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# Association between non-fatal opioid overdose and encounters with healthcare and criminal justice systems: Identifying opportunities for intervention

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## Abstract

**Background—**Accidental overdose, driven largely by opioids, is a leading cause of death among people who inject drugs (PWIDs). We conducted secondary analysis of data from a cohort of PWIDs to identify venues where high-risk PWID could be targeted by overdose education/ naloxone distribution (OEND) programs.

**Methods—**573 PWIDs completed a quantitative survey between June, 2012 and January, 2014, which was analyzed using multivariable logistic regression. The dependent variable was a dichotomous indicator of experiencing a heroin/opioid-related overdose in the past six months. Independent variables included: demographics, drug use behavior, and encounters with two venues – the health care and criminal justice systems – that could serve as potential venues for OEND programs.

**Results—**Almost half (41.5%) reported ever experiencing a heroin/opioid overdose, and 45 (7.9%) reported experiencing at least one heroin/opioid overdose in the past six months. In the final multivariable model, receiving care in a hospital in the past six months (Adjusted Odds Ratio [AdjOR] 4.08, 95% Confidence Interval [C.I.] 2.07 -- 8.04, p<0.001) and being arrested for drug

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**Contributors**

Author Wagner designed the statistical analysis and wrote the manuscript. Author Lin conducted the statistical analysis. Authors Davidson, Cuevas-Mota, Armenta and Garfein provided input on the statistical analysis and feedback and comments on the manuscript. All authors contributed to and have approved the final manuscript.

**Conflict of Interest**

All authors declare that they have no conflicts of interest.

possession in the past six months (AdjOR 5.17, 95% C.I. 2.37 – 11.24, p<0.001) were associated with experiencing an opioid overdose in the past six months.

**Conclusions—**Identifying venues outside of those that traditionally target services to PWIDs (i.e., syringe exchange programs) will be critical to implementing OEND interventions at a scale sufficient to address the growing epidemic of heroin/opioid related deaths. Clinical settings, such as hospitals, and drug-related encounters with law enforcement officers are promising venues for the expansion of OEND programs.

### Keywords

opioids; overdose; overdose prevention; people who inject drugs; naloxone

## 1. INTRODUCTION

Unintentional overdose death is now the leading cause of injury death in the United States (Centers for Disease Control and Prevention (CDC), 2014), and has been the leading cause of death among people who inject drugs (PWIDs) for many years (Tyndall et al., 2001). Prescription opioids and heroin account for a large and growing share of drugs involved in overdose deaths in the U.S. (Chen et al., 2014; Rudd et al., 2014). Risk factors for opioid overdose have been well-established, and include factors such as: loss of tolerance after periods of abstinence, concomitant use of other drugs (especially alcohol and other CNS depressants, but also stimulants such as cocaine), frequency of drug use, and characteristics of the drug such as purity and presence of adulterants (Coffin et al., 2003; Darke and Hall, 2003; Warner-Smith et al., 2001). Drug injection also confers a significantly elevated risk of overdose compared to other routes of administration (Brugal et al., 2002; Darke and Hall, 2003).

Naloxone hydrochloride is an opioid antagonist that specifically reverses the effects of opioids and restores breathing in an individual experiencing an opioid overdose (Baca and Grant, 2005). Overdose education and naloxone distribution (OEND) programs identify drug users at risk for opioid overdose, provide education about risk factors and appropriate response techniques, and prescribe naloxone to program participants (Clark et al., 2014; Maxwell et al., 2006). With a few exceptions, the majority of OEND programs in the US have been implemented by syringe exchange programs or other community-based organizations that primarily serve PWIDs (CDC, 2012; Clark et al., 2014; Doe-Simkins et al., 2009; Enteen et al., 2010; Wagner et al., 2010).

Given the breadth and scope of the opioid overdose epidemic, and the fact that not all PWIDs in the U.S. have access to syringe exchange programs, there is a need to identify other venues where high-risk PWID can be identified and provided with OEND programs. Two potential venues are health care and criminal justice settings (CDC, 2012). Physicians in primary care, pain management, hospital emergency departments, and other clinical settings can deliver overdose prevention training and prescribe naloxone to patients at risk of opioid overdose (Beletsky et al., 2007; Burris et al., 2001; Mayet et al., 2011) though the practice is relatively uncommon, particularly among those who are not familiar or comfortable with the health concerns of people who use drugs (Beletsky et al., 2007). The

criminal justice system is another venue where drug users at high risk for opioid overdose could be targeted for OEND interventions, in light of calls for the criminal justice system to align with public health goals (Silverman et al., 2012) and increased attention to the role that law enforcement officers can play in responding to the epidemic of opioid overdose death (Banta-Green et al., 2013; Davis et al., 2014; Green et al., 2013b; Ray et al., 2014).

