Drug and Alcohol Dependence 153 (2015) 43–49

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Incidence and predictors of non-fatal drug overdose after release from prison among people who inject drugs in Queensland, Australia

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ARTICLE INFO

Article history:
Received 12 March 2015
Received in revised form 23 May 2015
Accepted 4 June 2015
Available online 16 June 2015

Keywords:
Drug overdose
Prisoners
Drug users
Injecting drug use

ABSTRACT

Introduction: Release from prison is a period of elevated risk for drug-related harms, particularly among people who inject drugs (PWID). Non-fatal overdose can cause serious morbidity and predicts future fatal overdose, however neither the incidence nor the risk factors for non-fatal overdose following release from prison are well understood.
Methods: Structured health-related interviews were conducted with 1051 adult prisoners in Queensland, Australia prior to release and approximately 1, 3 and 6 months post-release. Incidence of self-reported overdose in the community was calculated for PWID and all prisoners for three discrete time periods. Negative binomial regression with robust error variance was used to identify pre-release predictors of overdose among PWID.
Results: The incidence of reported overdose was highest between 1 and 3 months post-release (37.8 per 100 person-years (PY) among PWID; 24.5/100 PY among all ex-prisoners). In adjusted analyses, the risk of post-release non-fatal overdose was higher for PWID who reported: being unemployed for >6 months before prison, having been removed from family as a child, at least weekly use of benzodiazepines and/or pharmaceutical opiates in the 3 months prior to prison, and ever receiving opioid substitution therapy (OST). Pre-release psychological distress and a lifetime history of mental disorder also predicted overdose, whereas risky alcohol use in the year before prison was protective.
Conclusions: PWID have a high risk of overdose following release from prison. Imprisonment is an opportunity to initiate targeted preventive interventions such as OST, overdose prevention training and peer-delivered naloxone for those with a high risk profile.

1. Introduction

Release from prison is a period of elevated mortality risk, particularly resulting from suicide and drug overdose (Merrall et al., 2010; Kinner et al., 2013a; Chang et al., 2015). The risk of drug-related death is highest in the first few weeks post-release (Merrall et al., 2010) and, although it decreases over time, excess mortality and morbidity continue among ex-prisoners (Hobbs et al., 2006). People who have a history of injecting drug use (PWID) are at particular risk of drug-related death, and are over-represented in the criminal justice system (Fazel et al., 2006); around 70% of people entering Australian prisons report illicit drug use in the past 12 months and around half report a history of injecting (Australian Institute of Health and Welfare, 2013).

Return to drug use is common after release from prison (Kinner, 2006; Binswanger et al., 2012) and ex-prisoners may be at increased risk of non-fatal drug overdose (Ochoa et al., 2005; Kerr et al., 2007; Kinner et al., 2012). Between 40% and 70% of PWID report having experienced a (mostly opioid) non-fatal overdose (Ochoa et al., 2005; Pollini et al., 2006; Darke et al., 2007; Kerr et al., 2007; Milloy et al., 2008). These events carry a risk of direct and

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http://dx.doi.org/10.1016/j.drugalcdep.2015.06.011
0376-8716/

indirect, acute and chronic morbidities such as physical injury, seizure, pulmonary conditions, peripheral neuropathy, temporary paralysis, chest infection, neurological damage and cognitive impairment (Warner-Smith et al., 2002). In a study of 136 Sydney-based heroin users who reported overdose, 79% reported one or more of these sequelae (Warner-Smith et al., 2002).

A substantial body of research from Australia, North America and Europe has identified correlates of heroin overdose, including patterns and types of drugs used (e.g., injecting route of administration (Brugal et al., 2002; Ochoa et al., 2005)), poly-drug use (Seal et al., 2001; Darke and Hall, 2003; Dietze et al., 2005; Kerr et al., 2007) and demographic (e.g., male gender (Darke and Hall, 2003; Stoové et al., 2009), older age (Kerr et al., 2007; Stoové et al., 2009)) and psychosocial factors (e.g., poor mental health (Bartoli et al., 2014), unstable housing (Kerr et al., 2007)). While there is evidence of a strong, dose-dependent protective effect of opioid substitution therapy (OST) against opioid overdose mortality (van Ameijden et al., 1999; Brugal et al., 2005), transitioning on or off drug treatment has been associated with increased risk (Strang et al., 2003; Davoli et al., 2007).

