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Prevalence and Correlates of Nonmedical Prescription Opioid Use Among a Cohort of Sex Workers in Vancouver, Canada

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Abstract

Background—The nonmedical use of prescription opioids (POs) is a major public health concern, causing extensive morbidity and mortality in North America. Canada has the second highest consumption rate of POs globally and data indicate nonmedical PO use (NPOU) is growing among key populations and increasingly available in street-level drug markets. Despite accumulating evidence documenting the rise of NPOU, few studies have systematically examined NPOU in Canada among key vulnerable populations, such as sex workers. This study prospectively evaluated the prevalence and correlates of NPOU within a Vancouver cohort of sex workers over three-years follow-up.

Methods—Data were drawn from an open prospective cohort, AESHA (An Evaluation of Sex Workers Health Access) in Metro Vancouver, Canada (2010-2013). Women were recruited through outreach from outdoor street locations and indoor venues. Bivariate and multivariable logistic regression using Generalized Estimating Equations (GEE) were used to examine social and structural correlates of NPOU over 36 months.

Results—Of the 692 sex workers at baseline, close to one-fifth (n=130, 18.8%) reported NPOU (injection or non-injection) in the last six months. In multivariable GEE analyses, factors independently correlated with recent NPOU were: exchanging sex while high (AOR 3.26, 95%CI 2.29-4.64), police harassment/arrest (AOR 1.83, 95%CI 1.43-2.35), intimate partner injects drugs (AOR 1.66, 95%CI 1.11-2.49), and recent physical/sexual intimate partner violence (AOR 1.65, 95%CI 1.21-2.24).

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Conclusion—Our results demonstrate that nearly one-fifth of sex workers in Metro Vancouver report NPOU. Factors independently statistically associated with NPOU included exchanging sex while high, police harassment/arrest, a drug injecting intimate partner and recent physical/sexual intimate partner violence. The high prevalence of NPOU use among sex workers underscores the need for further prevention and management strategies tailored to this key population. The correlates of NPOU uncovered here suggest that structural interventions may be further implemented to ameliorate this growing concern.

Keywords

Prescription opioids; Sex workers; Drug use; Substance use; Canada

INTRODUCTION

The nonmedical use of prescription opioids (POs) has emerged as a major public health concern, especially in North America where it has reached epidemic proportions, causing extensive morbidity and mortality (Dhalla et al., 2009; Fischer & Argento, 2012; Manchikanti, Boswell, & Hirsch, 2013). POs, pharmaceutical analgesic drugs (such as oxycodone and hydrocodone) designed for the treatment of moderate to severe chronic pain, are the most commonly misused class of prescription drugs (Fischer & Argento, 2012; Substance Abuse and Mental Health Service Administration, 2010). In the United States, PO-related deaths are now the second leading cause of unintentional death, after motor vehicle accidents and overdoses from POs cause more deaths than heroin and cocaine combined (Centers for Disease Control and Prevention, 2012; Volkow & McLellan, 2011). Emergency room visits involving PO misuse with oxycodone and hydrocodone increased dramatically by 242.2% and 124.5%, respectively, between 2004 and 2009 (Substance Abuse and Mental Health Service Administration, 2010).

Canada has the second highest PO consumption rate in the world (International Narcotics Control Board, 2012). It has been estimated that the harms from PO misuse in Canada now constitute the third highest overall substance use burden (after alcohol and tobacco) and that up to 1.25 million Canadians use POs for nonmedical purposes (Fischer & Rehm, 2011). There has been significant variation in the estimated prevalence of PO misuse among the general adult population in Canada; an updated 2010 survey in Ontario estimated the prevalence of nonmedical PO use (NPOU) to be as high as 7.7% (95% CI: 6.3% to 9.2%), while the 2008/2009 Centre for Addiction and Mental Health (CAMH) Monitor survey found NPOU to be much lower at 2.0% (95% CI: 1.2% to 2.8%) (Shield, Ialomiteanu, Fischer, & Rehm, 2013). Canada has seen PO-related deaths rise substantially; over a five-year period (1994–1999) oxycodone-related mortality in Ontario rose four fold ($p < 0.01$) (Dhalla, Mamdani, Gomes, & Juurlink, 2011).

