

# TIMING OF INCOME ASSISTANCE PAYMENT AND OVERDOSE PATTERNS AT A CANADIAN SUPERVISED INJECTION FACILITY

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## **ABSTRACT**

**Background:** Little is known about the relationship between timing of income assistance provision and health behaviours among injection drug users (IDU). We therefore investigated associations between income assistance provision and overdose patterns among IDU utilizing Insite, a supervised injection facility in Vancouver, Canada.

**Methods:** Using data collected at Insite between March 2004 and December 2010, we examined trends in overdoses and drugs injected. Data were stratified by proximity to the most recent day of issue of income assistance cheques, based on dates provided by the province.

**Results:** After adjustment for frequency of use, the risk of overdose for those injecting at Insite on the three days starting with “cheque day” was higher than for those injecting on other days (Odds Ratio [OR]=2.06; 95% Confidence Interval [CI]: 1.80–2.36,  $p<0.001$ ). These associations were also significant when drug-specific overdose rates were considered. The proportion of overdoses involving exclusive opioid use was lower for events occurring around cheque day than on other days (OR=0.63; 95% CI: 0.47–0.84,  $p=0.002$ ), though we observed no significant association between the proportion of overdoses involving stimulants and cheque timing ( $p=0.129$ ).

**Conclusions:** The risk of overdose among IDU utilizing Insite was significantly higher on and immediately after cheque day than during other days, and may be associated with reduced tolerance and increases in binge drug use. Alternative models of income assistance administration should be evaluated to reduce overdoses around cheque day.

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**Keywords:** Overdose; Illicit drug use; Cheque effects; Supervised injection facilities; Income assistance

## **INTRODUCTION**

Overdose is a significant health risk for people who use illicit drugs, with injection drug users (IDU) experiencing a particularly high burden of overdose-attributed mortality (Bargagli et al., 2006). Even when drug overdose does not result in death, the sequelae of non-fatal overdose among IDU are a significant source of morbidity (Warner-Smith, Darke, & Day, 2002). Prevention of drug overdose is therefore a central component of efforts to reduce the harms associated with injection drug use.

In the 1990s, Vancouver, Canada experienced epidemics of drug overdoses and infectious disease among the IDU population, especially in the impoverished Downtown Eastside neighbourhood (Fischer, Popova, Rehm, & Ivsins, 2006). In response, the city established Insite, North America's first government-sanctioned supervised injection facility (SIF) in 2003 (Wood, Kerr, Lloyd-Smith, et al., 2004). At Insite, clients can obtain sterile injection equipment and inject pre-obtained illicit substances under the supervision of health care professionals. The facility staff provides emergency response to overdoses, as well as primary health care and referrals. To date, there have been no fatal overdoses reported at Insite. However, non-fatal overdose is a common occurrence at the facility (Kerr, Tyndall, Lai, Montaner, & Wood, 2006).

In many North American jurisdictions, including British Columbia (Li, Sun, Marsh, & Anis, 2007), monthly income assistance cheques are issued to nearly all recipients on the same day. There is an emerging body of research investigating

associations between cheque issuance timing, and substance use and related harms (Halpern & Mechem, 2001; Rosen, 2011). These so-called “cheque effects” have been associated with increases in psychiatric emergencies (Shaner et al., 1995), drug and alcohol related deaths (Verheul, Singer, & Christenson, 1997) and admissions to a sobering unit for people who are publicly intoxicated (Li et al., 2007). These spikes in health service utilization are troubling not only because of negative health consequences associated with increased substance use, but also due to the heavy burden placed on healthcare systems around cheque day.

It has been suggested that a sudden increase in cash may act as a conditioned cue for drug consumption (Epstein et al., 2009; O'Brien, Childress, McLellan, & Ehrman, 1992). This may be especially relevant in the Vancouver setting, as Insite is located in a neighbourhood with a high prevalence of injection drug use (Wood, Kerr, Small, et al., 2004), and where a large number of residents receive income assistance (City of Vancouver, 2007). Thus, cheque issuance timing may be a strong environmental cue producing increased drug use for many IDU who utilize Insite (Riddell & Riddell, 2006). Despite previous research on cheque effects and substance use, little is known about how cheque timing affects injection drug use behaviour and overdose patterns. One Vancouver-based report found an increase in drug overdose hospital admissions around cheque day (Riddell & Riddell, 2006). However, a key limitation of this literature is the inability to standardize for drug use rates as there were no data available on the total number of drug injection events during this period. Thus, it is unclear whether the higher occurrence of drug-related harms observed in this study

results from more people injecting drugs immediately after cheque issuance or whether these trends result from higher-risk drug use behaviour. To address this question, the present study investigates the effects of cheque issuance timing on overdose patterns among IDU who utilize the Vancouver SIF, using data on all injections performed at the facility during the study period.

