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Using a Jail-Based Survey to Monitor HIV and Risk Behaviors Among Seattle Area Injection Drug Users

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ABSTRACT *Routine monitoring of human immunodeficiency virus (HIV) and risk behaviors among injection drug users (IDUs) is difficult outside drug treatment settings. We developed and implemented a survey of recently arrested IDUs to describe the prevalence of HIV, drug use, and sexual behaviors among them. A probability sampling survey was instituted in the King County Correctional Facility in Seattle, Washington, to sample recently arrested IDUs at the time of booking and in the jail health clinic between 1998 and 1999. Following HIV risk assessment and blood draw, additional information on drug use practices was gathered using a standardized questionnaire. Potential participants who were released from jail early could complete the study at a nearby research storefront office. Of the 4,344 persons intercepted at booking, 503 (12%) reported injection drug use, and 201 of the IDUs (40%) participated in the study. An additional 161 IDUs were enrolled in the study from the jail health clinic. Among the 348 unduplicated subjects, HIV prevalence was 2%; in the past 6 months, 69% reported two or more shooting partners, 72% used a cooker after someone else, 60% shared a syringe to divide up drugs, and 62% injected with used needles. Only 37% reported being hepatitis C seropositive, and 8% reported hepatitis B vaccination. It was feasible to conduct a jail-based survey of recently arrested IDUs that yielded useful information. The high prevalence of reported risky drug use practices warrants ongoing monitoring and illustrates the need for improving prevention programs for HIV and hepatitis B and C in this population, including expansion of hepatitis C screening and provision of hepatitis B vaccination at the jail health clinic.*

KEYWORDS *Correctional Facility, Hepatitis B and C Prevention, HIV, Injection Drug Users, Risk Behaviors.*

INTRODUCTION

Unsafe injection drug use practices continue to be a major route of human immunodeficiency virus (HIV) transmission, accounting for almost one third of acquired immunodeficiency syndrome (AIDS) cases reported in the United States in 1998.[1] While declines in HIV incidence and prevalence were reported among New York City injection drug users (IDUs) in the 1990s,[2,3] the need for ongoing monitoring

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of HIV and risk behaviors among IDUs is well illustrated by the recent Vancouver, British Columbia, outbreak among an IDU population with a long history of low and stable HIV prevalence[4]; between 1994 and 1997, HIV increased from 2% to 23%.

In the United States, the Centers for Disease Control and Prevention (CDC) sponsored a national sentinel HIV serosurveillance system between 1988 and 1999 that included anonymous surveys of HIV seroprevalence and risk behaviors in selected high-risk populations.[5–7] These surveys monitored HIV among IDUs through unlinked HIV antibody testing of residual sera from routine clinical testing conducted at entry into drug treatment. Because these surveys included mostly heroin injectors and because only about 15%–20% of IDUs are estimated to be in drug treatment at any given time, results from this serosurveillance system are not likely to be representative of the broader IDU community.[8,9] National efforts to survey out-of-treatment IDUs include studies by the National Institute on Drug Abuse (NIDA), which has recruited convenience samples of injectors in 19 different locations across the United States. Although the primary purpose of these studies was to design and evaluate HIV prevention programs for IDUs, they also measured HIV prevalence and risk behaviors.[10] Apart from injectors entering drug treatment, it is very difficult to find other equally accessible IDU populations for routine serosurveillance. In communities with high arrest rates among IDUs, however, local jails may serve as important sites to monitor this population.[11]

Although HIV prevalence has remained low in IDUs in the Seattle, Washington, area, the proximity of the Vancouver HIV outbreak and the high hepatitis B and C seroconversion rates observed in a cohort of approximately 3,000 Seattle area IDUs[12] emphasize the importance of continued accurate surveillance of HIV and risk behaviors among IDUs in this area.

We describe a survey that was implemented to monitor HIV, drug use and sexual risk behaviors, and travel patterns in recently arrested IDUs booked in the King County Correctional Facility in Seattle from September 1998 through August 1999.

