconversion.[11] In other urban settings in North America, high-risk behaviours shown to be associated with sex work included frequent injection use (greater than once per day), smokeable crack cocaine use and borrowing used needles.[15,16,20]

The extremely high rate of daily crack cocaine use (80%) among WISH participants is particularly striking. Crack has been previously shown to be associated with an increased risk of sexually transmitted infections (STI) land HIV infection through sexual transmission, an association mediated by increased high-risk sexual behaviours.[16,21,22] In fact, women who smoke crack and exchange sex for money or drugs have been found to have rates of HIV infection comparable with those of men having unprotected sex with men.[21,22] In addition, a growing body of literature surrounding HIV transmission among female IDUs has identified the increasing role of sexual rather than parenteral transmission among this population, and in particular, the multiple risk factors of regular sex partners, rather than clients or tricks, in HIV transmission.[13–15] The findings highlight the need for HIV care programs to promote the reduced frequency of high-risk sexual practices associated with crack-cocaine use, enhance access to harm reduction services, and address issues of polydrug dependency on uptake and management of HAART.

In terms of diagnostic testing, there was a high level of coverage for HIV and HCV testing among WISH participants. Notably, previous research surrounding self-reported HCV status among injection users shows that several high-risk sexual and drug-related behaviours are associated with unknown HCV status,[23] suggesting the potential for higher HCV infection because of inconsistent testing. In addition, it is anticipated that there was significant underreporting of HIV infection because of the high degree of stigma associated with HIV positive status among women engaged in sex work, as well as issues of privacy and disclosure. Given the heightened vulnerabilities of people of Aboriginal ancestry and women in the community,[10,18] and the already established link between survival sex work and elevated risk of HIV seroconversion among IDUs,[15] estimates suggest that a much higher proportion of women sex workers may be HIV positive.

Overall, there was a high uptake of both primary care (health clinic and mobile health van) and emergency room services among WISH participants. The high rates of emergency room use, in addition to primary care, is likely a reflection of the overall poor health status of women, the highly unstable lifestyle patterns, high rates of addiction, inaccessible clinic hours during evenings, and a lack of women-specific services.[24] In addition, women reported a high level of contact with front-line workers and use of harm reduction initiatives, attesting to a much higher uptake of low-threshold and more easily accessible services among this group. Notably, more information concerning the frequency and type of services accessed would provide important information.

Despite the high uptake of health services among WISH participants, there appears to be comparatively little attention paid to HIV care. Of the total, 23 (15%) women reported ever having initiated HAART and only 14 (9%) were currently on treatment. Self-reported barriers to HIV care were largely based on misinformation and misconceptions surrounding the potential for simplified once daily therapy. No differences were found among barriers when stratified by self-reported HIV infection. The most frequently cited barriers to accessing HAART included "not knowing enough about treatment" and "a fear of treatment side effects." Previous studies have demonstrated that patient's knowledge of current HAART regimes, beliefs in the benefits of treatment, and anticipation of side effects have a positive correlation with HAART uptake and adherence.[4,25,26] Clearly efforts aimed at enhancing uptake of HAART among this population of women need to focus on educating women regarding the benefits of HAART treatment and management of treatment side effects.

Difficulty in maintaining daily medication regimes and making regular medical appointments were also frequently reported as barriers to accessing HAART. Patients' confidence in their ability to take HAART medication and to incorporate the complex treatment regimes into their daily routine have been consistently shown to be the predictors of enhanced HAART retention.[26,27] Innovative strategies tailored to women's specific lifestyle patterns and incorporating a high degree of follow-up and outreach are urgently needed to enhance access to HAART. Increasing evidence suggests that directly observed therapy can be highly effective in promoting HAART adherence among even the hardest-to-reach of populations.[3,28,29] directly observed therapy programs have been particularly successful when paired with existing service providers in the community such as needle-exchange programs or peer outreach workers, as this provides the opportunity to engage active users in entry into treatment, ensures non-judgemental and continuous contact with clients, and ultimately facilitates access to comprehensive medical care.[3,28–31] Other initiatives previously shown to be effective in increasing HAART access include long-term follow-up, extended hours at primary health clinics, and increased focus on issues of self-efficacy.[5,26]

Finally, a fear of others suspecting their HIV status was identified as a significant barrier to accessing HAART treatment. Difficulties surrounding trust and confidentiality among women engaged in sex work have been well documented.[10] Issues of privacy and disclosure in an HIV care program would need to be promoted with a high level of sensitivity and would be best bridged through already established client–provider relationships. Also, current social policies surrounding sex trade work increasingly render the practice as illusive and clandestine, which further perpetuates the high level of stigma and devaluation faced by HIV positive women engaged in sex work.[32]

In terms of accessing HAART treatment, there was a higher acceptability among women to accessing HAART medications through community-based initiatives or women-specific services and a lower acceptability to accessing medications through the current models in the DTES community (a health clinic for both men and women and a community pharmacy). The highly favourable response to accessing HIV medications through community-based organizations or women-specific services is particularly noteworthy. This finding suggests the potential for uptake of HAART medications through enhanced services that are more responsive to women's specific needs. Although women have been shown to underutilize health services because of fear of running into their clients, "bad dates," and previous aggressors,[32] they are also less likely to initiate HAART through more conventional models due to a high level of stigma associated with their HIV status.