In the current study, we conducted secondary analysis of data collected from a cohort of PWID recruited in San Diego, California to identify venues where high-risk PWID could be targeted by OEND interventions. Because individuals who have overdosed previously are at increased risk for dying from a subsequent overdose (Stoove et al., 2009), we identified participants who reported at least one opioid overdose in the past six months. We then examined a set of independent variables representing contacts with two primary venues – health care and criminal justice settings – that could be used to deliver OEND interventions for PWID at high risk for fatal opioid overdose.

## 2. METHODS

### 2.1 Recruitment

Data for this secondary analysis were drawn from the baseline visit of an ongoing longitudinal cohort study designed to investigate health outcomes among PWIDs in San Diego, California. A full description of the study methods is available elsewhere (Robertson et al., 2014). Briefly, eligibility criteria for the cohort included: age ≥18 years, injection of illicit drugs within the past 30 days (confirmed by observation of injection stigmata or other physical evidence of injection), ability to speak English or Spanish, San Diego resident with no plans to move for two years, and not currently participating in any intervention study. Recruitment was conducted using street- and venue-based outreach, targeted advertising (e.g., ads in local newspapers, flyers), websites, and peer referrals. Potentially eligible participants completed a brief screening interview. Individuals determined to be eligible for the study were invited to participate and those who agreed provided written informed consent. The Institutional Review Board of the University of California, San Diego approved all study procedures.

### 2.2 Data collection

Data were collected using an interviewer-administered questionnaire via Computer Assisted Personal Interview (CAPI) software installed on a laptop computer. The questionnaire included standard demographic items (e.g., age, sex, race/ethnicity, homelessness status). The dependent variable of interest – experiencing a heroin/opioid overdose in the past six months –was measured using a single item that asked participants “In the past six months, how many times have you overdosed on heroin or other opiates?” Overdose was defined as “times when you took so much drug that you lost consciousness, stopped breathing, and something had to be done if you were going to come back.” Participants who reported experiencing at least one heroin/opioid overdose in the past six months were also asked a series of questions about the most recent overdose event, including the drugs they used in the 12 hours prior to the overdose, whether and for what reason they had stopped using

drugs for three or more days prior to the overdose, and what actions were taken by others at the overdose event.

Throughout the questionnaire, a number of sections assessed participants' encounters with healthcare and criminal justice systems. In the section on healthcare access, participants were asked whether they had received care or accessed services in any of the following venues in the past six months: hospital, emergency department (ED), outpatient clinic, or local syringe exchange program (1=yes, 0=no). In a separate section, participants were asked about their encounters with the criminal justice system in the past six months, including whether or not they: had been arrested for drug possession or carrying syringes, had police confiscate their syringes, were on parole or probation, or had any outstanding warrants for their arrest (1= yes, 0=no). Participants were also asked whether their experiences with police: caused them to hurry or rush an injection, affected where they buy or use drugs, or affected their access to new syringes (1=yes, 0=no). Finally, participants were asked to respond to the question, "How fearful are you that police are going to arrest you or interfere with your drug use?" on a 3-point scale (0=not at all fearful, 1=somewhat fearful, 2=very fearful).

### 2.3 Analysis

The dependent variable was a binary indicator of whether or not participants reported experiencing at least one heroin/opioid overdose in the past six months. We examined associations with three categories of independent variables: demographics, health care system encounters, and criminal justice system encounters. All variables of interest were summarized by descriptive statistics including frequencies and measures of central tendency and dispersion. We used Chi-square, Fisher's exact, and Wilcoxon rank sum tests to examine bivariate associations between dependent and independent variables. Variables that were statistically significant at $p \leq 0.05$ in the bivariate analysis were included in a multivariable logistic regression model. The logistic regression model was trimmed manually in a backwards, stepwise fashion in which the variable with the largest p-value was removed at each step until the most parsimonious final model was achieved, including only those variables significant at $p < 0.05$.