METHODS

Study Design and Sampling

This survey, also known as the Kiwi Study, was an anonymous cross-sectional, face-to-face interview survey of HIV prevalence and related risk behaviors among IDUs recently booked in the King County Correctional Facility in Seattle (here referred to as the jail) that began in September 1998. The jail, which is occupied by persons serving up to a 1-year sentence or awaiting criminal trial, on average houses 1,524 inmates (61% of the incarcerated population in King County) and conducts 114 bookings per day (73% of bookings in all King County correctional facilities); one forth of releases occur within 24 hours of booking, 56% within 72 hours.

Injection drug users were sampled through two different approaches in an attempt to obtain a broad sample of recently booked IDUs. First, a multistage probability sampling methodology was employed that consisted of systematic sampling of individuals being booked during 20–24 randomly sampled monthly 3.5-hour sampling periods to identify eligible IDUs. Eligible IDUs were referred to the jail health clinic or the nearby research storefront office (if released early) for HIV

counseling and testing (CT) and a risk behavior survey. Second, all eligible IDUs who were booked during nonsampled jail booking periods and who sought HIV CT at the jail health clinic were invited to complete the survey either immediately after their HIV pretest counseling and blood draw (time permitting) or at a later date by appointment at the jail health clinic. The jail health clinic, which is operated by Public Health—Seattle and King County (PHSKC), conducted 1,155 HIV tests in 1998.

This study was reviewed and approved by the institutional review boards of the Centers for Disease Control and Prevention and the Washington State Department of Social and Health Services.

Subjects and Data Collection

Trained study staff systematically intercepted all persons being booked in the jail during each 3.5-hour sampling period and administered a short set of screening questions regarding the following to determine eligibility: age 18 or older, English or Spanish speaking, injected drugs in the past 12 months, and no Kiwi Study participation in the past 3 months. We allowed reenrollment after 3 months to monitor changes in risk behaviors. Additional demographic and booking charge information (up to three charges) was collected from jail arrest records to compare characteristics of those who agreed to the intercept and those who either refused or were inappropriate for intercept (those who were violent and deemed a danger to study staff or were intoxicated and unable to carry out the screening interview).

The last names of eligible persons who agreed to participate in the study were converted to a soundex code (a four-character alphanumeric code produced from an algorithm that cannot be back-translated into any particular name). A second anonymous study code was created using biographical information from the subject; no names were retained by the study.

Study staff completed jail health clinic HIV CT referral forms for eligible IDUs who agreed to participate in the study. Eligible inmates were contacted by a jail health clinic Disease Intervention Specialist for an appointment. Following standard jail health clinic HIV risk assessment, HIV precounseling and blood draw, and referral to other health services, the Disease Intervention Specialist obtained informed consent for the study and administered the questionnaire. Participants received a $20 incentive.

Other eligible IDUs booked during nonsampling periods who sought HIV CT at the jail health clinic were invited to participate at the time of their appointment. Persons intercepted at booking who were released from jail before being seen at the jail health clinic were referred to the nearby research storefront office for completion of HIV CT and the study questionnaire. Both sites provided standard post-HIV test counseling. At the research storefront office, an appointment was made for posttest counseling immediately on completion of the interview, and participants were strongly encouraged to return for their results. Study records were linked using the date of birth, gender, race, and soundex and anonymous codes to connect jail booking intercept responses with HIV risk assessment and questionnaire data and to identify subsequent enrollment of the same individuals.

The standard jail health clinic HIV risk assessment included questions on number and gender of sex partners, sexual orientation, sex with persons at high risk for HIV, injection drug use, noninjection drug use, commercial sex history, other blood contact, sexually transmitted disease (STD) and hepatitis history, and previous HIV testing. The study questionnaire included questions regarding sociodemographics;

incarceration; injection drug use practices (injection frequency, types of drugs, drug use equipment-sharing behaviors, and shooting partner characteristics); source of new unused needles; noninjection drug use; drug treatment; travel history; and unprotected sex and needle-sharing activities with persons from outside the Seattle area. The referent periods for drug use activities included the past year for types of drugs used, drug treatment, and unprotected sex and needle-sharing activities with persons from outside the Seattle area; last 6 months for shooting partner characteristics and sharing behaviors; and last 30 days for most recent frequency of injection, type of drug injected most often, and injecting and sharing behaviors. The PHSKC Laboratory performed the screening for anti-HIV using an enzyme immunoassay (Abbott Laboratories, Abbott Park, IL); positive specimens were confirmed with Western blot (Novopath HIV-1 Immunopath, Biorad, Hercules, CA).