A growing body of literature documents trends in increasingly problematic PO use and street-level availability in Canada: data indicate that rates of NPOU are rising in general adult and student populations (Boak, Hamilton, Adlaf, & Mann, 2013; Health Canada, 2013) and NPOU is emergent among key marginalized populations, including street-drug users (Popova, Patra, Mohapatra, Fischer, & Rehm, 2009), First Nations/Aboriginal people (Dell

et al., 2012; Katt et al., 2012), and correctional populations (Johnson, MacDonald, Cheverie, Myrick, & Fischer, 2012). Local Vancouver studies of youth and adults who use drugs have seen a marked rise in the availability of POs, particularly oxycodone and hydrocodone, in street-level drug markets between 2006 and 2010, despite the high and stable availability of other illicit drugs (Nosyk et al., 2012), and injection and non-injection PO use has surpassed heroin use among some drug-using populations in Canada (Fischer et al., 2006; Leclerc, Morissette, & Roy, 2010).

Given the overlap between street-based drug use and sex work scenes, female sex workers represent a particularly vulnerable population to drug use and yet data on NPOU among sex workers are rare. A study among drug involved female sex workers (sex workers) in Miami found that 12.2% of the sample used at least one PO in the past 90 days without having a legitimate prescription and that those who were recently physically abused/victimized or currently used cocaine or heroin were more likely to abuse POs (Surratt, Inciardi, & Kurtz, 2006). Sex workers already suffer a high burden of poverty, disease, and violent victimization, which may be exacerbated by adverse health consequences and correlates of NPOU. Women in general represent a large and growing fraction of the NPOU population (Cicero, Lynskey, Todorov, Inciardi, & Surratt, 2008; Green, Grimes Serrano, Licari, Budman, & Butler, 2009; Tetrault et al., 2008). Emergency room visits related to NPOU among women in the US doubled between 2004 and 2010 and the percentage increase in overdose deaths since 1999 was significantly greater among women (151%) than men (85%) (Centers for Disease Control and Prevention, 2013). In Canada, First Nations communities in northwestern Ontario are experiencing alarming increases in the rates of NPOU among pregnant women; the incidence of oxycodone abuse during pregnancy rose from 8.4% in 2009 to 17.2% in 2010 (Kelly et al., 2011). Research indicates that NPOU is highly correlated with mental health comorbidities (Amari, Rehm, Goldner, & Fischer, 2011; Katz, El-Gabalawy, Keyes, Martins, & Sareen, 2013; Martin, Woodall, & McLellan, 2006; Sproule & Li, 2009), which tend to be higher among females than among men (Cicero et al., 2008; Wu, Woody, Yang, & Blazer, 2011).

Despite accumulating evidence of increasing NPOU and related harms, few studies have systematically examined the prevalence and correlates of PO use in subpopulations, particularly among marginalized groups such as sex workers. Therefore, the objective of this study was to provide a prospective analysis of the prevalence and correlates of NPOU among a cohort of female sex workers in Vancouver, Canada over three years of follow-up.

METHODS

Study Design and Sample

Data for this study were drawn from an ongoing open prospective cohort of female sex workers, AESHA (An Evaluation of Sex Workers Health Access) that initiated recruitment in January 2010. Eligibility criteria at baseline included being female (trans*-inclusive) older than 14 years of age, having exchanged sex for money within the last 30 days (at baseline and at follow-up), and providing written informed consent. Eligibility for the current prospective analyses included completing at least one baseline and one follow-up visit between January 2010 and February 2013.

In the context of hard-to-reach populations, sex workers were recruited through community mapping and time-location sampling. As executed previously, outdoor and indoor venues were identified through participatory mapping strategies conducted with current/former sex workers (and continuously updated by the outreach team) to identify sex work locations (Shannon et al., 2007). Using systematic time-location sampling, considered a useful method of recruitment for mobile/hidden populations (Stueve, Duran, Doval, & Blome, 2001), sex workers were recruited through day and late night outreach to both outdoor (i.e. streets, alleys) and indoor sex work venues (i.e. massage parlors, micro-brothels, and in-call locations) across Metro Vancouver. In addition, online recruitment was used to reach sex workers working through online solicitation spaces.

