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Differential Risk Factors for HIV Drug and Sex Risk-Taking Among Non-treatment-seeking Hospitalized Injection Drug Users

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Abstract

Injection drug users (IDUs) are at increased risk of contracting HIV. From a clinical trial assessing an intervention to enhance the linkage of hospitalized patients to opioid treatment after discharge, we conducted multivariate analysis of baseline data from hospitalized IDUs with a history of opioid dependence ($n = 104$) to identify differences in factors predicting HIV drug and sex risk

behaviors. Factors significantly associated with HIV drug risk were being non-Hispanic Caucasian and recent cocaine use. Being female, binge drinking, and poorer mental health were significantly associated with higher sex risk. Because factors predicting HIV sex risk behaviors differ from those predicting HIV drug risk, interventions aimed at specific HIV risks should have different behavioral and substance use targets.

Keywords

HIV; Injection drug use (IDU); Opiates; Mental health; Binge drinking

Background

Injection drug users (IDUs), particularly those not receiving substance abuse treatment, are at an increased risk for acquiring HIV [1, 2]. Risk is driven both by unsafe injection practices such as sharing non-sterilized needles or injection equipment (drug risk), and risky sexual behaviors such as unprotected sex, having multiple sex partners, or exchanging sex for drugs or money (sex risk) [3]. Public health efforts to reduce HIV transmission need to address both drug and sex risk behaviors in IDUs in order to be effective. A better understanding of the factors that underlie drug versus sex risk behaviors is needed in order to tailor specific, effective interventions to prevent HIV transmission among out-of-treatment IDUs, those not receiving substance abuse treatment.

Important factors identified in both the HIV drug and sex risk literature, and found to be variously associated with HIV risks, but not studied among hospitalized IDUs in North America, include gender [4–6], alcohol use [7–11], cocaine use [12, 13], mental health function [14–16], and homelessness [14, 17, 18]. Hospitalization can provide a unique opportunity for identifying drug users who are not seeking addiction treatment and are at risk for acquiring HIV. Less is known about HIV drug and sex risk behaviors in this population compared to patients who are enrolled in addiction treatment, who may have already engaged in behavioral change.

HIV drug risk behaviors have been associated with a variety of factors among opioid dependent IDUs. The use of substances other than opioids, particularly alcohol [19] and cocaine [20], is among those factors. Other potential predictors of HIV drug risk behaviors among IDUs that have previously been identified include decreased mental health functioning [16, 21], homelessness [14] and White/Caucasian [6] race/ethnicity. Among those with an opiate addiction, Caucasians have been found to be associated with a higher likelihood of being homeless [22] and a greater likelihood of psychiatric dysfunction and social/family problems [6].

HIV sex risk behaviors among opioid dependent IDUs have similar associations to HIV drug risk behaviors. Alcohol abuse among IDUs has been associated with HIV sex risk behaviors such as unprotected sex and having multiple partners [7, 14, 23, 24], although this finding has not been replicated in all studies of drug-using populations [13]. Cocaine use has been found to increase HIV sex risk behaviors [13, 23, 25], Homelessness has been found to be associated with exchanging sex for drugs or money, or having sex with another IDUs in

some studies of IDUs [26, 27], although not all studies have found a relationship between homelessness and unprotected sex among IDUs [28]. This suggests that the role of homelessness and HIV risk behaviors among IDUs is not consistent across study samples.

Research to date on the association between gender and HIV risk behaviors among drug users has shown varied results. Alcohol use and psychiatric severity increases HIV sex risk behaviors among women [4]. However, it is not clear whether female gender increases the likelihood of unprotected sex [4, 6, 14, 29]. Regarding drug risk, in some studies females were more likely to engage in needle-borrowing, sharing works, and being injected by someone else [30–32]. In other work, a gender difference in HIV drug risk behaviors was not found [6, 20].

There has been little study of drug injectors who get hospitalized where acute medical illness may present an opportunity to receive behavioral interventions. To understand who, in a cohort of hospitalized, out-of-treatment (not receiving substance abuse treatment), opioid dependent IDUs, is most at risk of engaging in HIV risk behaviors, we examined the associations between gender, substance use, mental health and homelessness with HIV sex and drug risk behaviors.