Data Management and Analysis

All booking intercept, HIV risk assessment, and study questionnaire records were reviewed for completeness before data entry. Data entry was conducted using Epi-Info programs developed for the study and equipped with logic checks for data accuracy; 10% of the records were audited to assess data entry accuracy. The present analysis includes data from individuals' first jail booking intercept and first Kiwi Study interview from September 1998 through August 1999.

Participation rates were assessed for subjects referred from jail booking by linking the intercept records and the questionnaire and HIV risk assessment records and calculating the percentage of eligible intercepted subjects who completed the study. For subjects recruited at the jail health clinic, where it was not feasible to record information consistently on nonparticipating eligible IDUs, we were able to track participation, including sex and race/ethnicity, for nonparticipants during a 2-month period. The participation rate was calculated as the percentage of eligible IDUs seen at the clinic during this period.

The HIV prevalence, sociodemographics, drug use and sexual behavior, health, drug treatment, and travel outside the region were described using univariate analysis. Multiple intercepts and interviews of the same persons were only included in the tracking diagram in the Figure.

RESULTS

Sampling Outcomes

From September 1998 through August 1999, 4,344 intercepts were conducted at jail booking (Figure). Most (83%) agreed to participate in the initial screening interview; among these, 14% were eligible to participate in the study. Most were male (73%), over 30 years of age (70%), and either white (67%) or black (18%) (data not shown). Nearly one half were booked on a property offense, and over one third were booked on a drug or alcohol offense. Of 503 eligible intercepts, 201 (40%) resulted in an interview at either the jail health clinic (115) or the research storefront office (86). Compared to those who did not participate, those who went on to participate in the survey were more likely to be male (79% vs. 69%, $P = .02$) and 30 years and older (75% vs. 66%, $P = .04$).

In addition, 161 IDUs who had not been intercepted at booking, but had been seen at the jail health clinic for HIV CT, participated in the study. Based on a 2-month sample, this represented an estimated 75% of eligible IDUs who had re-