## 3. RESULTS

The cohort consisted of 573 PWIDs recruited between June 2012 and January 2014. Almost half (n=238; 41.5%) reported ever experiencing a heroin/opioid overdose, and 45 (7.9%) reported experiencing at least one heroin/opioid overdose in the past six months. The median number of overdoses experienced by those 45 individuals in the past six months was one (interquartile range = 1–2; max = 10). Table 1 describes the circumstances of the most recent heroin/opioid overdose. Participants reported consuming several different drugs in the 12 hours prior to the overdose; the most commonly consumed drugs were heroin (73.8%), methamphetamine (28.6%), and alcohol (16.7%). Nearly one-quarter reported that they had stopped using drugs for three or more days prior to the overdose. Emergency services (i.e., 911) was called in 51% of the overdose events. In slightly less than half of the events (46.7%) participants were taken to a clinic or hospital. Participants reported receiving naloxone from bystanders in 16.3% of cases. Six (14.0%) participants reported that a

bystander gave them Suboxone in an attempt to reverse the overdose. Suboxone is a medication used to treat opioid dependency, which contains a combination of buprenorphine (a partial opioid agonist) and naloxone (an opioid antagonist) and can precipitate opioid withdrawal (Julien, 2005).

Table 2 shows the results of bivariate comparisons between those who reported experiencing a heroin/overdose in the past six months and those who did not. Participants who had experienced an overdose were younger (mean: 38 years vs. 44 years, p=0.01) and more likely to be homeless (77.8% vs. 59.7%, p=0.02) compared to those who had not overdosed in the past six months. There were no statistically significant differences in sex (male vs. all others), or race/ethnicity.

In terms of healthcare system encounters, a higher proportion of participants who overdosed in the past six months reported that they had received care in a hospital (40.0% vs. 16.5%, p<0.001) or an ED (53.3% vs. 33.5%, p=0.01) in the past six months, compared to those who had not overdosed. There were no differences in frequency of encounters with outpatient health clinics or syringe exchange programs.

In terms of law enforcement encounters, a higher proportion of participants who overdosed in the past six months reported that they had been arrested for any reason in the past six months (43.2% vs. 25.7%, p=0.02), had been arrested for drug possession in the past six months (27.3% vs. 7.3%, p<0.001), and had their syringes confiscated by police in the past six months (16.3% vs. 8.5%, p=0.10). Participants who overdosed in the past six months also more frequently reported that police presence caused them to hurry or rush an injection (40.9% vs. 25.3%, p=0.03) and that their experience with police has affected their access to new syringes (15.9% vs. 8.4%, p=0.10). Finally, a higher proportion of those who experienced an overdose in the past six months reported that they were somewhat or very fearful that police would arrest them or interfere with their drug use (72.7% vs. 58.7%, p=0.08). There were no statistically significant differences in frequency of arrest for other reasons (e.g., carrying new or used syringes), parole/probation status, or existence of outstanding warrants.

In the final multivariate model controlling for age, two venue-based factors remained independently associated with reporting a non-fatal heroin/opioid overdose in the past six months (Table 3). The odds of reporting a recent overdose were increased by three times among those who had received care in a hospital in the past six months (Adjusted Odds Ratio [AdjOR] 4.08, 95% Confidence Interval [C.I.] 2.07 – 8.04, p<0.001). Using Fisher's Exact Test we did not find a statistically significant association between receiving care in a hospital in the past six months for any reason and being taken to a clinic or hospital at the time of the most recent overdose (p=0.14). Sixty-one percent of individuals who received care in a hospital or clinic in the past six months also reported being taken to a clinic or hospital at the time of their last overdose. The odds of reporting a recent overdose were increased by four times among those who had been arrested for drug possession in the past six months (AdjOR 5.17, 95% C.I. 2.37 – 11.24, p<0.001).

## 4. DISCUSSION

We found that nearly half of this sample of PWIDs had experienced at least one non-fatal overdose in their lifetime, consistent with other research (Bradvik et al., 2007; Latkin et al., 2004; Philbin et al., 2008; Pollini et al., 2006; Seal et al., 2001; Sergeev et al., 2003; Sherman et al., 2007). Further, we found that 8% of the sample had experienced a non-fatal overdose in the previous six months. Our findings regarding the characteristics of the overdose events were consistent with the literature on risk factors for opioid overdose (e.g., Darke and Hall, 2003): participants reported using a wide variety of drugs prior to the overdose event and nearly one-quarter reported that the overdose occurred after a period of abstinence.