Methods

Sample/Recruitment

Hospitalized opioid dependent patients were recruited from the inpatient medical service of a safety-net, urban, academic hospital [Boston Medical Center (BMC)] as part of a clinical trial concerning linkage to opioid agonist treatment. Research staff, which included a BMC addiction nurse specialist, screened the daily (Monday through Friday) hospital census for all new inpatient admissions age 18 or older and whose medical history suggested recent opioid use. Persons who had been receiving substance abuse treatment with methadone or buprenorphine maintenance prior to admission, were in alcohol or benzodiazepine withdrawal, or did not speak English were not screened further. Potential study participants were then visited by research staff to assess interest in study participation, and a clinical assessment of opioid dependence was made by either the addiction nurse specialist or physician. Persons were excluded from the study if they expressed a desire to harm themselves or others, had alcohol or benzodiazepine dependence, were not greater-Boston residents, had surgery or potential jail time pending, or were pregnant. Persons interested in opioid agonist treatment with buprenorphine after hospital discharge and who were willing to receive primary care at a BMC-affiliated primary care practice were consented for study participation. The study was approved by the Butler Hospital Institutional Review Board (IRB) and the Boston Medical Center IRB.

Between August 2009 and June 2012, five hundred seventy-eight patients were approached about the study and 428 were found ineligible (336) or declined (92) study participation. Of those who declined study participation, 47 did so because they were not interested in any form of opiate replacement therapy. The most common reasons for ineligibility included a pending legal case ($n = 63$), benzodiazepine dependence [55], the need for pain medication [50], behavioral issues [36], medical issues [28], and alcohol abuse [27]. Of the 150 who

enrolled in the study, fourteen did not complete the baseline interview and were not randomized. Of the remaining 136, 104 had injected opiates and were included in the study sample. Following obtaining informed consent, study participants were interviewed by trained research assistants. Participants received \$25 in gift cards for their participation in the baseline study visit.

Measurements

Predictors/Independent Variables—The predictors of interest were: cocaine use, alcohol abuse, mental health functioning, HIV status, homelessness, race/ethnicity, gender, and age. Recent cocaine use was defined as any use in the previous 30 days using the Addiction Severity Index (ASI) [33]. Mental health functioning was determined by responses to the mental health component of the Short Form Health Survey (MCS-12) [34] which includes questions such as, “How much of the time during the past four weeks have you felt calm and peaceful?” and “During the past 4 weeks have you accomplished less than you would like as a result of any emotional problems such as feeling depressed or anxious?” The range for the MCS-12 is from 0 to 100 where a lower score represents decreased mental health functioning. Homelessness was defined as having spent any time sleeping on the street or in a shelter in the previous 90 days. Binge drinking was defined as report of four or more drinks on one occasion for women or five or more drinks on one occasion for men, at least once in the last 3 months.

Outcome/Dependent Variable—The outcome of primary interest was the score on the HIV drug risk and sex risk subscales of the Risk Assessment Battery (RAB) [35]. The drug risk sub-scale (range 0–22) includes questions such as the frequency of injection drug use and sharing of needles and works as well as the number of recent visits to a shooting gallery. The sex risk sub-scale (range 1–18) includes questions involving the number of sexual partners, sexual orientation, frequency of condom use, and the number of times sex was exchanged for drugs or money. Behavior was assessed for the past 3 months; higher scores on both sub-scales indicate greater levels of HIV risk behaviors.

Analytic Methods

We present descriptive statistics to summarize the characteristics of the sample. RAB sex and drug risk indexes are continuous outcomes but exhibited marked skew. An examination of residuals indicated the model-based assumptions underlying ordinary least squares regression were not well approximated. Bootstrap resampling provides a robust alternative method for estimating confidence intervals (CIs) and standard errors when samples are small or when usual model assumptions are unrealistic [36]. We used bias-corrected and accelerated bootstrap CI estimates (10,000 replications) to assess statistical significance; 95 % CI estimates which did not include zero were considered statistically significant at the 0.05 level. This CI estimate has been shown to have good coverage of population parameters even when the sampling distribution of bootstrap estimates is skewed [37].

Results

Study participants had an average age of 39 years ($SD = 12.2$) (Table 1) with 31 (30 %) female, 50 (48 %) non-Hispanic Caucasian, 23 (22 %) African American, 22 (21 %) Hispanic, and 9 (9 %) identifying as Other. Thirtytwo (31 %) participants reported being homeless at some point in the previous 90 days. Nine persons (9 %) were HIV-positive. The average score on the MCS-12 measuring mental health functioning was 36.2 ($SD = 12.4$). Forty (39 %) of the participants reported at least one instance of binge drinking in the previous 90 days. Sixty-five (63 %) participants reported recent (past 30-day) cocaine use; no participants reported recent methamphetamine use. The mean RAB drug risk score was 5.6 (± 5.9), and the mean RAB sex risk score was 4.0 (± 3.1). More than one-third of participants (36 %) had shared needles or works in the past 3 months and 28 % reported having been to a shooting gallery. Overall, forty persons (39 %) reported multiple sex partners with more than half (57 %) of women and 33 % of men reporting two or more sexual partners in the last 3 months. Twenty-three persons, 36 % of women and 16 % of men reported exchanging sex for drugs or money.