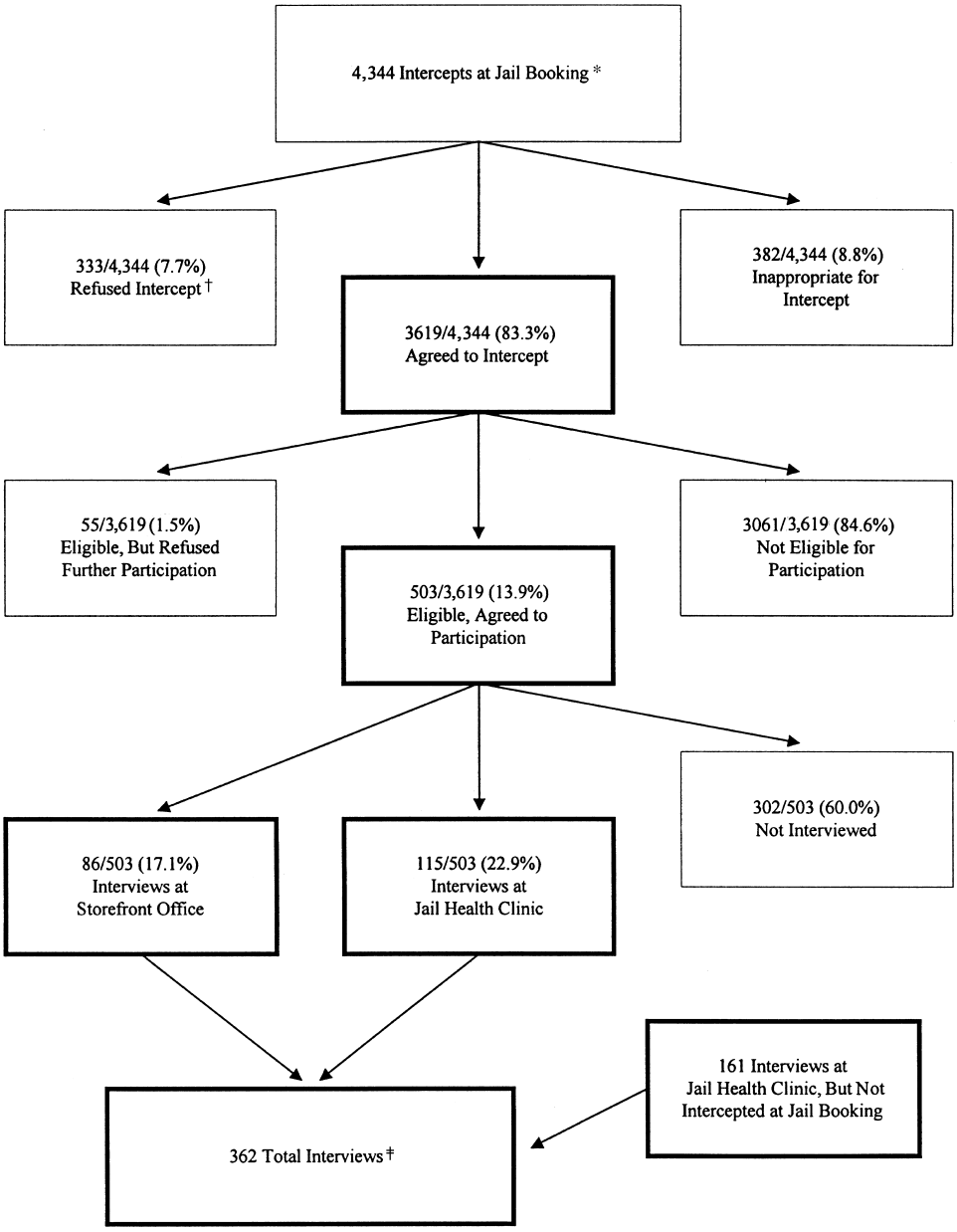

FIGURE. Jail booking intercept, eligibility, and subsequent jail health clinic or research storefront office interview participation tracking diagram. *Total number of intercepts, not unique individuals; persons may have been intercepted multiple times. †Excluding 10 (10/4,344, 0.2%) records due to missing data on reasons for not participating in intercept. ‡Includes 14 (14/362, 3.9%) subsequent interviews of persons who had previously participated in the study.

ceived HIV CT at the jail health clinic, but had not been intercepted during sampling periods at jail booking. These participants did not differ from the nonparticipants with respect to gender, but participants were more likely to be black than nonparticipants (32% vs. 4%, $P < .01$). Comparison of all study participants who were interviewed at the jail health clinic (including referrals from booking) with all eligible jail health clinic clients for the 1-year study period showed no differences with respect to sex, race/ethnicity, time since last injection, or injection frequency in the last month. Study participants, however, were more likely to be 40 years and older (31% vs. 22%, $P < .01$).

After exclusion of the second interview for 14 participants who completed the study twice, 348 subjects were available for analysis, including 192 originating from booking and 156 recruited at the jail health clinic. These two groups did not differ with respect to sex, age, race/ethnicity, most commonly injected drug, or frequency of injection in the last month among those who injected in the last month. Not surprisingly, a smaller proportion of those recruited at the jail health clinic had injected in the past month since some of them had been in jail longer (47% vs. 82%, $P < .01$). Over 90% of interviews were completed within 2 months of the approximate booking date.

Sociodemographic Characteristics

Most survey participants were male (75%), over 30 years of age (75%), and either white (61%) or black (21%) (Table 1). Over half were transient; over one quarter had not completed high school; most (69%) were unemployed; and more than one quarter were receiving public financial assistance. There were 60% who had spent more than 1 year incarcerated over their lifetime. The median age at which they first injected drugs was 19.

Sexual and Drug Use Characteristics and Behaviors

Most survey participants (88%) identified themselves as heterosexual, although almost one quarter of the female participants considered themselves bisexual (Table 2). Over half had two or more sex partners in the past year. Almost two thirds of men and women engaged in unprotected vaginal sex. One third of all participants reported a lifetime history of at least one STD. Nearly half of participants recalled a history of at least one type of hepatitis, with 37% reporting infection with hepatitis C. Most participants (85%) had a prior HIV test and few (8%) had received hepatitis B vaccination.

