



Short communication

Sex work, injection drug use, and abscesses: Associations in women, but not men

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ABSTRACT

Background: Abscesses commonly occur among people who inject drugs (PWID). However, whether the risks are comparable between males and females, and the impact of sex work on abscess risk is unclear. The goal of this study was to examine the contemporary associations of gender and sex work with the risk of abscesses in PWID. **Methods:** Combining data from two cross-sectional studies conducted in the Greater Boston Area with people at risk for HIV and hepatitis C virus (HCV), we used the following inclusion criteria: age 18–45 years and report of illicit or non-prescription drug injection within the 30 days prior to the survey. Information on demographics, injection-mediated risks, and sexual behaviors was collected using Audio Computer-Assisted Self-Interview Software. Multivariable logistic regressions were used to model associations. **Results:** The study sample included 298 people including 30% were female. Females were more likely than men to report sex work (28% vs. 16%, $p = .012$) and abscess during their lifetime (55% vs. 37% $p = .004$). Among the females, engaging in sex work increased by > 5-fold the odds of reporting abscesses [Adjusted odds ratio 5.42; 95% CI: 1.27, 23.10]. There was no association between sex work and abscesses among men. **Discussion:** We found a female-specific association between sex work, injection drug use, and abscesses among PWID. Although the cross-sectional designs precluded causal inferences, longitudinal studies could enhance understanding of gender-associated risks for abscesses and inform the development of harm reduction interventions.

1. Introduction

Skin and soft tissue infection (SSTI) is one of the most common infectious complications of injection drug use (Ebright and Pieper, 2002). Encompassing the clinical spectrum of cellulitis, abscesses, and deeper, more invasive infections of the fascia and muscle, SSTI in people who inject drugs (PWID) can result from introduction of bacteria on contaminated injection equipment or skin flora into skin and subcutaneous tissue (Kaushik et al., 2011; Louria, 1974). Early identification and treatment of SSTI are crucial to prevent progression of infection to more severe infectious syndromes including endocarditis and osteomyelitis (Cardona and Wilson, 2015). Depending on geographic location, method of abscess evaluation (self-report vs. clinical exam), and period of ascertainment, the prevalence of SSTIs in PWID has ranged from 11% to 70% (Binswanger et al., 2000; Cedarbaum and

Banta-Green, 2016; Ciccarone and Harris, 2015; Dahlman et al., 2015; Ebright and Pieper, 2002; Lloyd-Smith et al., 2010; Phillips and Stein, 2010; Summers et al., 2017; Vlahov et al., 1992). Injection of black tar heroin and acid-solubilized free-base cocaine has been linked to increased risk of abscess due to exposure to impurities, caustic solvents, and vasoconstriction, leading to decreased wound healing (Buchanan et al., 2006; Ciccarone and Harris, 2015; Murphy et al., 2001; Passaro et al., 1998; Phillips and Stein, 2010; Summers et al., 2017). Besides immune suppression from HIV, non-vascular injection (i.e., subcutaneous or intramuscular injection) and sharing or re-using needles increases the risk of SSTI (Binswanger et al., 2000; Hope et al., 2014; Phillips and Stein, 2010; Spijkerman et al., 1996).

Females have a higher risk of SSTI—up to five-fold in some studies (Dahlman et al., 2015; Hope et al., 2010; Larney et al., 2017; Lloyd-Smith et al., 2005; Lloyd-Smith et al., 2008). The mechanism for this

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association remains incompletely understood but may be linked to risky injection-drug use behaviors mediated by sex work. Common in PWID, sex work was associated with increased risk of abscesses in pooled analyses of males and females (Lloyd-Smith et al., 2005; Matusiewicz et al., 2016; Pollini et al., 2010). A survey of young PWID in Denver found that people who shared needles were five times as likely to report a history of “survival sex,” a term inclusive of prostitution and sex work (Walls and Bell, 2011). The authors did not find any differences in the frequency of sex work between males and females, and no information was collected about SSTIs. Over twenty years ago, researchers in Amsterdam examined risks for abscesses in over 700 PWID and found that females who engaged in sex work had higher incidence rates of skin abscesses compared to females who did not engage in sex work (Spijkerman et al., 1996). The potential interaction of gender and sex work was not analyzed in this study, and one-third of the participants had HIV and given limited treatment options during that era, it is likely that these participants were immunocompromised and at increased risk for infections.

In light of limited data and important unanswered epidemiologic questions, the objective of this study was to examine the association between abscesses in PWID, focusing on sex work and differences between males and females.