In multivariate analysis (Table 2), being Caucasian ($b = 2.84$, 95 % CI 0.61, 5.06) and recent cocaine use ($b = 2.35$, 95 % CI 0.44, 4.32) were significant predictors of increased HIV drug risk scores. Substantively, persons who were HIV? had much higher ($b = 5.99$) adjusted mean drug-risk scores, though this association was not statistically significant (95 % CI -0.49 ; 11.18). Being female ($b = 1.60$, 95 % CI 0.30, 3.18), decreased mental health functioning ($b = -0.05$, 95 % CI -0.10 , -0.00) and binge drinking ($b = 1.23$, 95 % CI 0.04, 2.40) were significantly associated with higher RAB sex risk scores.

Discussion

Both drug risk and sex risk behaviors among IDUs can drive HIV transmission [38]. IDUs who are not in drug treatment represent a particularly high-risk group for acquiring and transmitting HIV [39, 40], and in this study we focused on out-of-treatment, hospitalized, opioid dependent IDUs. We found that the factors associated with these two routes of transmission differ. In our cohort, drug risk behaviors were more likely to be found among those who identified as Caucasian and who had used cocaine in the previous 30 days. In contrast, being female, having poorer mental health, and engaging in binge drinking were risk factors for HIV sex risk behaviors.

Being Caucasian and using cocaine predicted higher HIV drug risk in our sample. Our finding that Caucasian race/ethnicity was associated with a negative outcome related to substance use is not without precedent at an urban safety net hospital. One study has also shown a correlation between White/Caucasian race/ethnicity and a greater likelihood of psychiatric dysfunction and social/family problems among patients with an opiate addiction [6]. Caucasian race/ethnicity may be a marker for different social network that have different, higher risk injection practices. While cocaine has been found to predict increased sex risk [23], we did not replicate that finding here. Our finding is consistent with previous work that reported an association with cocaine use and HIV seroconversion among IDUs, an association that may be due to cocaine bingeing that may lead to greater injection equipment

sharing [12]. HIV-positivity was also associated with drug risk, although not significantly; this likely reflects limited power due to the small number of HIV+ patients in the sample. But if replicated in other samples, this finding would be worrisome in regard to HIV transmission.

While we did not find a significant gender difference in the HIV drug risk behaviors of our participants, we found that HIV sex risk behaviors were more likely to be at higher levels among women. Female gender has been associated with higher overall HIV sex risk scores and a greater likelihood of reporting multiple partners among drug abusers [4, 41] or engagement in commercial sex [42]. For females, having both a greater number of partners and greater number of instances of engaging in commercial sex could produce a higher RAB sex risk score than for males. Violence in the lives of female drug injectors may also leave them disempowered regarding condom use decisions [43]. Studies of HIV drug risk behaviors among IDUs, in both Canada and the U.S., also suggest the existence of gender differences [30, 44], although we did not find a gender effect for HIV drug risk.

Individuals who have recently engaged in binge drinking had an increased likelihood of having higher HIV sex risk scores. Binge alcohol use may interfere with behavioral regulation and cause persons to act impulsively without regard to consequence [45]; so perhaps sexual risktaking is more dependent on impulsivity than drug use. This finding has been reported among IDUs who abuse alcohol [7, 23] and among female drug users in particular [10]. Binge drinking could cause an increase in HIV sex risk scores via less frequent use of condoms [46, 47], and/or a greater number of partners [48, 49].

Our finding regarding the impact of decreased mental health functioning on HIV sex risk scores could be related to symptoms of depression [21], which have been associated with increased sex risk among drug users [50, 51]. Depressive and anxiety symptoms may increase impulsivity and fatalism [52], inhibit the ability to plan for the future [53, 54], discount the value of delayed outcomes [55], or lower distress tolerance [56], all of which could contribute to increased sex risk behaviors.

Our study had limitations. The sample size was relatively small and limited to IDUs who were opioid dependent and willing to consider substance abuse treatment following hospital discharge. Those who are not willing to consider substance abuse treatment may represent a particularly high risk group. Second, opioid injection and other risk behaviors were assessed via interviews with trained research staff but are based on participant selfreport. Third, the RAB treats oral, vaginal and anal sex as equally risky sexual acts and does not distinguish condom use with a primary partner versus a casual partner, which may confer different HIV risks [57, 58]. Fourth, we did not enroll non-English speaking patients in the study, although several of the participants did speak English as a second language at a level sufficient to provide informed consent and complete study assessments. In addition, the setting for the study was an urban, safety-net hospital, so findings may not be generalizable to rural/suburban opiate-dependent IDUs, or to out-of-treatment IDUs who have not been hospitalized. However, we believe this study provides valuable information for those seeking to design or implement interventions to reduce HIV drug and sex risk behaviors among hospitalized, English-speaking, out-of-treatment IDUs in an urban environment.