At enrolment and bi-annually, participants complete an interviewer-administered questionnaire by a trained interviewer and HIV/STI/HCV serology testing by a project nurse. The main interview questionnaire elicits responses related to socio-demographics (e.g. sexual identity, ethnicity, housing), the sex industry (e.g. work environment, solicitation, social cohesion, access to services, violence/safety, incarceration), clients (e.g. number/type of clients, types of services, condom use), intimate partners (e.g. sexual history, cohabitation, financial support), trauma and violence (e.g. lifetime and childhood trauma, exposure to intimate partner and workplace violence), and drug use patterns (injection and non-injection). In addition, a clinical questionnaire is administered relating to overall physical, mental and emotional health, sexual and reproductive health, and HIV testing and treatment experiences. Sex workers have the option to visit one of two study offices or complete the questionnaire and clinical component at a safe location identified by them, including work or home locations. All participants receive an honorarium of \$40CAD at each bi-annual visit for their time, expertise and travel.

Ethics Statement—The AESHA study holds ethical approval through Providence Health Care/University of British Columbia Research Ethics Board and has a community advisory board of over 15 agencies.

Study Variables

Nonmedical Prescription Opioid Use Outcome—Our dependent variable of interest was recent NPOU, defined as responding ‘yes’ to any nonmedical injection or nonmedical non-injection PO use in the last six months (i.e. responded ‘yes’ to street methadone, dilaudid, morphine, oxycontin, or T3s/T4s). Probing questions were asked to determine whether the POs were prescribed to the participant or not. If the POs were either diverted by the participant (i.e. purchased from an acquaintance or on the street) or prescribed to the participant being interviewed, but not taken as prescribed (i.e. either injected or taken more frequently/in greater quantity than as prescribed) then they were considered to be used for nonmedical purposes. The NPOU variable did not include any medical use of POs.

Individual and Historical Factors—Fixed variables considered at baseline included demographic variables such as: age (continuous), sexual minority (lesbian, gay, bisexual, transgender, transsexual, or two-spirited), being of Aboriginal/Indigenous ancestry (inclusive of First Nations, Metis, and Inuit), and being a migrant/new immigrant worker

(versus Canadian born). Historical exposure to childhood physical and/or sexual abuse (<18 years of age) was also included. Individual variables including education level and injection and non-injection drug use were collected at baseline and time-updated based on the last six months at each follow-up visit.

Socio-structural Factors—Social and structural variables including primary place of soliciting and servicing clients, exchanging sex for drugs, exchanging sex while high, physical or sexual violence from clients and intimate partners, police harassment (without arrest), police arrest, and intimate partner-level data (e.g. inconsistent condom use for vaginal/anal sex, sourcing drugs from intimate partners, and injection or non-injection drug use by intimate partners) were collected at baseline and time-updated based on the last six months at each follow-up visit.

Statistical Analyses

Socio-demographic variables (age, ethnicity, sexual minority, migrant status) were considered fixed variables. All other variables were considered time varying, and were updated to reflect their occurrence within the last six months. Since analyses of factors potentially associated with prevalence of NPOU during follow-up included time-updated serial measures for each participant, bivariable and multivariable generalized estimating equations (GEE) with a logit link function for binary outcomes were used to determine which factors were independently associated with NPOU in the last 6 months. Therefore, data from every follow-up visit was considered in this analysis. For example, an individual participant may have reported NPOU on and off during follow-up and this approach serves to examine variables that correlated with times of NPOU versus times when NPOU is not reported. To adjust the standard error and account for correlations arising from the five repeated measurements on the same participant over the three-year follow-up period, an exchangeable correlation matrix was applied. GEE accounts for missing data using the *all available pairs* method, which uses data from non-missing pairs into the estimators of the correlation matrix. Variables significantly correlated with PO use at the $p<0.05$ level in bivariate analyses were subsequently fitted into a multivariable GEE model to adjust for potential confounding. Quasi-likelihood Information Criteria (QIC) selection was used to build the final multivariable model, which has been used successfully in past research by our group (Deering et al., 2013). Two-sided p-values and unadjusted and adjusted odds ratios (OR and AOR) with 95% confidence intervals (95% CI) are reported. All statistical analyses were performed using SAS software package version 9.3 (SAS Institute, Cary, NC, USA).