## **METHODS**

Data on overdose events in the SIF were compiled from the Insite facility's comprehensive on-site surveillance database. This system was the source of data for earlier analyses of SIF overdose patterns and has been previously described in detail (Kerr et al., 2006; Wood, Kerr, Lloyd-Smith, et al., 2004). Briefly, all clients must register at the SIF using a pseudonymous identifier and basic demographic information (i.e., gender and age). Overdose events are clinically determined by Insite nursing staff based on observation of symptoms, including respiratory rate, level of consciousness and skin colour. All activities in the SIF, including the type and amount of substances injected, the characteristics of overdose events and emergency interventions, are entered into the database and associated with the client's identifier. The evaluation of Vancouver's SIF has been reviewed and approved by the University of British Columbia/ Providence Healthcare Research Ethics Board.

For this cross-sectional analysis, we obtained data on all injections in the facility between March 2004 and December 2010. Using monthly cheque distribution dates provided by the BC Ministry of Social Development, we stratified the data by the

number of days since the last income assistance cheque was issued. For further analyses, the data were categorized into those events occurring on the three days starting with a cheque issue day and events occurring on all other days. This served as our primary outcome of interest, with overdoses occurring on all other days in the month serving as the comparison. We then calculated the number of injections resulting in an overdose event and divided this number the total number of injections during each time period, to calculate overdose rates per 1,000 injections. Next, we calculated overdose rates per 1,000 injections by drug type: opioids alone, defined as heroin, morphine, methadone, hydromorphone or oxycodone; stimulants alone, defined as cocaine, crack or crystal methamphetamine; and both opioids and stimulants. Each rate was calculated by dividing the number of drug-specific overdoses by the total number of injections involving that drug type. The median number of daily injections performed at the facility was also calculated for both time periods. Finally, odds ratios were calculated for the associations between the outcome and type of drugs used prior to overdose events: opioids alone (yes vs. no); stimulants alone (yes vs. no); and both opioids and stimulants (yes vs. no).

Associations of categorical variables were assessed using the Pearson's chi-square test and associations of continuous variables were assessed using the Wilcoxon-Mann-Whitney test. All statistical analyses were performed using the SAS software version 9.3 (SAS Institute Inc., Cary NC, 2011). All *p*-values were two-sided.

## **RESULTS**

Between March 2004 and December 2010, there were a total of 1,338 overdose events at Insite, with a rate of 1.11 events per 1,000 injections (95% Confidence Interval [CI]: 1.05–1.17). No drug overdose fatalities occurred at Insite during this time. The distribution of overdose events per 1,000 injections was not uniform over time, with a peak occurring during the three days beginning with income assistance cheque issue day. As indicated in Table 1, the risk of overdose for those injecting on the three days beginning with cheque day was significantly higher than for those injecting on other days (Odds Ratio [OR]=2.06; 95% CI: 1.80–2.36,  $p<0.001$ ). This association held when drug-specific overdoses were examined. The risk of overdose on the three days beginning with cheque day was significantly higher for those injecting opioids alone (OR=2.16, 95% CI: 1.83–2.55,  $p<0.001$ ), those injecting stimulants alone (OR=2.22, 95% CI: 1.55–3.18,  $p<0.001$ ), and those injecting both opioids and stimulants (OR=1.74, 95% CI: 1.01–3.01,  $p=0.045$ ). The daily number of injections at Insite was also significantly higher on the three days beginning with cheque day than on other days (median: 513 vs. 483,  $p<0.001$ ).

Finally, we investigated associations between types of drugs involved in overdoses at Insite and cheque issuance timing (Table 1). Exclusive opioid use was reported in 66% of overdoses that occurred on the three days beginning with cheque day, while 75% of overdoses on other days involved opioid use (OR=0.63; 95% CI: 0.47–0.84,  $p=0.002$ ). The proportion of overdoses involving only stimulants (15%) was slightly higher for events occurring on the three days beginning with cheque day as

compared to events on other days (12%), though this association was not statistically significant ( $p=0.129$ ). There was also no significant association between the proportion of overdoses involving both opioids and stimulants, and cheque issuance timing ( $p=0.269$ ).

## **DISCUSSION**

In the present study, we observed an overall overdose rate of 1.11 events per 1,000 injections (95% CI: 1.05–1.17) at Vancouver's SIF between March 2004 and December 2010. This was a lower rate than one found in a previous study of drug overdose events at Insite conducted between March 2004 and August 2005 (Kerr et al., 2006). We found a significant association between the rate of non-fatal overdose at Vancouver's supervised injection site and the issuing of income assistance cheques. Specifically, the risk of injections resulting in overdose doubled during the three days beginning with the issuing of income assistance cheques. This association was also significant when drug-specific overdose rates were considered. The corresponding median number of injections performed at Insite was also higher around cheque day, consistent with previous studies that indirectly observed increased substance use coinciding with income assistance cheque timing (Halpern & Mechem, 2001; Maynard & Cox, 2000).