Two thirds of participants had injected in the last 30 days; the majority injected multiple times per day (Table 3). Heroin was the most commonly injected drug. The majority of participants reported multiple shooting partners, most of whom were regular shooting partners, friends, or steady sex partners. Most had used a cooker after someone else had used it, as well as divided up drugs with somebody else using the same needle (backloading). Similarly, injecting with a needle that had been used by somebody else before them was common. In addition to injection drug use, survey participants used a variety of noninjected drugs, crack being the noninjection drug used most often (67%).

Most participants (71%) had been in some kind of drug treatment at one point in their lives, about one third in the last year. In the last year, few (7%) had been enrolled in a methadone maintenance or a 180-day methadone detoxification (6%) program. About one quarter of participants reported they had tried but could not

TABLE 1. Sociodemographic characteristics of Kiwi Study participants

	% (N = 348)
Gender	
Male	75.3
Female	24.7
Age*	
18–29 years	24.9
30–39 years	39.6
≥40 years	35.5
Race/ethnicity	
White, not Hispanic	61.2
Black, not Hispanic	20.7
Native American	7.8
Hispanic/Latino	5.5
Other	4.9
Current type of residence (prior to jail)	
Own house/apartment	42.5
Transient†	57.5
Education	
K–11	27.9
High school graduate or GED	44.3
Some college or technical school	27.9
Unemployed	69.3
Receiving public assistance	28.7
Total legal income in the last month	
$0, no legal income	44.8
$1–1,000	37.9
≥$1,001	17.3
Total lifetime months incarcerated	
≤1 month	11.5
2–6 months	15.0
7–12 months	13.8
≥13 months	59.7
Age first shot drugs	
≤19 years	53.2
20–29 years	34.5
≥30 years	12.3

*Seven subjects with missing date of birth values were excluded from results.

†Transient includes residing in someone else's house or apartment or in a hotel, motel, boarding house, halfway house, or shelter or on the street.

get into drug treatment in the last year. Only 9% of the study participants were currently in treatment.

Three fourths of participants got new unused needles from a needle-exchange program in which they exchanged the needles personally; 14% acquired needles from a needle exchange through someone else (Table 4). Nearly half acquired new unused needles from a pharmacy.

TABLE 2. Sexual orientation, sexual activity, and health history by gender among Kiwi Study participants

	Total (N = 348), %	Male (N = 262), %	Female (N = 86), %
Sexual orientation			
Heterosexual	87.6	92.7	72.1
Bisexual	9.2	4.6	23.3
Homosexual	3.2	2.7	4.6
Number of sexual partners in the past year			
0	11.2	11.8	9.3
1	29.6	32.4	20.9
2–4	32.8	34.7	26.7
≥5	26.4	21.0	43.0
Unprotected sex in the past 6 months			
Vaginal	63.8	63.4	65.1
Anal	8.3	7.6	10.5
Lifetime health history			
Gonorrhea	18.1	14.5	29.1
Chlamydia	14.7	9.9	29.1
Genital warts	5.7	5.7	5.8
Herpes	4.9	3.8	8.1
Syphilis	3.4	2.3	7.0
Hepatitis A	10.1	9.5	11.6
Hepatitis B	17.5	16.0	22.1
Hepatitis C	37.4	35.1	44.2
Hepatitis B virus vaccination*	8.0	8.4	7.0
Prior HIV test	84.5	83.6	87.2

*Of these vaccine recipients, 40% reported having completed the vaccination regimen.

During their travels outside of the county or state, almost one quarter injected with someone from the destination traveled, few (10%) used a needle after someone else had used it, and about one fifth had sex without a condom (Table 5). Few participants injected, used needles after, or had unprotected sex within the county with someone from outside the county. In all, 4% of participants injected with someone from Vancouver, few (1%) used a needle after someone from Vancouver, or had sex without a condom (2%) with someone from Vancouver.

HIV Test Results

There were 8 survey participants (2%) who tested positive for HIV, 2 of whom were not aware of their HIV status. Of the 86 interviews completed at the research storefront office, only 7% of the people returned for posttest counseling; during the study period, 76% of all persons receiving HIV CT at the jail health clinic received their results at either the jail health clinic or another PHSKC testing site.