RESULTS

Descriptive Results

A total cohort of 692 sex workers completed a baseline and at least one follow-up visit between January 2010 and February 2013. Baseline individual and socio-structural characteristics of participants who reported recent NPOU compared to those who did not are displayed in Table 1. Overall, close to one-fifth ($n=130$, 18.8%) reported NPOU (injection or non-injection) in the last six months at baseline, with 19.2% events of NPOU over the follow-up period. Within the study sample, 25.6% self-identified as a sexual minority

(lesbian, bisexual, transgender, two spirited) and 36.3% as being of Aboriginal ancestry. A full 73.4% were born in Canada, and 52.2% had an educational level of high school or greater. Physical or sexual childhood abuse (before age 18 years) was reported by 71.2% of participants. Regarding drug use, 69.4% and 40.0% reported non-injection and injection illicit drug use (excluding cannabis) at baseline, respectively, in the last six months. Additionally 61.4% reported exchanging sex while high, and this was statistically significantly higher among those with recent NPOU (90.0%) than those without (54.8%) ($p<0.001$). Police harassment and/or arrest in the last six months (including, detained against will/forced/moved by police, confiscation of property, condoms or drug use paraphernalia without arrest, physical abuse without arrest, coerced into providing sexual favours) was reported by 40% of participants, and this was more prevalent among those with recent NPOU (60.0%) than those without (35.4%) ($p<0.001$). Recent physical/sexual violence by clients was reported by 23.4% of participants and 21.2% reported recent physical/sexual violence by intimate partners, which were both higher among those who reported recent NPOU than those who did not ($p<0.001$).

Bivariate and Multivariable GEE Analyses

Bivariate and adjusted odds ratios for independent correlates with recent NPOU are displayed in Table 2. In bivariate GEE analyses, factors positively correlated with recent NPOU at $p<0.05$ included: non-injection drug use (OR 23.95, 95%CI 12.18-47.10); born in Canada (OR 9.31, 95%CI 4.14-20.98), injection drug use (OR 5.92, 95%CI 4.25-8.25); exchanged sex while high (OR 3.74, 95%CI 2.76-5.06); childhood abuse (OR 2.94, 95%CI 1.91-4.52); exchanged sex for drugs (OR 2.56, 95%CI 1.97-3.32); police harassment/arrest (OR 2.38, 95%CI 1.89-3.01); injection drug use by intimate partner (OR 2.27, 95%CI 1.55-3.31); physical and/or sexual violence by intimate partner (OR 2.12, 95%CI 1.57-2.86); physical and/or sexual violence by client (OR 1.82, 95%CI 1.41-2.35); non-injection drug use by intimate partner (OR 1.76, 95%CI 1.36-2.28); sourced drugs from intimate partner (OR 1.66, 95%CI 1.21-2.28); and sexual minority (OR 1.65, 95%CI 1.19-2.28). Soliciting clients from indoor establishments (vs. street/public spaces) was correlated with a 74% reduced odds of recent NPOU (OR 0.26, 95%CI 0.15-0.44).

In the final multivariable GEE model, exchanging sex while high (AOR 3.26, 95%CI 2.29-4.64), police harassment/arrest (AOR 1.83, 95%CI 1.43-2.35), injection drug use by an intimate partner (AOR 1.66, 95%CI 1.11-2.49), and recent physical and/or sexual violence from an intimate partner (AOR 1.65, 95%CI 1.21-2.24) were independently correlated with NPOU in the last six months.

DISCUSSION

Our results demonstrate that nearly one-fifth of sex workers in Metro Vancouver report NPOU. Factors independently statistically associated with NPOU in this setting included exchanging sex while high, police harassment/arrest, having a drug injecting intimate partner and recent physical/sexual intimate partner violence. This study provides some of the first empirical evidence documenting the prevalence and characteristics of sex workers who use nonmedical POs. To our knowledge, this is the first study to provide a prospective

analysis of the prevalence and correlates of recent NPOU among a cohort of sex workers in Canada; and among the first in higher income settings globally.