Most of the available research has focussed on heroin-related overdose, but there is increasing research into overdose related to other nervous system depressants such as prescription opioids and benzodiazepines, in line with the burgeoning use of these drugs in many countries (Centers for Disease Control and Prevention, 2013; Cerdá et al., 2013). There has been comparatively little investigation of non-opioid illicit drug overdose, such as from psychostimulants (Kaye and Darke, 2004; Darke et al., 2008). Psychostimulants are the primary cause of only a minority of fatal overdoses in Australia (Darke et al., 2008), however their contribution to non-fatal overdose is less clear, obfuscated by the high prevalence of poly-drug use among users (Darke and Hall, 2003; Kaye and Darke, 2004; Kerr et al., 2007; Darke et al., 2008). The lower risk of death and ambiguity in definition (Kaye and Darke, 2004; Darke et al., 2008) mean that non-fatal psychostimulant overdoses may also be documented less frequently than opioid overdoses. Nevertheless, 13% of 200 regular cocaine users from Sydney reported cocaine overdose (Kaye and Darke, 2004), and some Australian jurisdictions have seen recent increases in psychostimulant-related harms (Heilbronn et al., 2013). Psychostimulant-related overdose morbidity may confer a range of short and long term cardiovascular, respiratory, autonomic and neuromuscular harms (Kaye and Darke, 2004; Darke et al., 2008; Cruickshank and Dyer, 2009).

Non-fatal overdose is a strong predictor of future fatal overdose (Stoové et al., 2009; Darke et al., 2011), suggesting the potential for non-fatal overdose to serve as a flag for early intervention to prevent death. Release from prison may present an opportunity to intervene to reduce the risk of non-fatal drug overdose after release.

To date, most studies of non-fatal overdose have relied on cross-sectional data; few studies have examined overdose longitudinally to enable identification of risk and protective factors. Based on data from a cohort of adults interviewed in prison and at multiple time points after release from custody in Australia, the aims of this study were to: (1) estimate the incidence of self-reported non-fatal overdose at three discrete time periods following release from prison, among all released prisoners and among PWID, and (2) identify the pre-release predictors of non-fatal overdose among PWID.

2. Methods

2.1. Study design and setting

The *Passports* study was a multi-site, single-blinded, randomised controlled trial of a case-management re-entry intervention for sentenced adult prisoners in the state of Queensland, Australia. The study methods are described in detail elsewhere (Kinner et al., 2013b). Baseline interviews were conducted within 6 weeks of expected release from prison and before randomisation, in the seven prisons from which the majority of sentenced prisoners were released. Participants were randomised to receive either usual care or a transitional intervention that included individualised case-management in the first 4 weeks following release (Kinner et al., 2013b). Follow-up interviews occurred approximately 1 (FU1), 3 (FU2) and 6 months (to a maximum of 12 months) (FU3) after release from prison.

2.2. Sample selection and recruitment

Prisoners due to be discharged from selected prisons from August, 2008 to July, 2010 were identified through correctional records and screened for eligibility. Eligibility criteria included (1) expected release within 6 weeks, (2) sentenced (i.e., not a pre-trial detainee), (3) imprisoned for at least 4 weeks, and (4) able to give informed consent. Participation was limited to prisoners who met these criteria so that baseline data were a true reflection of the status of participants immediately prior to release and measures which refer to a specific in-prison time period could be accurately collected. Researchers explained the study and supplied a plain-language information sheet; participants provided signed informed consent to participate. Of 1665 prisoners eligible and approached to participate, 1325 (80%) consented and completed a pre-release interview (Kinner et al., 2013b). By key demographic indicators, participants were broadly representative of all persons released from prison in Queensland during the recruitment period, with the exception that women were oversampled to allow adequate numbers for sex-stratified analyses (Kinner et al., 2013b).

Pre-release data were collected via a face-to-face, researcher-administered structured questionnaire, typically taking 60–90 min to complete. Follow-up interviews were conducted by telephone in the community, and for participants who had been reimprisoned, in prison either by telephone or face-to-face. Participants who were released more than 8 weeks after their baseline interview or who did not complete at least one follow-up interview were excluded from the analyses presented here.

2.3. Measures

2.3.1. Post-release non-fatal overdose. At each follow-up interview, participants were asked whether they had overdosed or become unconscious as a result of taking drugs since release or last follow-up. The definition of non-fatal overdose was intentionally broad to accommodate poly-drug use in the sample (Kerr et al., 2007). Participants were asked how many times they had overdosed, what drugs they had been using and – for participants who had been re-imprisoned during follow-up – whether the overdose/s occurred in the community or in custody. In this paper only community overdoses are examined. Reported non-fatal overdoses after using only cannabis and/or alcohol were also excluded; all other illicit drug overdoses, including those related to non-prescribed use of pharmaceuticals, were included.

2.3.2. Potential predictors of non-fatal overdose. Potential predictors of non-fatal overdose among PWID were identified based on a review of the literature. Demographic indicators included age at baseline (<30/30+ years), sex (male/female), indigeneity (yes/no), years of schooling (<10/10+ years), >6 months unemployed prior to imprisonment (yes/no), unstable housing in the month prior to imprisonment (yes/no), having been removed from family (e.g., fostered) as a child (yes/no), history of previous adult incarceration (yes/no) and duration of current incarceration. Drug-related measures included: years since first injection, lifetime overdose