Several limitations of this study should be considered. First, this study was a cross-sectional survey and thus no associations can be drawn between risk behaviours and outcome measures. Further in-depth research is needed to explore the multiple risk factors faced by this population. Second, the study relies on self-reported information and the reported behaviours may have been subject to socially desirable reporting. However, previous literature has provided validation of self-reported information among injection users in this community and others.[33,34] As well, issues of trust and privacy are known to be particularly prevalent among women engaging in sex work, and thus, it is further anticipated that self-reported health and drug use patterns were underreported. However, all interviews were conducted during WISH drop-in hours with interviewers who were well known to the participants. Third, all participants were recruited through the WISH Drop-in Centre which may not be representative of women selling sex in the community. Given the immense difficulties in reaching this population, WISH provides a valuable point of contact through which to access a large sample of survival sex workers in the Downtown Eastside. There are clearly multiple facets to commercial sex work from escort agencies to massage parlours to street-based sex work, and this study offers insight into the lifestyle patterns of a group of women engaged in street-level sex work in Vancouver. Results should therefore not be generalized to other levels of commercial sex work in this setting or others. Finally, recruitment through WISH provides a sample of women already accessing a service, and thus results may overestimate health service utilization and in turn, underestimate the degree of marginalization faced by this population. However, given that the drop-in is an extremely low threshold service and the largest community program accessed by street-entrenched women engaged in sex work in this community, it is likely that this study would have reached many of the most marginalized women.

In summary, women engaged in sex work in the DTES are faced with high rates of addiction, unstable social conditions, and heightened risk of infectious disease. Health and social programs targeting street-based women sex workers need to develop more tangible programs that reach these women "where they are at," and recognize the unique vulnerabilities and transient nature of this population. Current barriers surrounding HIV care are largely due to lack of information on HAART, and coupled with high uptake of health and social services, highlight a window of opportunity through education and enhanced access afforded to this population. This study provides an important first step at assessing the specific needs of the sex worker community and further identifies the potential for community-driven interventions and existing client–provider relationships to reach this highly marginalized group.

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REFERENCES

1. Porter K, Babiker A, Bhaskaran K, Darbyshire J, Pezzotti P, Walker AS. Determinants of survival following HIV-1 seroconversion after the introduction of HAART. *Lancet*. 2003;362:1267–1274.

2. Hogg RS, Heath KV, Yip B, et al. Improved survival among HIV-infected individuals following initiation of antiretroviral therapy. *JAMA*. 1998;279:450–454.
3. Mitty JA, Flanigan T. Community-based interventions for marginalized populations. *Clin Infect Dis*. 2004;38:S373–S375.
4. Altice FL, Mostashari F, Friedland GH. Trust and the acceptance of and adherence to antiretroviral therapy. *J Acquir Immune Defic Syndr*. 2001;28:47–58.
5. Palepu A, Tyndall MW, Li K, et al. Adherence and sustainability of antiretroviral therapy among injection drug users in Vancouver. *Can J of Infect Dis*. 2001; 12(suppl B): 32B.
6. Strathdee SA, Palepu A, Cornelisse PG, et al. Barriers to use of free antiretroviral therapy in injection drug users. *JAMA*. 1998;280:547–549.
7. Strathdee SA, O'Driscoll PT, Galai N, et al. Trends in use of optimal, suboptimal, and no HIV antiretroviral therapy. Paper presented at: XV International AIDS Conference; July 11th, 2004; Bangkok, Thailand.
8. Moore AL, Kirk O, Johnson AM, et al. Virologic, immunologic, and clinical response to highly active antiretroviral therapy: the gender issue revisited. *J Acquir Immune Defic Syndr*. 2003, 2004;32:452–461.
9. Wood E, Montaner JS, Tyndall MW, Schechter MT, O'Shaughnessy MV, Hogg RS. Prevalence and correlates of untreated human immunodeficiency virus type 1 infection among persons who have died in the era of modern antiretroviral therapy. *J Infect Dis*. 2003;188:1164–1170.
10. Miller CL, Spittal PM, LaLiberte N, et al. Females experiencing sexual and drug vulnerabilities are at elevated risk for HIV infection among youth who use injection drugs. *JAIDS*. 2002;30:1–10.
11. Spittal PM, Craib KJ, Wood E, et al. Risk factors for elevated HIV incidence rates among female injection drug users in Vancouver. *CMAJ*. 2002;166:894–899.
12. Spittal PM, Bruneau J, Craib KJ, et al. Surviving the sex trade: a comparison of HIV risk behaviours among street-involved women in two Canadian cities who inject drugs. *AIDS Care*. 2003;15:187–195.
13. Kral A, Bluthenthal R, Lorvick J, et al. Sexual transmission of HIV-1 among injection drug users in San Francisco, USA: risk-factor analysis. *Lancet*. 2001;357:1397–1401.
14. Strathdee S, Sherman SG. The role of sexual transmission of HIV infection among injection and non-injection drug users. *J Urban Health*. 2003;80:iii7–iii14.
15. Astemborski J, Vlahov D, Warren D, et al. The trading of sex for drugs or money and HIV seropositivity among female intravenous drug users. *Am J Public Health*. 1994;84:382–387.
16. Gollub EL, Rey D, Obadia Y, Moatti JP. Gender differences in risk behaviours among HIV+ persons with an IDU history: the link between partner characteristics and women's higher drug-sex risks. *Sex Transm Dis*. 1998;25:483–488.
17. Health Canada. HIV/AIDS among Aboriginal persons in Canada: A Continuing concern In: *HIV/AIDS Epi Update*. Ottawa: Bureau of HIV/AIDS, STD and TB; 2003:35–40.
18. Craib KJ, Spittal PM, Wood E, et al. Risk factors for elevated HIV incidence among Aboriginal injection drug users in Vancouver. *CMAJ*. 2003;168:19–31.
19. Needle RH, Trotter RT, Singer M, et al. Rapid assessment of the HIV/AIDS crisis in racial and ethnic minority communities: an approach for timely community interventions. *Am J Public Health*. 2003;93:970–979.
20. Johnson BL, ven Haeften I, Fishbein M, Kasprzyk D, Montano D. Factors influencing IDU and non–IDU female commercial sex workers' intentions to always use condoms for vaginal sex with their regular partners. *Psychol Health Med*. 2001;6:207–222.
21. Booth R, Kwiatkowski CF, Chitwood DD. Sex related HIV risk behaviours: differential risks among injection drug users, crack smokers, and injection drug users who smoke crack. *Drug Alcohol Depend*. 2000;58:219–226.
22. Edlin BR, Irwin KL, Faruque S, et al. Intersecting epidemics—crack cocaine use and HIV infection among inner-city young adults. *N Engl J Med*. 1994;331:1422–1427.