The results of this study correspond with a growing body of research that establishes links between PO use and experiences of victimization or abuse (Buttram, Kurtz, Surratt, & Levi-Minzi, 2013; Stene, Dyb, Tverdal, Jacobsen, & Schei, 2012; Surratt et al., 2006). In our current study, recent physical and/or sexual violence by an intimate partner was independently correlated with NPOU in the last six months (AOR 1.65, 95%CI 1.21-2.24). Globally, sex workers continue to face disproportionately high levels of violence (Argento et al., in press; Deering et al., 2014; Shannon & Csete, 2010), and unequal power dynamics within intimate partner relationships play a key role in shaping health risks (Dunkle et al., 2006; Jewkes, Dunkle, Nduna, & Shai, 2010; Shannon et al., 2012; Stockman, Lucea, & Campbell, 2013). For example, among a cohort of drug-using women in the US, results indicated bi-directional temporal relationships between sexual and physical intimate partner violence and risk of HIV/STI transmission (El-Bassel, Gilbert, Wu, Go, & Hill, 2005). A study involving a sample of adolescent ER patients, of which 8.7% reported past year NPOU, found dating violence was positively correlated with NPOU (OR 1.47, 95%CI 1.00 – 2.17) (Whiteside et al., 2013). Of note, while NPOU in our study was significantly higher among sex workers working in street-based settings, 6.5% of sex workers working indoors (both informal venues, such as bars, hotels, saunas; and formal sex work/‘in-call’ establishments) reported NPOU, reflecting the diversity of populations using POs non-medically and suggesting that other factors such as partner violence may play an important role in NPOU.

There are complex and synergistic effects between substance use, violence and HIV risk among sex workers, including the associations between high rates of childhood abuse among sex workers (Rio Navarro, Cohen, Rocillo Arechaga, Zuniga, & Act, 2012; Stolz et al., 2007), and the subsequent likelihood of experiences of physical or sexual violence and injection drug use later in life (Kerr et al., 2009; Strathdee et al., 1997; Ulibarri et al., 2010). In our study, an alarming 71% reported childhood abuse (before age 18 years), which was higher among those with recent NPOU (87%) than those without (68%), and in bivariate analyses the odds of recent NPOU were significantly increased by recent client violence (OR 1.82, 95%CI 1.41-2.35) and intimate partner violence (OR 2.12, 95%CI 1.57-2.86). These findings support existing literature documenting the normalization of violence and victimization among criminalized, isolated and street-involved environments (Bourgois, Prince, & Moss, 2004; Decker, Pearson, Illangasekare, Clark, & Sherman, 2013; Rhodes, Simic, Baros, Platt, & Zikic, 2008; Shannon et al., 2008), and the role of physical and sexual violence from intimate partners in elevating HIV risk for sex workers (Argento et al., in press). Integrated violence and HIV prevention/intervention strategies tailored to this key population are needed, yet the extent to which screening for intimate partner violence improves health outcomes for women remains unclear (Hegarty et al., 2013; Macmillan et al., 2009) and implementation of effective screening for violence is a key challenge in high-risk populations (Ramachandran, Covarrubias, Watson, & Decker, 2013). Stigma remains as a primary barrier to accessing violence prevention and health care services for sex workers; therefore, health care facilities and programs need to work in partnership with sex workers to reduce stigma and discrimination and improve access to health (Lazarus et al., 2012).

Previous research has shown that HIV risk among sex workers who use drugs is particularly shaped by the role of structural violence and gendered power inequities where drug sharing with intimate, non-paying partners occurs (Bourgois et al., 2004; Shannon et al., 2008). Having a sexual partner who injects drugs has been linked to transitioning to injection (Firestone & Fischer, 2008; Sherman, Smith, Laney, & Strathdee, 2002; Surratt, Kurtz, & Cicero, 2011). Further, our findings indicate that having an intimate partner who injects drugs significantly increases the odds of NPOU (AOR 1.66, 95%CI 1.11-2.49).