2. Methods

2.1. Data collection

The analysis is based on data obtained from the 2016 Tufts REACTS (Responds to the Epidemic of Addiction and Hepatitis C Virus Together; PI: Stopka) study of PWID in Boston, and a subset of respondents from the 2015 HCV and HIV-HCV Hotspots Study (PI: Stopka) of people at risk of or living with HCV/HIV infection in the Boston/Worcester area. Participants for these studies were recruited at needle-exchange programs, through street outreach, and at local clinics and hospitals. Inclusion in our study sample from these two cross-sectional studies required (1) age between 18 and 45 years and (2) active injection of any non-prescription or illicit drug in the past 30 days. Data were collected using an Audio Computer-Assisted Survey Instrument (ACASI).

2.1.1. Variables

Primary independent variables and covariates used in logistic regression were selected based on the literature and previous research (Hasnain et al., 2007; Morissette et al., 2007; Suryaprasad et al., 2014; Walls and Bell, 2011; Wurcel et al., 2016). We asked participants their gender, and options for answers included male, female, transgender male to female, transgender female to male, or no answer. We calculated age as a continuous variable using the year of birth and the year that the survey was completed. Due to a high percentage of people reporting “other” race, and a low number of black participants, we dichotomized the race/ethnicity variable (White vs. non-White). We dichotomized education for having greater than a high school education (yes/no). Based on self-reported age at initiation of injection drugs, we calculated the approximate number of years of injection drug use by subtracting this number from their current age. We dichotomized both the heroin and the cocaine injection-drug use variables into yes/no to “high use” for each gender based on the median number of times participants reported injections in the past 30 days. If someone did not report the use of the drug in the previous 30 days, then they were classified as “no” to the question of “high use.” We controlled for having obtained needles at Needle Exchange Program. HCV and HIV infection status were self-reported. Homelessness was classified as a binary measure (yes/no) based on participant answer to the question, “Do you consider yourself homeless?”

2.1.2. Exposure

Participants were identified as engaging in sex work if, within the

thirty days before taking the survey, they engaged in “prostitution” for income or exchanged sex for money or drugs.

2.1.3. Outcome

The outcome of interest was the dichotomous answer (yes/no) to the question “Has a medical professional ever told you that you had an abscess?”

IRB: We received approval from the Tufts University Health Sciences Investigational Review Board to conduct this research. Informed consent was required for participation in both studies and participants were reimbursed for their time.

2.2. Statistical analysis

2.2.1. Summary statistics

Continuous variables were summarized using the median and compared between two groups: males and females. Categorical variables were summarized as proportions and compared between two genders using χ^2 test.

2.2.2. Logistic regression analyses

Following the original analytical plan, we performed binary analyses to assess crude associations between the outcome of abscess and the exposure of interest and other variables. Because the interaction term between sex work and gender was statistically significant ($p = .02$) we performed and reported all regression analyses stratified by gender. Independent variables were checked for collinearity, with a variance inflation factor cut-off at 6. All analyses were performed with SAS software 9.3 (SAS Institute Inc., Cary, NC, USA).

3. Results

Table 1 displays demographic data and the frequency of injection-mediated risks and infections. Of the 298 study participants, 30% ($n = 88$) were female with more females reporting white race compared to males (86% vs. 62%, $p < 0.001$). Despite finding no difference in median age between males and females or age at first injection, males had been injecting for longer (13 years vs. 10 years, $p = .04$). The vast majority of PWID reported injecting heroin (94%); about half of the participants reported cocaine injection, and about one-third reported speedball injection, which combines heroin and cocaine in a single injection. Females had a significantly higher median number of times injecting heroin in the past 30 days (31 vs. 20, $p < 0.001$). Males had a higher median number of times injecting cocaine in the past 30 days (10 vs. 8, $p < 0.001$) and were more likely than females to report speedball injection (33% vs. 21%, $p < 0.001$).

Females were more likely to engage in sex work (28% vs. 16%, $p = .012$) and report HCV infection (73% vs. 60%, $p = .038$). Nearly half of the study participants had been told by a medical professional that they had ever had an abscess with females more likely to report ever having an abscess than males (55% vs. 37%, $p = .004$). Only 6 individuals reported having an abscess in the previous 30 days. About 33% of the sample reported having a primary care physician although 46% or 126 people (36 females, 90 males) did not answer this question.

In females but not males, sex work was associated with ever having an abscess (adjusted odds ratio [AOR] 5.42; 95% confidence interval [CI]: 1.27, 23.10) in the multivariable model (Table 2). Increased number of years injecting (AOR 1.15; 95% CI: 1.02, 1.29) and HCV infection (AOR 6.91; 95% CI: 1.36, 35.2) were also associated with increased risk of abscess in females, but not males. The type and amount of injection drug were associated with ever having an abscess in males, with a positive association seen for high cocaine use (AOR 2.50; 95% CI: 1.06, 5.91).

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