We investigated associations between heroin/opioid overdose and encounters with two primary venues where PWIDs come into contact with entities that could provide OEND programs: the health care and criminal justice systems. Clinical settings such as hospitals are potential venues for OEND programs, and our findings suggest that PWID at the highest risk for dying from an opioid overdose do access care from hospitals with some frequency. Overall, nearly one in five of our participants had received care in a hospital in the past six months, and those who had received care in a hospital were more likely to report experiencing a recent overdose. While it makes sense that some degree of correlation between overdose and hospitalization should exist, we did not detect a statistically significant association between receiving care in a hospital for any reason and begin taken to a clinic or hospital after the most recent overdose event. It is important to note that less than half of those who had overdosed in the past six months said that they were taken to the hospital after their most recent overdose. Therefore, we suggest that PWIDs are accessing health care from hospitals for both overdose and non-overdose related reasons and, whether the visit is due to an acute overdose event or for other health care needs, the provision of OEND programs through hospitals can reach PWIDs who are at high risk for overdose-related morbidity. Interestingly, receiving care in an outpatient clinic was not associated with reporting a recent overdose. This may be because high-risk PWIDs are less likely to be insured, and therefore less likely to receive care in a clinic compared to a hospital or ED setting. While some research shows support by clinicians for providing naloxone to people at risk for opioid overdose (Green et al., 2013a), both attitudinal and procedural barriers remain, and clinicians will need training and organizational support for integrating OEND into existing protocols.

Participants who had been arrested for drug possession were significantly more likely to report experiencing a recent overdose. Though this was the only criminal justice system variable retained in the final regression model, bivariate analysis showed that a larger proportion of participants who had recently overdosed reported interacting with the criminal justice system in a number of other ways, including having syringes confiscated, hurrying or rushing injections due to police presence, and fearing that police presence will interfere with their drug use. Research has described the “bolus effect”, in which a rapid administration of the drug causes a higher blood concentration of the drug than would otherwise be experienced, leading to more severe respiratory depression (Davidson, 1999). Though the aim of our current analysis was not to identify risk factors for overdose, it could be that

rushed injections due to fear of police interference stimulate such an effect, thereby increasing the risk for overdose.

Research on HIV and other health risks suggests that there is room for law enforcement and public health to work together to improve health outcomes among PWIDs (Beletsky et al., 2011; Bluthenthal et al., 1999a, 1999b; Martinez et al., 2007; Wagner et al., 2013b). Recently, communities have begun enlisting law enforcement officers to assist in the prevention of fatal overdose by training them in overdose prevention and naloxone administration (Banta-Green et al., 2013). In 2014, then Attorney General Eric Holder urged federal law enforcement agencies to train their personnel how to respond to opioid overdose and to equip them with naloxone (Office of the Attorney General, 2014). It is possible that training law enforcement officers in overdose response could save lives through naloxone administration, though no rigorous evaluation studies of this intervention exist to date. Nonetheless, our findings also suggest that interactions with law enforcement officers could serve as opportunities for PWIDs to access OEND services through appropriate referrals. When drug users are arrested for drug possession or other offenses, providing referrals to evidence-based drug treatment, syringe access services, and OEND programs should all be part of a comprehensive approach to reducing drug-related harms.

We found that 911 was called in only 51% of recent overdose events. Other research has shown that PWIDs are afraid to call 911 for fear of police response and possible arrest (Davidson et al., 2002). However, the effect of this fear on calling 911 might be modified based on individuals' experiences with the police. In a study among PWIDs in Baltimore, fear of arrest was associated with increased likelihood of calling 911 among those who had previous experience with police, and was negatively associated with calling 911 among those with no previous experience with police (Tobin et al., 2005). Having positive experiences with law enforcement officers at the scene of an overdose (e.g., receipt of medical assistance and appropriate referrals) could help minimize fears and increase the likelihood that PWIDs will seek emergency medical assistance in the event of future overdoses.