The misuse of POs has been associated with a diversity of other injection and non-injection substance abuse (Buttram et al., 2013; Lankenau et al., 2012; Pergolizzi et al., 2012; Wu et al., 2011). In a US study among 515 men who have sex with men (MSM), NPOU was significantly associated with recent injection drug use (AOR 2.20, 95%CI 1.12-4.31, $p<0.05$) and substance dependence (AOR 2.15, 95%CI 1.25-3.69, $p<0.05$) (Buttram et al., 2013). The risk of HIV/STI among injection PO users is an emerging concern (McCabe, Cranford, Boyd, & Teter, 2007; Surratt et al., 2011; Young, Havens, & Leukefeld, 2010). Our findings demonstrate that of those who recently injected drugs, 79% also reported recent NPOU compared to 31% who did not ($p<0.001$).

As a result of the increased presence and availability of POs in street drug markets, the drug use profile of street-drug users who also use POs has become increasingly diversified, posing considerable adverse health risks (Firestone & Fischer, 2008). HIV and HCV rates of up to 20% and 66% respectively have been found among street-drug users who use also POs (Bruneau, Roy, Arruda, Zang, & Jutras-Aswad, 2012; Fischer et al., 2005).

The structural context plays an important role in shaping the risk environment among sex workers who use drugs (Blankenship & Koester, 2002; Shannon et al., 2008). Increasing evidence demonstrates that criminalized sex work environments and policing subvert harm reduction initiatives (Krüsi et al., 2012; Shannon et al., 2008). Policing practices in Vancouver have been shown to exacerbate drug and sexual-related harms, violence, and other HIV-related vulnerabilities among street-involved drug users (Werb et al., 2008) and sex workers who use drugs (Shannon et al., 2009; Shannon et al., 2008). Current injection drug use among sex workers has been shown to be independently associated with police sexual coercion (AOR 2.09, 95%CI 1.45-3.02) (Odinokova, Rusakova, Urada, Silverman, & Raj, 2013); potentially through increased visibility and/or police targeting of this highly vulnerable sub-population. Our study also indicates that police harassment is correlated with drug use: sex workers who recently experienced harassment by police were significantly more likely to report recent NPOU.

The criminalized environment and policing strategies in Vancouver continue to undermine the health and safety of sex workers and other street-involved populations (Goldenberg et al., 2014; Shannon et al., 2009; Small, Kerr, Charette, Schechter, & Spittal, 2006; Werb et al., 2008). Enforcement-based policies have been shown to negatively impact sex workers' ability to negotiate safer sex transactions with clients, including condom use and reporting violence to police (Rhodes et al., 2008; Shannon & Csete, 2010). A recent qualitative study among sex workers in Vancouver provides further insight into the lack of evidence-based policies operating in Canada that have serious implications for the health and safety of sex

workers, even with the implementation of a new enforcement policy that criminalizes and targets sex buyers rather than sex workers (Krüsi et al., 2014). In December 2013, the Supreme Court of Canada unanimously struck down three of Canada's core prostitution laws on the basis they were violating sex workers' constitutional rights (Supreme Court of Canada, 2013). However, new amendments to sex work legislation in Canada proposed by the federal government (in June 2014) threaten to reproduce the risks and harms created by criminalizing sex work, severely limiting sex workers' ability to work together and protect themselves from occupational hazards; legislative provisions include criminalizing the purchase of sexual services, communicating for the purpose of selling sex, receiving material benefit from sex work, and advertising sexual services (Minister of Justice and Attorney General of Canada, 2014).

