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Illicit use of opioid substitution drugs: Prevalence, user characteristics, and the association with non-fatal overdoses

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ABSTRACT

Background and aims: Diversion of opioid substitution drugs (OSD) is of public concern. This study examined the prevalence, frequency, and predictors of illicit OSD use in a group of injecting drug users (IDUs) and assessed if such use was associated with non-fatal overdoses.
Methods: Semi-annual cross-sectional interviews conducted in Oslo, Norway (2006–2013), from 1355 street-recruited IDUs. Hurdle, logistic, and multinomial regression models were employed.
Results: Overall, 27% reported illicit OSD use in the past four weeks; 16.8% methadone, 12.5% buprenorphine, and 2.9% both drugs. Almost 1/10 reported at least one non-fatal overdose in the past four weeks, and roughly 1/3 reported such experience in the past year. Use of additional drugs tended to be equally, or more prevalent among illicit OSD users than other IDUs. In terms of illicit OSD use being a risk factor for non-lethal overdoses, our results showed significant associations only for infrequent buprenorphine use (using once or less than once per week). Other factors associated with non-fatal overdoses included age, education, homelessness, as well as the benzodiazepines, stimulants, and heroin use.
Conclusions: Users of diverted OSD may represent a high-risk population, as they used more additional drugs and used them more frequently than other IDUs. However, illicit OSD use may be less harmful than previously assumed. After accounting for an extensive set of covariates, only infrequent illicit buprenorphine use, but not methadone use, was associated with non-fatal overdoses.

1. Introduction

Diversion and illicit use of opiate substitution drugs (OSD), such as methadone and buprenorphine, appear to be widespread in countries where opioid substitution treatment (OST) is available (Duffy and Baldwin, 2012; Roche et al., 2008; Winstock et al., 2009). Illicit OSD use is of public concern due to its potential health risks and because diversion to the black market may undermine public support and legitimacy of OST. Most studies suggest a positive association between flexible OST regimens and diversion (Ritter et al., 2005; Strang et al., 2010). For this reason, there is an argument for stricter OST regimens, including supervised OSD intake and restriction of take-home doses (Obadia et al., 2001). However, less flexible regimens may result in fewer treatment seekers and lower retention rates (Duffy and Baldwin, 2012; Pani et al., 1996). This in turn could have serious public health implications given the health risks among opioid users and OST's contribution to the reduction of such risks (Clausen et al., 2008; Darke et al., 2011; Degenhardt et al., 2011).

Deciding on a strict vs. a more flexible OST regimen constitutes a difficult dilemma. Thus, a better understanding of factors associated with illicit OSD use, and in turn, how such use may contribute to adverse health outcomes is important in informing the OST debate and public policies. It is a challenging task however, as even seemingly straightforward facts must be interpreted with caution. For instance, the recent increase in OSD-related fatalities reported in many countries (EMCDDA, 2013; Lee et al., 2013) does not necessarily imply that the number of drug-related deaths had been lower without diversion. It is possible that diversion primarily influences which drugs are used without necessarily affecting the total number of drug-related fatalities; i.e., OSD use may in some cases simply replace the use of heroin or other opioids without altering the risk of overdosing. If used in a mode similar to the prescribed OST regimen, such self-substitution may potentially even lower the overdose risk. Thus, it is not altogether clear whether illicit OSD use increases overall morbidity and mortality among opioid users, and if so, to what extent. Additional information about illicit OSD use, user characteristics, and OSD-related health outcomes need to be considered.

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Specifically, fatal and non-fatal overdoses are the most serious side effect of illicit OSD use. These risks appear to depend upon intake modes and concomitant drug use. For instance, injection of crushed buprenorphine tablets and methadone syrup appear riskier than oral intake, as is concomitant intake of other substances, particularly benzodiazepines (Kintz, 2001; Mégarbane et al., 2006; Nielsen et al., 2008; Renard and Gaillard, 2008). Even though buprenorphine is generally considered safer than methadone (Bernard et al., 2013; Ernst et al., 2002; Heinemann et al., 2000; Seymour et al., 2003; Vormfelde and Poser, 2001), there have been reported fatalities after buprenorphine snorting or injecting (Ferrant, 2011; Tracqui et al., 1998). Further, fatalities have also been reported after high-dose buprenorphine consumption regardless of intake mode, especially when combined with benzodiazepines and alcohol (Häkkinen et al., 2012; Lai et al., 2006; Schifano et al., 2005; Seldén et al., 2012). However, the question remains as to whether illicit OSD use poses an independent risk for such adverse health outcomes.

