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The relationship between age and risky injecting behaviours among a sample of Australian people who inject drugs

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ABSTRACT

Background: Limited evidence suggests that younger people who inject drugs (PWID) engage in high-risk injecting behaviours. This study aims to better understand the relationships between age and risky injecting behaviours.
Methods: Data were taken from 11 years of a repeat cross-sectional study of sentinel samples of regular PWID (The Australian Illicit Drug Reporting System, 2001–2011). Multivariable Poisson regression was used to explore the relationship between age and four outcomes of interest: last drug injection occurred in public, receptive needle sharing (past month), experiencing injecting-related problems (e.g. abscess, dirty hit; past month), and non-fatal heroin overdose (past six months).
Results: Data from 6795 first-time study participants were analysed (median age: 33 years, interquartile range [IQR]: 27–40; median duration of injecting: 13 years [IQR: 7–20]). After adjusting for factors including duration of injecting, each five year increase in age was associated with significant reductions in public injecting (adjusted incidence rate ratio [AIRR]: 0.90, 95% confidence interval [CI]: 0.88–0.92), needle sharing (AIRR: 0.84, 95% CI: 0.79–0.89) and injecting-related problems (AIRR: 0.96, 95% CI: 0.95–0.97). Among those who had injected heroin in the six months preceding interview, each five year increase in age was associated with an average 10% reduction in the risk of heroin overdose (AIRR: 0.90, 95% CI: 0.85–0.96).
Conclusions: Older PWID report significantly lower levels of high-risk injecting practices than younger PWID. Although they make up a small proportion of the current PWID population, younger PWID remain an important group for prevention and harm reduction.

1. Introduction

There is evidence to suggest that the population of people who inject drugs (PWID) in Australia is ageing; over the past decade significant increases in median age have been detected in repeat cross-sectional studies of Needle and Syringe Program (NSP) clients and community-recruited PWID (Iversen et al., 2011; Stafford and Burns, 2011). This may reflect the ageing general population, including early-onset substance users (European Monitoring Centre for Drugs and Drug Addiction, 2008; World Health Organisation, 2011), as well as reduced initiation to heroin injecting following a period of reduction in heroin supply in late 2000/early 2001, in what had been heroin-dominated illicit drug markets, particularly in the country's two most populous jurisdictions, New South Wales and Victoria (Topp et al., 2001; Degenhardt et al., 2004, 2005; Day et al., 2006). Although there has been recent attention to ageing PWID in public health research, particularly in relation to hepatitis C virus (HCV) related morbidity (Higgs and Maher, 2010; Gibson et al., 2011), further research is required to understand the injecting behaviours and associated health needs of younger PWID.

Research into the influence of age on patterns of injecting drug use (IDU) and associated risk behaviours has shown that compared

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with their older counterparts, younger PWID (commonly defined as those below 30 years of age) report injecting drugs at a higher frequency (Miller et al., 2007; Degenhardt et al., 2008), higher levels of sharing of injecting equipment (Fennema et al., 1997; Kral et al., 2000; Miller et al., 2007; Degenhardt et al., 2008) and engaging in high-risk injecting practices, such as 'backloading' (a process in which one syringe is used to mix drugs and to give measured shares to other PWID by squirting the drug solution directly into their syringes; Kral et al., 2000). These behaviours have significant implications for the risk of blood-borne virus (BBV) acquisition, and vascular and tissue injuries, as well as prevention practices (Jose et al., 1993; Topp et al., 2008; Pouget et al., 2011). Younger PWID also report limited use of health and drug treatment services (Cronquist et al., 2001; Miller et al., 2007; Day et al., 2011). These studies however have tended to group participants into just two or three age categories (usually ≤25 years or ≤30 years compared with older PWID), thereby not considering the effects of age within these groups. Further, previous studies have not focused on age-related differences in health outcomes such as drug overdose or injecting-related injury.

Although younger PWID may make up a small proportion of the current PWID population, evidence of their high-risk injecting behaviours and poor service utilisation suggest that they are an important target population for harm reduction and drug treatment services. In this paper, we use 11 years of repeat cross-sectional surveys conducted among sentinel samples of regular Australian PWID to generate robust estimates of the associations between age and selected risky injecting behaviours and related health outcomes.

2. Methods

2.1. Study methods

Data were obtained from the Illicit Drug Reporting System (IDRS), which has been described in detail elsewhere (Hando et al., 1998). In brief, participants were recruited using convenience sampling through NSPs, treatment agencies, advertisements in street press and peer referral, in the capital cities of all Australian states and territories. Participants were eligible for the study if they: were aged 16 years or older, had injected drugs at least monthly in the six months preceding interview, and had been a resident in the city where they were interviewed for at least 12 months. Eligible participants completed a structured interviewer-administered questionnaire canvassing demographics, drug use history, drug market characteristics and health and crime related behaviours, and were reimbursed up to $40 for their time and out-of-pocket expenses. Informed consent was obtained from all participants prior to interview, and the study received ethics approval from appropriate ethics committees in each jurisdiction, as well as the University of New South Wales Human Research Ethics Committee for the overall study.

