



Opioid overdose experience, risk behaviors, and knowledge in drug users from a rural versus an urban setting



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ABSTRACT

Background: Opioid use is highly prevalent in the United States and there has been an increased incidence in the rate of opioid-related overdose. While evidence suggests that there are substantial differences in opioid use among rural versus urban settings, the rate of overdose and corresponding frequency of opioid overdose risk behaviors and overdose knowledge between rural and urban settings have not been examined.

Methods: Individuals with opioid use disorder from rural (N = 98) and urban (N = 247) settings completed a self-report survey regarding their lifetime history of overdose and overdose risk behaviors. Participants also completed the Brief Opioid Overdose Knowledge (BOOK) questionnaire, a 12-item self-report measure of opioid overdose knowledge.

Results: Overall, 35.6% of participants had experienced an overdose, and prevalence of overdose was significantly higher ($p < .01$) among rural (45.9%) vs. urban (31.6%) participants, though fewer rural participants reported past 30-day risk behaviors. There were few differences observed between the subset of rural and urban participants who had experienced an overdose, and fewer rural participants with a history of overdose reported past 30-day risk behaviors. Both rural and urban participants performed poorly on the BOOK, though the percent of correct responses was lowest among rural participants with a history of overdose.

Conclusion: Results demonstrate higher rates of overdose among rural opioid users, though rural participants were less likely to report recent risk behaviors. Results also suggest that knowledge regarding key factors related to opioid overdose is severely lacking, particularly among rural opioid users, which could be a potential target for future intervention efforts.

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Introduction

Opioids like heroin or prescription pain medications (e.g., oxycodone, hydrocodone) are a significant public health problem in the United States. In 2013, close to 12 million people reportedly misused an opioid, 2.5 million people met criteria for, and 1.4 million people sought treatment for problematic opioid use (Substance Abuse and Mental Health Services Administration (SAMHSA), 2014). Misuse of opioids is associated with myriad problems, including the risk of opioid-related overdose. The frequency of opioid-related overdose has increased throughout society, encompassing children, adolescents, elderly, patients with chronic pain, and women (Bailey, Campagna, Dart, & RADARS System Poison Center Investigators, 2009; Bohnert et al., 2011; Centers for Disease Control and

Prevention (CDC), 2013; Cobaugh & Krenzelok, 2006; Coben et al., 2010; Dunn et al., 2010; Palmiere, Staub, La Harpe, & Mangin, 2010; Paulozzi, Budnitz, & Xi, 2006; Rosca et al., 2012) and accidental poisonings, which are predominately opioid-related, have now surpassed motor vehicle accidents to become the leading cause of accidental death in persons aged 25–64 in the United States (CDC, 2014). Recent evidence suggests as many as 73% of drug users have witnessed an overdose and that 45% have themselves experienced a nonfatal overdose (Martins, Sampson, Cerda, & Galea, 2015). Overall, the rate of overdose from prescription opioid and heroin use has increased 3- and 6-fold, respectively, between 2001 and 2014 (CDC & Wonder Database, 2015), and the CDC has recommended increased and targeted efforts to reduce risk of opioid-related overdose (Rudd et al., 2014).

Though opioid use has traditionally been reported in urban settings (defined by the US Census Bureau as having more than 50,000 inhabitants; US Census Bureau, 2010), the onset of the prescription opioid epidemic has been associated with increases in opioid use in rural

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environments (Cicero, Ellis, Surratt, & Kurtz, 2014; Cicero & Kuehn, 2014). Evidence now suggests that there are qualitative differences in the experience of opioid use disorder within rural versus urban settings. First, opioid users in rural settings are more likely to abuse prescription opioids (versus heroin) relative to those in urban settings (Cicero, Surratt, Inciardi, & Munoz, 2007; Rigg & Monnat, 2015; Wang, Becker, & Fiellin, 2013; Wang, Fiellin, & Becker, 2014). Second, relative to urban settings, rural settings have substantially lower availability for opioid use disorder treatments (Heil, Sigmon, Jones, & Wagner, 2008; Hirchak & Murphy, 2016; Paulozzi & Xi, 2008; Rosenblum et al., 2011; Stein et al., 2015), which could otherwise serve as a protective factor against opioid overdose (Schwartz et al., 2013). For instance, 90.4% of physicians who are authorized to prescribe buprenorphine reside in metropolitan areas versus 1.3% who reside in rural settings, and 82.5% of rural counties have no buprenorphine-authorized physician (Rosenblatt, Andrilla, Catlin, & Larson, 2015). Physicians who reside in rural versus urban settings are also less likely to be authorized to prescribe buprenorphine to 100 (versus 30) patients (Stein et al., 2015). When treatment availability is low, individuals seeking opioid maintenance treatment for opioid use disorder may be placed on extended waiting lists. For instance, one study conducted within VT reported that patients waited an average of two years to begin opioid maintenance treatment (Sigmon, 2014). A further limitation in treatment access is that administration of naloxone, a fast-acting opioid antagonist that is used by first responders to reverse opioid overdose, is generally less possible in rural versus urban settings, largely due to a dearth of naloxone training and supplies for first responders (Faul et al., 2015). These differences may partially underlie the dramatic difference in overdose rates that are evident in rural versus urban settings. Specifically, opioid-related poisonings have increased by 371% in counties classified as rural, versus 52% in counties classified as urban (Paulozzi & Xi, 2008).