A previous study of non-treatment-seeking, hospitalized, opiate-dependent patients found that the time of an acute hospitalization was an effective time for enrolling patients in an opioid replacement therapy treatment program [59] and a similar conclusion was reached regarding medical illness as an opportune time to initiate substance abuse treatment in another study [60]. Perhaps with an appropriate understanding of factors associated with HIV risk behaviors (our results suggest that considering drug and sex risk behaviors in isolation would miss important differences), effective HIV risk reduction programs that include enrollment in or referral to substance abuse treatment programs for those interested, or that offer brief motivational interventions specifically addressing sex and drug risks could be designed and initiated at the time of hospitalization of opioid dependent drug injectors.

Future Directions

Our study population included only drug injectors who were interested in outpatient buprenorphine treatment for their opioid dependence. Future studies should explore whether our findings hold true for hospitalized IDUs who are not interested in any treatment, or who are interested in other types (methadone, 12-step, detox) of drug abuse treatment, or primarily inject other substances, such as methamphetamines. Differential HIV risk factor research need not be limited to IDUs, but our findings suggest that interventions aimed at reducing HIV risk behaviors in hospitalized opiate-dependent IDUs should incorporate both a mental health screening and a substance use screening (especially for cocaine and alcohol) in order to achieve the greatest likelihood of success. Further research could be conducted to determine the feasibility and efficacy of incorporating a brief mental health screening and referral component into HIV harm reduction programs targeting inpatient IDUs. When seeking to design HIV drug risk harm reduction interventions or programs, those patients who report recent cocaine use could be particularly targeted, or discussion of the benefits of decreasing cocaine use could be included in an intervention. Additionally, assessing IDUs' patterns of binge-drinking that are below the level of dependence may allow staff to identify and address alcohol abuse that is contributing to HIV sex risk behaviors. While it may be tempting to focus limited clinical time and resources solely on addressing a patient's opioid dependence, given our findings, failure to identify and discuss problematic patterns of alcohol use that may be below the dependence threshold would be a missed opportunity for education and potential HIV risk harm reduction.

In settings with limited resources, such as urban safety-net hospitals, being able to screen and counsel around specific behaviors in a high-risk group of patients may increase the likelihood of relevance to participants and thereby improve intervention uptake, resulting in decreased HIV transmission. That different factors were predictive of HIV drug versus sex risk behavior suggests that in seeking to slow the transmission of HIV, a one-size-fits-all approach to behavior modification among this population may not be appropriate.

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Table 1

Background characteristics (n = 104)

	n (%)	Mean (SD)	Median
Age (years)		38.9 (12.2)	37.5
Gender (female)	31 (29.8)		
Race/ethnicity			
Non-Hispanic Caucasian	50 (48.1)		
African American	23 (22.1)		
Hispanic	22 (21.2)		
Other ethnic minority	9 (8.7)		
Homeless	32 (30.8)		
HIV+ (yes)	9 (8.7)		
MCS-12 (SF-12 mental function)		36.2 (12.4)	37.4
Binge drinking (yes)	40 (38.5)		
Recent (30-days) cocaine use (yes)	65 (62.5)		

Table 2

Linear regression models predicting mean RAB Drug- and Sex-Risk Scores (n = 104)

Predictor	Drug risk b (95 % CI ^a)	Sex risk b (95 % CI ^a)
Age (years)	−0.08 (−0.18; 0.02)	−0.04 (−0.10; 0.01)
Gender (female)	0.62 (−1.72; 3.42)	1.60 ^b (0.30; 3.18)
Ethnicity (Caucasian)	2.84 ^b (0.61; 5.06)	−0.56 (−1.99; 0.71)
Homeless	1.17 (−1.04; 3.41)	0.54 (−0.75; 1.81)
HIV+ (yes)	5.99 (−0.49; 11.18)	0.18 (−1.69; 3.46)
MCS-12	−.06 (−0.15; 0.02)	−0.05 ^b (−0.10; −0.00)
Binge drinking	1.08 (−1.22; 3.14)	1.23 ^b (0.04; 2.40)
Recent cocaine	2.35 ^b (0.44; 4.32)	0.89 (−0.31; 2.05)
Intercept	6.80	5.81

^aConfidence intervals were estimated by bias-corrected and accelerated bootstrap with 10,000 replications^b95 % CI estimate excludes 0