Despite recent advancements in the reach and scope of OEND programs, to our knowledge at the time of this study (2012–2014) there were no organized OEND programs distributing naloxone to PWIDs in San Diego. Therefore, it is notable that seven participants reported that someone other than a medical professional administered naloxone at their last overdose event. This could reflect dissemination of OEND information and naloxone through drug user networks in the region (Wagner et al., 2013a), particularly since OEND programs have been operating in nearby cities since at least 2006 (Wagner et al., 2010). It is also notable that six participants reported being given Suboxone by someone attempting to treat their overdose. Other cases of sublingual and intravenous administration of Suboxone by laypeople to treat overdose have been reported (Welsh et al., 2008; Yokell et al., 2012). However, Suboxone is a medication used for the treatment of opioid dependence and is not recommended for the treatment of overdose. Therefore, current recommendations to call 911 and administer rescue breathing and naloxone are still recommended as best practices to respond to opioid overdose (Nielsen and Lintzeris, 2008; Yokell et al., 2012).

### 4.1 Limitations

Our findings should be considered in light of some limitations. Data were all obtained via self-report by the individual who experienced the overdose; therefore, the descriptions of the circumstances of the last overdose are likely affected by recall bias. Individuals who experienced an overdose might not accurately recall or be aware of the details of the event. Recall bias may also affect responses to the independent variables, including the type and frequency of interactions with healthcare and criminal justice systems. Though we provided a definition of overdose to assist participants in determining whether the event was truly an overdose, misclassification of the dependent variable was possible. For example, participants might have described events that were not truly an overdose (e.g., simply over-consumption), or an overdose event that was not caused by heroin/opioids. This is a limitation of most self-report data on non-fatal overdose that does not include a clinical assessment, though the inclusion of consistent definitions and training of interviewers may help to reduce this bias. Because we conducted a secondary analysis of data collected by an existing and ongoing study, there may be other variables representing important venues for providing OEND programs that were not available for this analysis. For example, we did not have data on recent utilization of substance abuse treatment – another important venue where PWIDs at risk for overdose death are likely to be encountered. Finally, as with all non-experimental, observational designs, our findings cannot be used to determine causality or order of precedence.

### 4.2 Conclusion

Between 1999 and 2011, the rate of overdose deaths involving prescription opioids in the United States nearly quadrupled from 1.4 per 100,000 to 5.4 per 100,000, and heroin-related deaths increased 45% (Chen et al., 2014; Rudd et al., 2014). While these trends have focused attention on the prominent role played by prescription opioids, more recent data suggest that deaths related to prescription opioids may be declining, while heroin overdose deaths continue to climb (Rudd et al., 2014). While the authors found no statistical correlation between the decreasing deaths involving prescription opioids and increasing heroin-involved deaths (Rudd et al., 2014), other research has demonstrated a high probability that individuals who initiate opioid use with prescription opioids transition to heroin use when prescription opioids become too expensive or unavailable (Pollini et al., 2011). For many opioid users, transition to injection as the preferred route of administration soon follows (Lankenau et al., 2012; Young and Havens, 2012), and injection is an independent risk factor for overdose (Darke and Hall, 2003; Davidson, 1999). Therefore, an ongoing focus on prevention of overdose death among PWIDs is warranted. Identifying venues outside of those that traditionally target services to PWIDs (i.e., syringe exchange programs) will be critical to implementing OEND interventions at a scale sufficient to address the growing epidemic of heroin/opioid related deaths. Clinical settings such as hospitals and drug-related encounters with law enforcement officers are promising venues for the expansion of OEND programs.

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## Highlights

- Eight percent of participants had a heroin/opioid overdose in the past six months
- Overdose was associated with hospital care and arrest for drug possession
- Criminal justice and clinical settings should address overdose death prevention

**Table 1**

Descriptive characteristics of most recent heroin/opioid overdose (N=45)

| | n | % |
|---|---|---|
| Drug(s) used in the 12 hours before the last overdose (check all that apply; n=42) | | |
| Heroin by itself | 31 | 73.8 |
| Methamphetamine | 12 | 28.6 |
| Alcohol | 7 | 16.7 |
| Tranquilizers (rivotril, diazepam, valium, Ativan, or restoril) | 5 | 11.9 |
| Marijuana | 4 | 9.5 |
| Other prescription opioids (Vicodin, Darvon, Percocet) | 3 | 7.1 |
| Crack by itself | 1 | 2.4 |
| Cocaine by itself | 0 | 0 |
| Heroin and cocaine together | 0 | 0 |
| Methamphetamine and heroin | 0 | 0 |
| OxyContin | 0 | 0 |
| Stopped using drugs for 3 or more days before the most recent overdose | 11 | 24.4 |
| Why stopped for 3 or more days? (n=11) | | |
| Was in jail/prison | 3 | 27.3 |
| Was in detox/drug treatment | 1 | 9.1 |
| Just wanted to | 4 | 36.4 |
| Other | 3 | 27.3 |
| Emergency services were called for last overdose | 23 | 51.1 |
| Taken to clinic or hospital | 21 | 46.7 |
| Someone other than paramedic or medical professional gave you naloxone to treat overdose (n=43) | 7 | 16.3 |
| Anyone gave you Suboxone (R) to treat overdose (n=43) | 6 | 14.0 |