Given the differences in opioid treatment availability and overdose rates between rural and urban settings, there is value in examining opioid overdose knowledge and risk behaviors among opioid users residing in those settings. This information can aid in the development of public health campaigns and interventions tailored to opioid users in those areas. The majority of studies that have evaluated relative risk factors between rural and urban drug users have done so using epidemiological data from the National Survey on Drug Use and Health (Rigg & Monnat, 2015; Wang et al., 2013, 2014). No studies, as of yet, have reported a prospective, comprehensive evaluation of opioid overdose risk behaviors and knowledge among individuals in predominately rural versus urban geographic areas. In the present study, we compare the incidence of opioid-related overdose, overdose risk behaviors, and overdose knowledge in samples of rural and urban opioid users.

Methods

Participants were 345 opioid users. To be eligible for study participation, participants were required to have known opioid use disorder (e.g., assessed by staff from the program from which they were recruited), be over the age of 18, and be fluent in English. Rural participants ($N = 98$) were recruited from a methadone-maintenance clinic and a syringe exchange program in Burlington, VT. In 2014, Burlington VT had a population of 42,211 (US Census Bureau, 2014), placing it below the census definition of urban (50,000 people) (US Census Bureau, 2010). Urban participants ($N = 248$) were recruited from a methadone-maintenance clinic and a hospital-based drug and alcohol brief detoxification program in Baltimore MD. In 2014, Baltimore MD had a population of 622,793 (US Census Bureau, 2014), meeting the definition of an urban setting. The study was approved by University of Vermont and the Johns Hopkins University Institutional Review Boards (IRBs) and waivers of written consent were obtained for both sites. Participants were compensated \$10 in cash or giftcards for survey completion.

Study measures

All questions were administered using self-report surveys. Participants were provided with paper questionnaires and study staff were available to assist with completion of surveys as needed.

Demographic, drug use, and overdose history

Participants answered questions assessing demographic characteristics and past 30-day drug use, and then completed questions regarding their lifetime history of experiencing and/or witnessing an opioid overdose and their most recent overdose (e.g., what drugs had been used). Past 30-day engagement in the following behaviors that incur a heightened risk of experiencing an overdose were also assessed: using opioids while alone (which prevents someone from being available to administer aid if needed) (Davidson et al., 2003; Dietze, Jolley, Fry, Bammer, & Moore, 2006; Shah, Lathrop, Reichard, & Landen, 2008), combining opioids with alcohol (Coffin et al., 2003, 2007; Davidson et al., 2003; Dietze et al., 2006; Laberke & Bartsch, 2010; Seal et al., 2001), using methadone that was not prescribed to them (Bunn, Yu, Spiller, & Singleton, 2010; Webster et al., 2011), and having a recent decrease in opioid tolerance (e.g., having recently completed an opioid detoxification or being released from jail/prison) (Kinner et al., 2012; Merrill et al., 2010; Ravndal & Amundsen, 2010; Seal et al., 2001). Finally, participants were asked (yes/no) whether they had “ever heard of naloxone (Narcan)”, “received a prescription for naloxone”, “been trained to administer naloxone”, and “been trained to administer CPR”.

Brief opioid overdose knowledge questionnaire (BOOK) (Dunn et al., 2016)

Participants completed the BOOK as a measure of opioid overdose knowledge. The BOOK is a 12-item self-report measure that sums into three subscales: opioid knowledge (range 0–4), opioid overdose knowledge (range 0–4), opioid overdose response knowledge (range 0–4), and a total score (range 0–12). The BOOK is a psychometrically sound measure that was developed and replicated within three independent samples of participants who were abusing opioids and/or using them as prescribed for the treatment of chronic pain. To discourage random guessing, response options are “True”, “False”, and “I Don’t Know” (Harris & Changas, 1994; Herrmann et al., 2013; Pennington, Pachana, & Coyle, 2001). Results were coded dichotomously as correct and incorrect for analyses, with “I Don’t Know” responses being treated as incorrect.

Data analysis

Data were first evaluated descriptively to characterize the sample. Data were then compared as a function of rural versus urban participants, and then within the subset of rural and urban participants who reported a lifetime history of opioid-related overdose. Variables were analyzed using chi-squares for dichotomous variables and independent group t-tests for continuous variables. Finally, a logistic regression was conducted within the entire sample to evaluate several potential predictors of reporting a lifetime experience of opioid overdose. There was a low rate of missing data, so no corrections were made. Alpha was set at .05 and all analyses were conducted using SPSS version 21.

Results

Overall sample

Participant characteristics

Participant characteristics are presented in Table 1. Briefly, participants were 44.8% male, 60.0% Caucasian, 3.5% Hispanic, and 29.1% were over 30 years of age. Past-month drug use was common and consisted of heroin (54.4%), alcohol (48.5%), cannabis (44.4%), cocaine/crack (41.1%), prescription opioids (39.5%), and other medications (defined as stimulants and benzodiazepines) (35.4%). Sixty-nine percent of participants reported lifetime injection drug use.

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