DISCUSSION

We found that identifying IDUs, either when they were being booked in jail or when they were seen for HIV CT at the jail health clinic, and enrolling them in an

TABLE 3. Drug use behavior in the past year, last 6 months, or last 30 days, and drug treatment history among Kiwi Study participants

	Past year* (N = 348), %	Last 6 months* (N = 341), %	Last 30 days* (N = 232), %
Average frequency of shooting			
<Once a week			16.0
1–6 times a week			12.1
Once a day			5.6
Two or more times a day			66.2
Any drugs injected			
Heroin	85.3		
Heroin and cocaine together (speedballs)	69.0		
Cocaine	64.7		
Speed	27.9		
Drugs injected most often			
Heroin	59.9		64.2
Heroin and cocaine together	18.4		19.4
Cocaine	11.8		7.8
Speed	9.8		8.6
Number of shooting partners			
0		7.9	15.5
1		23.2	32.8
2–4		30.9	28.9
≥5		37.9	22.8
Types of shooting partners			
Regular shooting partner		54.0	
Other friends, not sex partner		48.7	
Steady sex partner		38.4	
Other sex partner		14.1	
A dealer		20.8	
Somebody younger than 25 years		19.1	
A man who has sex with other men		10.3	
Relatives		6.7	
Used a cooker after someone else used it		71.6	60.3
Backloaded		60.4	52.6
Injected with a needle used by someone else		62.2	42.7
Number of people who used a needle before participant			
0		38.8	58.0
1		30.1	26.8
≥2		31.0	15.2
Use of any noninjection drugs			
Crack	67.2		
Marijuana	60.6		
Cocaine	19.8		
Barbiturates	19.3		
Heroin	16.4		
Speed	13.2		

TABLE 3. Continued

	Past year* (N = 348), %	Last 6 months* (N = 341), %	Last 30 days* (N = 232), %
Ever been in any kind of drug treatment	71.0		
Drug treatment in the past year	35.9		
Type of treatment in the past year			
12-step program	13.8		
Therapeutic community	10.6		
Drug-free outpatient program	8.3		
Methadone maintenance	7.2		
Methadone detoxification	5.5		
Nonmethadone detoxification	5.7		
Other	4.0		
Tried but did not get into treatment past year	23.0		
Currently in treatment	9.2		

*Subjects with missing values were excluded from analysis.

HIV and risk behavior study was feasible and yielded relevant behavioral information. Although HIV prevalence was only 2%, drug use behaviors illustrated the potential for transmission of HIV and hepatitis B and C among IDUs in this community. Most survey participants injected drugs multiple times per day, with heroin being the most popular drug of choice, although use of other injection drugs, as well as noninjection drugs, was typical. Few IDUs injected alone; most had used a cooker after someone else had used it; and most divided up drugs with somebody else using the same needle. Injecting with needles previously used by other IDUs was common.

We identified several limitations of the study methods and operations that

TABLE 4. Source of new unused needles in the last 6 months among Kiwi Study participants

	Any (N = 341), %	Most often* (N = 341), %
A needle exchange (exchanged personally)	74.2	62.2
A drugstore/pharmacy	44.6	17.9
A friend	5.2	4.7
Someone who sells needles	24.3	5.6
A diabetic	14.4	2.9
A needle exchange (someone else exchanged)	14.1	2.1
A sex partner	14.1	0.9
A drug dealer	12.9	1.5
Someone to whom participant sold drugs	7.0	0.3
A relative	2.1	0.6
Other	0.9	1.3

*Responses are mutually exclusive.

TABLE 5. Unprotected sex and needle-sharing activities during travel outside the Seattle–King County area and with persons from outside the area while in Seattle–King County in the past year

	% (N = 348)
Traveled out of Seattle–King County	44.5
Traveled out of Washington State	25.3
Traveled out of county, within Washington State	23.3
Injected with someone during travels*	22.7
Used needles after someone during travels*	9.5
Had sex without a condom during travels*	18.7
Injected in county with someone from outside the area	14.9
Used needles in county after someone from outside the area	3.7
Had sex without a condom with someone from outside the area	4.6

*Behaviors occurred with someone from the destination.

should be considered when interpreting the study results. First, only 40% of eligible IDUs identified at booking eventually participated in the study. The low participation rate among eligible IDUs intercepted at booking may have been due to several reasons, such as quick release from jail or transfer to other facilities.