**Table 2**

Factors associated with reporting a non-fatal heroin/opioid overdose in the past six months (N=573)

| | ≥ 1 overdose in the past six months (n=45; 7.9% ) | | No overdoses in the past six months (n=528; 92.1%) | | |
|---|---|---|---|---|---|
| | **n** | **%** | **n** | **%** | **p-value** |
| **Demographics** | | | | | |
| Age (mean, SD) | 38 | 12 | 44 | 12 | 0.01 |
| Male | 29 | 64.4 | 388 | 73.6 | 0.22 |
| Race/ethnicity | | | | | 0.46 |
| White | 26 | 57.8 | 266 | 50.4 | |
| Hispanic/Latino | 14 | 31.1 | 164 | 31.1 | |
| Other | 5 | 11.1 | 98 | 18.6 | |
| Homeless past six months | 35 | 77.8 | 315 | 59.7 | 0.02 |
| **Health care system encounters (past six months)** | | | | | |
| Received care in hospital | 18 | 40.0 | 87 | 16.5 | <0.001 |
| Median number of times hospitalized (IQR; n=105) | 2 | 1,3 | 1 | 1, 2 | 0.11 |
| Received care in ED | 24 | 53.3 | 176 | 33.5 | 0.01 |
| Median number of times visited ED (IQR; n=198) | 2 | 1, 2.3 | 2 | 1, 3 | 0.46 |
| Received care in outpatient clinic | 14 | 31.1 | 153 | 29.1 | 0.74 |
| Median number of times visited outpatient clinic (IQR; n=167) | 2 | 2, 5 | 3 | 1, 6 | 0.61 |
| Used local SEP | 17 | 37.8 | 219 | 41.5 | 0.75 |
| **Criminal justice system encounters (past six months)** | | | | | |
| Arrested | 19 | 43.2 | 135 | 25.7 | 0.02 |
| Arrested for drug possession | 12 | 27.3 | 38 | 7.3 | <0.001 |
| Arrested for carrying unused syringes | 2 | 4.5 | 10 | 1.9 | 0.24 |
| Arrested for carrying used syringes | 3 | 6.8 | 16 | 3 | 0.18 |
| Police have confiscated syringes | 7 | 16.3 | 45 | 8.5 | 0.10 |
| Police presence caused hurried or rushed injection | 18 | 40.9 | 133 | 25.3 | 0.03 |
| Police presence has affected location of drug purchases | 19 | 43.2 | 210 | 39.9 | 0.75 |
| Police presence has affected location of drug use | 19 | 43.2 | 200 | 38.0 | 0.52 |
| Experience with police has affected access to new syringes | 7 | 15.9 | 44 | 8.4 | 0.10 |

| | ≥ 1 overdose in the past six months (n=45; 7.9% ) | | No overdoses in the past six months (n=528; 92.1%) | | |
|---|---|---|---|---|---|
| | n | % | n | % | p-value |
| Somewhat/very fearful that police are going to arrest or interfere with drug use (vs. not at all fearful) | 32 | 72.7 | 308 | 58.7 | 0.08 |
| Currently on parole or probation | 17 | 38.6 | 148 | 28.2 | 0.17 |
| Currently have outstanding warrants for arrest | 4 | 9.3 | 27 | 5.2 | 0.29 |

Note: statistical comparisons were made using Chi-square test or Fisher's exact test for frequencies, and Student's T test and Wilcoxon Rank Sums test for means/medians.

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**Table 3**

Factors independently associated with reporting a non-fatal heroin/opioid overdose in the past six months (n=573)

| | Adjusted Odds Ratio | 95% Confidence Interval | p-value |
|---|---|---|---|
| Age (per 5 year increase) | 0.81 | 0.71, 0.94 | 0.004 |
| Received care in a hospital last six months | 4.08 | 2.07, 8.04 | <0.001 |
| Arrested for drug possession past six months | 5.17 | 2.37, 11.24 | <0.001 |