23. Vidal-Trecan G, Coste J, Varescon-Pousson I, Christoforov B, Boissonnas A. HCV status knowledge and risk behaviours amongst intravenous drug users. *Eur J Epidemiol*. 2000;16:439–445.
24. Palepu A, Strathdee SA, Hogg RS, et al. The social determinants of emergency department and hospital use by injection drug users in Canada. *J Urban Health*. 1999;76:409–418.
25. Murphy DA, Roberts KJ, Martin DJ, Marelich W, Hoffman D. Barriers to antiretroviral adherence among HIV-infected adults. *AIDS Patient Care STDS*. 2000;14:47–58.
26. Ammassari A, Trotta MP, Murri R, et al. Correlates and predictors of adherence to highly active antiretroviral therapy: overview of published literature. *JAIDS*. 2002;31: S123–S127.
27. Chesney MA, Ickovics JR, Chambers DB, et al. Self-reported adherence to antiretroviral medications among participants in HIV clinical trials: the AACTG adherence instruments. Patient Care Committee & Adherence Working Group of the Outcomes Committee of the Adult AIDS Clinical Trials Group (AACTG). *AIDS Care*. 2000;12:255–266.
28. Kresina TF, Normand J, Khalsa J, Mitty J, Flanigan T, Francis H. Addressing the need of treatment paradigms for drug-abusing patients with multiple morbidities. *Clin Infect Dis*. 2004;38:S398–S401.
29. Macalino GE, Mitty J, Bazerman LB, Singh K, McKensie M, Flanigan T. Modified directly observed therapy for the treatment of HIV-seropositive substance users: lessons learned from a pilot study. *Clin Infect Dis*. 2004;38(suppl 5):S393–S397.
30. Altice FL, Mezger JA, Hodges J, et al. Developing a directly administered antiretroviral therapy intervention for HIV-infected drug users: implications for program replication. *Clin Infect Dis*. 2004;38:S376–S387.
31. Pollack HA, Khoshnood K, Blankenship KM, Altice FL. The impact of needle exchange-based health services on emergency department use. *J Gen Intern Med*. 2002;17:341–348.
32. Aral SO, Mann JM. Commercial sex work and STD: the need for policy interventions to change societal patterns. *Sex Transm Dis*. 1998;25:455–456.
33. Strathdee SA, Patrick DM, Currie SL, et al. Needle exchange is not enough: lessons learned from the Vancouver injecting drug user study. *AIDS*. 1997;11:F59–F65.
34. De Irala J, Bigelow C, Mccusker J, Hindin R, Zheng L. Reliability of self-reported human immunodeficiency virus risk behaviours in a residential drug treatment population. *J Epidemiol*. 1996;143:725–732.