Our study contributes to the literature by providing estimates of prevalence and frequency of, as well as the factors associated with, illicit OSD use among street-recruited injecting drug users (IDUs). By investigating the correlates of illicit OSD use, we aim to contribute to a better understanding of the user profiles, and to extend previous scarce findings on this topic. Further, we specifically examined the association between the frequency of illicit methadone and buprenorphine use and one important harmful effect: non-fatal overdoses. The frequency of opioid use may influence individual OSD tolerance levels, which in turn can affect the risk for non-fatal overdoses. Non-fatal overdoses are linked to increased morbidity and risk of subsequent fatal overdoses (Darke et al., 2003). To our knowledge, this is the first report to consider the frequency of illicit OSD use when investigating these questions.

2. Material and methods

2.1. Study setting

Data were drawn from a large survey ($n = 1355$) of street-recruited IDUs in Norway. Norway has one of the highest rates of IDUs among problem drug users, and one of the highest reported drug-induced mortality rates in Europe (EMCDDA, 2013). The country currently has an estimated number of 7300–10000 active IDUs (Hordvin, 2013) in a population of approximately 5 million.

OST became nationally available through a public specialised health care programme in 1998 (Waal, 2007). Recent statistics shows a total of 7055 registered OST users in Norway; 1788 in Oslo (Skretting et al., 2014). Buprenorphine has been available since 2001 and is now prescribed for approximately 50% of OST patients, with take-home doses being a common practice (Riksheim et al., 2014). Only methadone syrup and the buprenorphine preparations Subutex and Subuxone (buprenorphine–naloxone) are available for OST in Norway (The Norwegian Pharmaceutical Product Compendium, 2014). Methadone is available, but rarely used as pain medication, while buprenorphine preparations (such as Temgesic) are somewhat more commonly prescribed.

2.2. Design

Our semi-annual cross-sectional study was conducted outdoors, in close proximity to Oslo's needle exchange programme (NEP) and the drug consumption room (DCR). Participants were recruited from both of these facilities, which are located next to one another. Trained research staff from The Norwegian Institute for Alcohol and Drug Research (SIRUS) recruited and interviewed participants during the opening hours two or three weeknights within a month. Interview sessions were held in March and September each year. This study used data collected between 2006 and 2013. Over the study period, the NEP facility received about 80,000 visits and distributed between 1.2 and 2 million syringes annually (*personal communication NEP 2014*). Even though the majority of needles and syringes are distributed from this NEP facility, clean injecting equipment is also available free of charge from other low threshold services such as shelters, street clinics, and the DCR.

2.3. Inclusion

Clients from the NEP and the DCR facility were approached for an interview. Current OST patients were excluded from the analytical sample, as our focus was on the illicit OSD use only. No further exclusion criteria were imposed.

2.4. Representativeness

The study sample was a convenience sample. However, we found that the age and gender distributions were similar to what has been estimated for IDUs in Norway (Bretteville-Jensen, 2006). The high number of needles and syringes distributed annually suggests that a large proportion of the city's IDUs were using the NEP service.

2.5. Ethics

The study protocol was under the jurisdiction of the Norwegian Social Science Data Services (NSD) and its Data Protection Official for Research. Even though this project involved human subjects, an equivalent of the IRB exemption was obtained from NSD because the data collected were completely anonymous and did not involve any information which could directly or indirectly be linked to individual participants. Therefore, no formal NSD submission and action was required. No monetary incentives were given for participation.

2.6. Measures

The study instrument included questions on legal and illegal substance use (alcohol, cannabis, cocaine, LSD, ecstasy, amphetamine, heroin and prescription drugs) and the number of non-fatal overdoses in the month and in the year before the interview. A non-fatal overdose was defined as an incident where the person needed assistance from others to regain consciousness, while frequent drug use was defined as using on a daily, or almost daily, basis. In addition, we recorded participants' age, gender, education, current living situation, length of injecting career, treatment experience, and sources of income (including from illegal activities) for the four weeks prior to the interview.

2.7. Data analyses

The frequency of illegal OSD use was examined using a hurdle model (Cameron and Trivedi, 2005) in which the outcome variable was assumed to be generated by two processes; one concerning zeroes (i.e., whether illicit OSD use has occurred or not, estimated through a logistic regression model) and one concerning counts (i.e., the frequency of use, estimated through a zero-truncated negative binomial (ZTNB) model). For these analyses, the ordinally-coded illicit OSD use variables were recoded to reflect the actual number of use days per month; e.g., those having used "once per week" were assigned 4 days/month use, those having used "2–3 times per week" were assigned a midpoint of 10 days/month use, etc. The identical set of substantive predictors was included in both parts of the hurdle model.