Second, 25% of the eligible IDUs seeking HIV CT at the jail health clinic did not participate in the survey, and we were only able to assess participation in the jail health clinic during a 2-month period, which may not be representative of the full study period. While none of the nonparticipants refused the study, other factors such as jail release, transfer, or court appearances hindered participation. It was not feasible to administer the study questionnaire at the HIV CT session among this group of newly identified eligible potential participants since a longer appointment could not have been scheduled ahead of time, as was the case for participants referred by our study staff at booking. Based on comparison of characteristics of participants and nonparticipants either referred from booking or identified at the jail health clinic, it is possible that our study could have underrepresented female and younger recently arrested IDUs.

Third, while the research storefront office allowed inmates who were released early to participate, it may not have been convenient for those who did not live in downtown Seattle to be interviewed in our office. Our only reminder system, consisting of a pocket-size card given to the person at booking and with their property on release, may have been lost or forgotten by the potential participant. Because this study was anonymous, there was no way for us to contact the individual and provide another type of reminder.

Fourth, the jail mainly houses persons arrested in North King County and accounts for 73% of the bookings in all King County and 61% of the incarcerated population in the county; thus. our sample of jailed IDUs may not have represented the entire county. Finally, the face-to-face interviews may have led to underreporting of risky behaviors, in which case our results would be an underestimate of the true risky behaviors being conducted by IDUs in this community.

Strengths of our study included the use of a probability sampling system in-

tended to enroll a representative sample of recently arrested IDUs, the ability to interview at our storefront office those released early, and the additional recruitment of IDUs who were seen for HIV CT, but were not intercepted at booking. Although less than half of the eligible persons identified at booking participated in the study, over half of our final sample originated from booking intercepts. If we had limited enrollment to IDUs who were seen at the jail health clinic for HIV CT, a substantial portion of the sample would have been missed.

In addition, several features of the jail and jail health clinic made it possible to carry out this research design in this setting. First, the jail health clinic is operated by the local public health department, and the study utilized personnel who were already trained and experienced in conducting HIV CT in the jail setting and who were not part of the correctional facility staff. Second, the support and collaboration of jail administration and correctional officer staff was essential to collect study data in a busy booking area while ensuring the confidentiality of participants and the safety of study staff. Booking areas in other jails, by their physical design, may not always be conducive to such confidential interviews. Third, incarcerated participants' monetary incentives could be deposited in their jail account, a practice that is not always possible in other correctional facilities. Finally, because all study activities and contact with study participants were conducted exclusively by public health department staff and strict confidentiality procedures were in place for HIV CT services in the jail, the participants' drug use behaviors and HIV status were not known by corrections staff. Moreover, no personal identifiers were retained by our study, so that study subjects could be assured that their confidentiality would be protected, and that participation in the study would not affect their incarceration or legal case status.

The low HIV prevalence among our study participants is consistent with findings from other local studies showing that prevalence of HIV has continued to remain low (under 4%) in Seattle area IDUs. Together with the low HIV incidence observed in another local study,[12] this indicates that the Vancouver HIV outbreak has not expanded to the Seattle area, and that the risk of a related outbreak may be limited unless contact patterns between IDUs from the two areas change. In addition, cocaine injection was associated with higher prevalence of HIV in Vancouver,[4] while heroin continues to remain the most commonly injected drug in the Seattle area, as demonstrated in our study and other studies.[12]

The prevalence of injection with used needles in the past 30 days uncovered in our study was similar to the prevalence among IDUs surveyed in 19 US cities between 1991 and 1995 and among recent arrestees surveyed in 1995 in Los Angeles,[10,13] while the prevalence in the past 6 months (62%) was markedly higher among our study participants than the 40% reported among Vancouver IDUs during the HIV outbreak.[4]

We found that the prevalence of sharing other drug preparation equipment such as cookers was even higher than the prevalence of injection with used needles; this is in agreement with reports by Koester et al.[14] This form of sharing was less common among IDUs in the multicity study and among IDUs in Vancouver.[4,10]

The low HIV prevalence combined with the high prevalence of needle and equipment sharing and multiple shooting partners observed in our study deserve further investigation. Considering that the majority reported that their shooting partners were "regular shooting partners," steady sex partners, and friends, it is possible that the sharing activities take place within smaller networks, thereby limiting the spread of HIV.