Targeted interventions for NPOU in Canada continue to be constrained by a highly fragmented data and monitoring system for NPOU and PO-related harms (Fischer & Argento, 2012; Fischer, Gooch, Goldman, Kurdyak, & Rehm, 2014). POs obtained for nonmedical purposes are sourced through various diversion routes in Canada, the most common being via "double-doctoring" (i.e. fraudulently obtaining prescriptions from different physicians) and through street-drug markets (Fischer et al., 2009; Haydon, Fischer, Monga, & Adlaf, 2005; Sproule & Li, 2009). While Canada has developed and implemented prescription-monitoring programs (PMPs) in most provinces (designed to reduce the misuse of prescription drugs), they vary significantly and their impacts on reducing harms from NPOU have yet to be assessed (Fischer & Argento, 2012; Furlan et al., 2014). The federal government has, in the past, developed tools for guiding health practitioners and pharmacists on how to recognize prescription shoppers and minimize abuse (Health Canada, 2006), but Canada still lags behind in terms of key basic prevention measures, such as safe pharmaceutical drug storage and drug return/recycling programs (Doyle, 2010; Fischer & Argento, 2012).

Unlike the US and Australia, a national strategy for NPOU has been absent in Canada until only recently. In March 2013, a new national prescription drug strategy, "First Do No Harm: Responding to Canada's Prescription Drug Crisis," was presented by the Canadian Centre on Substance Use (National Advisory Committee on Prescription Drug Misuse, 2013). The new strategy aims to implement and address five streams of action: Prevention, Education, Treatment, Monitoring and Surveillance, and Enforcement; however, its role in government policy-making and impact remain unclear (Fischer et al., 2014). Other recent policy interventions aimed at NPOU include the introduction of Ontario's electronic PMP and delisting of OxyContin (controlled-release oxycodone) from the Ontario Drug Benefit formulary in 2012 (Ontario Ministry of Health and Long-Term Care, 2012), which was then followed by the federal government's approval of licensing generic oxycodone products (Health Canada, 2012).

Until a national monitoring system for NPOU is effectively implemented, data/knowledge gaps remain, as does the implementation of successful interventions for NPOU-related harms, particularly among marginalized populations.

Limitations

There are a number of strengths and limitations to consider in the interpretation of this study. Strengths of this study include the prospective design and GEE analyses, which increased the number of observations allowing average estimates of the correlates of NPOU over a three-year period to be determined. Several variables examined in this study were sensitive (i.e. childhood abuse, drug use, partner violence), which may have resulted in under-reporting or respondent-driven reporting biases by our participants. However, the interviewer-administered questionnaires were conducted in safe and comfortable spaces by experienced interviewers (including current/former sex workers), with strong community rapport, and there is no reason to believe there would be differences in reporting between PO and non-PO users. Although our findings may not be fully generalizable to other sex worker populations/settings, our study population included sex workers from a wide-ranging representation of sex work environments. The mapping of working areas and time-location sampling likely helped to ensure a representative sample and to minimize selection bias; however more higher-income earning and independent sex workers (e.g. escorts; online) are likely underrepresented.

CONCLUSION

Our results demonstrate that nearly one-fifth of sex workers in Metro Vancouver report recent NPOU. Factors independently associated with NPOU in this setting included exchanging sex while high, police harassment/arrest, a drug injecting intimate partner and recent physical/sexual intimate partner violence. The high prevalence of NPOU among sex workers underscores the need for further prevention and management strategies tailored to this key population. The correlates of NPOU uncovered here suggest that structural interventions may be further implemented to ameliorate this growing concern.

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Highlights

- Nearly one-fifth of sex workers report nonmedical prescription opioid use (NPOU).
- Partner violence and police harassment were independently correlated with recent NPOU.
- Further prevention/management strategies tailored to this population are needed.
- This is the first study to longitudinally examine NPOU among sex workers in Canada.

TABLE 1

Individual and socio-structural characteristics of sex workers in Metro Vancouver who used prescription opioids (POs) in the last six months compared to those who did not, at baseline