2.2. Measures

The primary exposure of interest was age, which was examined as a continuous variable where each one-unit increase represented a five-year increase in age. The outcomes of interest were seven binary variables relating to injecting practices which are indicative of risky behaviours that merit intervention: (1) most recent drug injection occurred in a public place, (2) receptive needle sharing in the last month, (3) reuse of own needles in the last month (collected across 2008–2011 only), (4) overall frequency of injecting (daily *vs.* less than daily), (5) any injecting-related problem ("dirty hit", abscess, prominent scarring/bruising, difficulty injecting or thrombosis) in the last month, (6) non-fatal heroin overdose in the last six months, and (7) other opioid overdose in the last 12 months (collected across 2006–2011 only).

Secondary socio-demographic explanatory variables included sex, language spoken at home (English *vs.* other), educational attainment (completed high school *vs.* did not complete high school), employment status (unemployed *vs.* employed), accommodation type (stable *vs.* unstable), duration of injecting, lifetime history of incarceration and recent criminal activity (property crime, violent crime or drug dealing in the past month). Measures of substance use included frequency of heroin, speed and crystal methamphetamine injection (daily injection in the last six months *vs.* less than daily injection *vs.* no injection), recent illicit use of pharmaceutical opioids (yes/no), recent injection of pharmaceutical opioids (yes/no), and current opioid substitution therapy (OST) status (yes/no). No collinearity between age and duration of injecting was detected (variance inflation factor: 1.83).

2.3. Data analysis

This analysis used national IDRS data for the period 2001–2011. As no unique identifier was collected, it was not possible to track repeat participants over time. In order to avoid including participants who completed the survey more than once, data from all participants in the 2001 survey were included, but data for the years 2002–2011 were limited to first-time participants only (i.e. those who self-reported that they had never previously completed an IDRS survey). Sensitivity analysis indicated that limiting our analysis to first-time participants in this way did not bias the included sample towards younger participants.

All bivariate and multivariable analyses were conducted using Poisson regression with robust error variance (Zou, 2004). This method was chosen as the prevalence of outcomes was relatively high (>10%), meaning odds ratios produced through logistic regression would not provide an accurate estimate of the risk ratio for most of the outcomes (Zhang and Yu, 1998; Barros and Hirakata, 2003).

First, we assessed the relationship between age and each outcome of interest at the bivariate level, and after adjusting for year of interview. At this level no significant relationship ($p < 0.05$) was detected between age and reuse of own needles or overall frequency of injecting; as such no further analysis was conducted for these outcomes. No further analysis was conducted for other opioid overdose as the number of participants reporting the outcome was small ($n = 53$). We used the Phi Coefficient to assess the extent of correlation across the four outcomes selected for further analysis (public injection, needle sharing, IRP and heroin overdose); the level of correlation was low (range: 0.014–0.087).

Second, we compared the relationship between age and each selected outcome across survey years, and measured trends in this relationship using linear regression.

Finally, we used multivariable regression to adjust for confounding and to calculate the best effect estimate of the relationship between age and each of the four outcome variables selected for further analysis. We constructed conservative multivariable models using a strategy described by Greenland (1989) and previously used in Australian and international settings (Hayashi et al., 2011; Milloy et al., 2011; Dietze et al., 2012). Using a statistically-driven approach, secondary variables were selected to be included in analysis if they had a significant relationship with age in bivariate regression ($p < 0.05$) or if prevalence fluctuated significantly across study years (accommodation status, main language spoken at home, employment status, OST status, duration of injecting). Jurisdiction of residence and year of interview (used as a categorical variable as it acts as a marker of heroin availability, with 2001 used as the reference group to reflect the lowest level of heroin availability across the study period) were included in each of the initial models regardless of bivariate significance; year of interview was also included in all final models.

The primary explanatory variable and all selected secondary explanatory variables were included in an initial model, and a backward selection approach was employed. Reduced models were constructed, each with one secondary explanatory variable removed. We compared the value of the coefficient for the primary explanatory variable between the full model and each of the reduced models, and removed the secondary explanatory variable corresponding to the smallest change in coefficient, retaining those that had a greater influence on the relationship of interest. This process was repeated until the smallest change in coefficient exceeded 10%. This resulted in final models which retained only covariates which significantly confounded the relationship of interest. Adjusted incidence rate ratios (IRR) for each final model were obtained by exponentiating the Poisson regression coefficient; IRRs can be interpreted in the same was an odds ratio obtained through logistic regression, representing the relative change in the incidence rate for a one-unit change in any given variable. To account for multiple comparison testing and to reduce the likelihood of Type I error, a conservative cut-off of $p < 0.01$ was considered significant in the final multivariable models. Analyses were conducted using Stata Version 11.1 (Statacorp LP, TX, USA).

3. Results

The percentage of first-time participants in annual IDRS samples fluctuated over time, from 74% in 2002 to as low as 55% in 2010. In total, 6795 first-time study participants were included in analysis, representing 67% of the overall study population; the number of participants decreased from 951 in 2001 to 491 in 2011 (Supplementary Material, Table 1). Two thirds of participants were male (66%), and the majority spoke English as their main language (96%). The median age of participants was 33 years (interquartile range (IQR): 27–40), and participants reported having injected drugs for a median of 13 years (IQR: 7–20). The most commonly reported drugs of choice among study participants were heroin (53%) and amphetamines (23%). There were some differences in socio-demographic and drug use characteristics across age groups, with a larger proportion of younger participants being female, and a smaller proportion of younger participants reporting recent heroin injection, compared with their older counterparts (Table 1).