Our findings are also consistent with a previous study that reported an increase in the number of overdose admissions to a Vancouver hospital on the three days beginning with cheque day relative to other days in the month (Riddell & Riddell,



2006). In contrast to this previous work, the present analysis adjusted the number of drug overdoses for the total number of daily injections performed at the facility. Thus, our study suggests that higher utilization of the facility alone cannot account for the higher incidence of overdoses at Insite around check day. Higher-risk drug behaviour, such as binge use, poly-drug use or higher drug doses may therefore be a contributing factor to elevated risk of overdose around the provision of income assistance cheques. As many opioid overdoses are related to concurrent use of CNS system depressant drugs, such as alcohol or benzodiazepines (Jones, Mogali, & Comer, 2012), increased consumption of CNS depressants with opioids following the issuance of cheques is a possible explanation for the observed findings. Further, it may be that individual tolerance is lower when cheques are issued as individuals may have exhausted the funds they received from their last cheque. Therefore, high-risk drug use combined with low tolerance may plausibly explain the results observed herein.

Further analysis examined the drug types involved in overdose events at Insite in relation to cheque issuance timing. Interestingly, the proportion of overdoses involving only opioids declined on the three days beginning with cheque day relative to other times. Small increases in the proportion of overdose events involving stimulants alone, and those involving both opioids and stimulants around cheque day were also observed, but these findings were not statistically significant. However, regardless of timing, opioid use accounted for the overwhelming majority of overdose events in this study, consistent with previous findings in this setting (Kerr et al., 2006).

This study has notable limitations. First, the population of IDU injecting at Insite is not a random sample drawn from all local IDU. Indeed, previous studies have found that the facility attracts a population particularly at risk for blood-borne infections and overdose (Wood et al., 2005). Thus, the results of the present study may not be generalizable to other settings. Second, The Insite database does not collect information on non-injection drug use or substances consumed by users outside the SIF. While Insite staff request information about drugs that are being injected upon entry into the injecting room, collecting additional information from individuals post-overdose may provide further insight into the dynamics reported herein. Finally, the SIF database does not collect information on the income sources of clients and we have no data on the prevalence of income assistance receipt among those who experienced overdose after injecting drugs at Insite. While previous research on Vancouver IDU has found that social assistance constitutes the majority of monthly income for a high proportion of IDU, many IDU supplement this income with other sources (DeBeck et al., 2007). Therefore conclusions regarding a possible causal relationship between cheque issuance and drug overdose should be made with caution.

Our findings have important policy implications. Under the current model of monthly income assistance cheque issuance, both the number of injections and the demand for emergency overdose interventions at Insite is highest on the three days beginning with cheque day. Thus staffing and resource allocation decisions should be made accordingly. More importantly, these associations also suggest that there may be an opportunity for structural interventions to reduce the incidence of drug overdose. It

is important to note that many IDU may experience a number of barriers to maintaining employment, including physical and mental comorbidities, and unstable housing (Gresenz, Watkins, & Podus, 1998). Discontinuing assistance is unlikely to eliminate substance use, and could exacerbate health and social problems related to poverty in this population. Thus, more research is needed to characterize the determinants of overdose in order to inform interventions for those on social assistance. The ideal timing and quantity of income assistance cheques has not been examined in detail. Alternative models of income assistance cheque issuance include issuing payments via smaller and more frequent cheques. While it is possible that such policy changes may alter the timing of overdose events without a reduction in overall incidence, a wider distribution of the demand for overdose-associated health services may still be beneficial. An alternative approach of assigning a payee representative to administer funds on behalf of the recipient has also been proposed (Rosen, McMahon, & Rosenheck, 2007). However, this can be perceived as coercive (Elbogen, Swanson, & Swartz, 2003) and has not been found to decrease substance use when used in the absence of addiction treatment interventions (Rosen et al., 2007; Rosenheck, Lam, & Randolph, 1997), and thus may not be appropriate or desirable. There is therefore a need to further research harm reduction and income management interventions for IDU receiving income assistance to decrease high-risk drug behaviour while preserving recipient autonomy.

In conclusion, we found a twofold increase in the risk of overdose for those injecting drugs at a supervised injection facility on the three days beginning with the

issuing of income assistance cheques relative to those injecting at the facility on other days. Our findings suggest that alternative models of income assistance cheque issuance may be warranted to decrease the morbidity associated with drug overdose and to ease the burden on health systems following cheque day.

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