Characteristic	Total (%) (<i>N</i> = 692)	Recent PO use		<i>p</i> - value
		Yes (%) (<i>n</i> = 130)	No (%) (<i>n</i> = 562)	
Individual & Historical Variables				
Age (<i>med, IQR</i>)	34 (28-42)	35 (28-41)	34 (28-42)	0.960
Canadian-born	508 (73.4)	126 (96.9)	382 (68.0)	<0.001
Aboriginal ancestry	251 (36.3)	57 (43.9)	194 (34.5)	0.048
HIV seropositivity	78 (11.3)	22 (16.9)	56 (10.0)	0.031
STI seropositivity	77 (11.1)	14 (10.8)	63 (11.2)	0.885
Education, high school or greater	361 (52.2)	64 (49.2)	297 (52.9)	0.457
Sexual minority	177 (25.6)	49 (37.7)	128 (22.8)	<0.001
Injection drug use [†]	277 (40.0)	102 (78.5)	175 (31.1)	<0.001
Non-injection drug use [†]	480 (69.4)	129 (99.2)	351 (62.5)	<0.001
Childhood abuse	493 (71.2))	113 (86.9)	380 (67.6)	<0.001
Social & Structural Variables				
Exchanged sex while high [†]	425 (61.4)	117 (90.0)	308 (54.8)	<0.001
Exchanged sex for drugs [†]	208 (30.1)	66 (50.8)	142 (25.3)	<0.001
Physical or Sexual Violence				
By client [†]	162 (23.4)	47 (36.2)	115 (20.5)	<0.001
By intimate partner [†]	147 (21.2)	48 (36.9)	99 (17.6)	<0.001
Police Harassment				
Without arrests [†]	266 (38.4)	74 (56.9)	192 (34.2)	<0.001
Including arrests [†]	277 (40.0)	78 (60.0)	199 (35.4)	<0.001
Primary place to solicit clients				
Street/public [†]	382 (55.2)	102 (78.5)	280 (49.8)	REF
Indoor establishment [†]	196 (28.3)	8 (6.5)	188 (33.5)	<0.001
Independent [†]	114 (16.5)	20 (15.4)	94 (16.7)	<0.001
Intimate Partner-level Data				
Inconsistent condom use [†]	268 (38.7)	55 (42.3)	213 (37.9)	0.354
Sourced drugs from partner [†]	140 (20.2)	42 (32.3)	98 (17.4)	<0.001
Partner used non-injection drugs [†]	242 (35.0)	63 (48.5)	179 (31.9)	<0.001
Partner used injection drugs [†]	69 (10.0)	22 (16.9)	47 (8.36)	0.006

[†] Last six months

TABLE 2

Longitudinal bivariate and multivariate GEE correlates of recent prescription opioid (PO) use among sex workers in Metro Vancouver, AESHA Cohort 2010-2013

Characteristic	Odds Ratio (OR)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Individual & Historical Variables		
Age	1.00 (0.98 – 1.01)	-
Canadian-born	9.31 (4.14 – 20.98)*	
Education, high school or greater	0.83 (0.61 – 1.13)	-
Aboriginal ancestry	1.23 (0.90 – 1.68)	-
Sexual minority	1.65 (1.19 – 2.28)*	
HIV seropositivity	1.18 (0.79 – 1.77)	-
STI seropositivity	1.08 (0.72 – 1.63)	-
Childhood abuse	2.94 (1.91 – 4.52)*	
Social & Structural Variables		
Exchanged sex while high [†]	3.74 (2.76 – 5.06)*	3.26 (2.29 – 4.64)*
Exchanged sex for drugs [†]	2.56 (1.97 – 3.32)*	
Police harassment or arrest [†]	2.38 (1.89 – 3.01)*	1.83 (1.43 – 2.35)*
<i>Physical or Sexual Violence</i>		
By client [†]	1.82 (1.41 – 2.35)*	
By intimate partner [†]	2.12 (1.57 – 2.86)*	1.65 (1.21 – 2.24)*
<i>Intimate Partner-level Data</i>		
Partner used non-injection drugs [†]	1.76 (1.36 – 2.28)*	
Partner used injection drugs [†]	2.27 (1.55 – 3.31)*	1.66 (1.11 – 2.49)**
Sourced drugs from intimate partner [†]	1.66 (1.21 – 2.28)*	
Inconsistent condom use with partner [†]	1.15 (0.87 – 1.51)	-
<i>Primary place to solicit clients</i>		
Indoors (vs. street/public) [†]	0.26 (0.15 – 0.44)*	
Independent (vs. street/public) [†]	0.77 (0.59 – 1.02)	-

*
p<0.01

**
p<0.05

[†]
Last six months