Several studies have reported results of HIV serosurveillance efforts in prisons. As part of the national HIV serosurveillance system, the CDC funded anonymous unlinked serosurveys to monitor HIV prevalence in US correctional facilities across the country.[5,7] These studies required that residual blood specimens obtained for routine clinical testing on entry into the facility were available for unlinked HIV antibody testing. Demographic and risk behavior information was obtained from inmate records of routine processing on prison entry. This study methodology avoids self-selection bias, and HIV prevalence measured in this fashion is representative of the survey population.

Correctional facilities where reliable information on drug use is available may serve as good sentinel sites for HIV serosurveillance of IDUs.[15] This information, however, is often incomplete. Vlahov et al.[16] found that the drug use variable was missing for 40% of the records in a 1986 study of the Maryland prison system.

Recent studies of HIV prevalence in prison inmates in Europe have examined self-reported risk behavior data obtained during face-to-face interviews or by self-administered surveys.[17–21] These data were collected in conjunction with a routine medical examination on entry into prison[17,18] or as part of a separate study.[19–21] All studies were voluntary and anonymous and were carried out by medical staff or external research teams. Four of the five studies achieved participation rates of 89% or higher. Thus, these studies were able to access a high proportion of the eligible population and to assess HIV prevalence by risk exposure status.

Fewer studies of HIV and risk behaviors have been reported from jails. Unlike prisons, most jails in the United States do not routinely collect blood specimens for clinical purposes at the time of booking; thus, it is not possible to conduct unlinked anonymous serosurveys that would be representative of the jail population. HIV risk behavior data are usually not available; as has been previously reported and confirmed by our findings, drug-related charges are not useful as a surrogate measure of injection drug use because property offenses are the most common crime for which IDUs are arrested.[22] A jail-based HIV serosurveillance system would capture a very different population than a prison-based serosurveillance system because the majority of inmates are released within weeks. Such a system would be more reflective of the serological status and risk behaviors of specific populations in the community. Because of the difficulty of finding and sampling IDUs outside drug treatment center settings and the high arrest rate among IDUs, jails may serve as an important location for HIV serosurveillance of this population. Carpenter et al.[11] employed urine testing to measure HIV prevalence among recent arrestees in the Los Angeles County Jail as part of the Arrestee Drug Abuse Monitoring Program (ADAM). All data collection was completed at the time of booking, thus avoiding loss of study subjects due to early release. It might not be feasible, however, to conduct comprehensive HIV pretest counseling at the time of booking in all jail settings.

Information gathered in a jail-based serosurveillance system can be useful for planning and evaluation of prevention and care services in the general community, as well as in the jail system. We found that the proportion who reported a seropositive hepatitis C status was much lower than expected for IDUs, clearly indicating the need for better screening of this population or better education about test results. Furthermore, less than 10% had ever received any hepatitis B vaccinations. These findings indicate that there is a need to include hepatitis C screening more frequently in HIV CT visits at the jail health clinic and to provide hepatitis B vaccinations routinely. Several studies have pointed out that jails and prisons offer excel-

lent opportunities for targeting and intervening with populations at high risk for HIV, hepatitis B, hepatitis C, and other infectious diseases.[23–28] Furthermore, the Public Health Service guidelines on hepatitis C recommend hepatitis C testing in settings with high proportions of IDUs, including correctional facilities.[29]

We found that implementation and operation of a jail-based survey to monitor HIV and risk behaviors among recently arrested IDUs is feasible, and that a high proportion of recently arrested IDUs in the Seattle area reported risky drug use behaviors, which warrants continued monitoring of this population. Our findings also demonstrated that continued improvement of programs to prevent HIV and other bloodborne infections in this population is needed in this jail health clinic, as well as in the general community. Specifically, hepatitis C screening and provision of hepatitis B vaccination should be expanded in the jail health clinic, and these services should be coordinated with programs in the community to ensure appropriate follow-up care after release.

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