Addictive Behaviors xxx (xxxx) xxx–xxx

Contents lists available at ScienceDirect

Addictive Behaviors

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

Overdose and adverse drug event experiences among adult patients in the emergency department

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HIGHLIGHTS

- Prior overdose and adverse drug events are common for emergency department patients.
- Prior overdose was associated with a greater number of drugs used in the past year.
- Intent to self-harm was more common for overdoses involving opiates or sedatives.
- Drug use screening in the emergency department could also address overdose risk.

ARTICLE INFO

Keywords:
Overdose
Emergency department
Substance use
Suicide

ABSTRACT

Introduction: Overdose is a leading cause of injury and death in the United States. Emergency Department (ED) patients have an elevated prevalence of substance use. This study describes overdose/adverse drug event experiences among adult ED patients to inform strategies to address overdose risk.

Methods: Patients seeking care at a large ED in the city of Flint, Michigan participated in a computerized self-assessment during 2011–2013 (n = 4571). Overdose was assessed with a broad definition and included occurrences that could be considered adverse drug events. Among those with this type of experience, additional items assessed symptoms, outcomes, and intent.

Results: 12% reported an overdose history. Of participants' most serious overdoses, 74% were without clear intent for self-harm, although this was true of only 61% of overdoses involving opiates or sedatives, and 52% had symptoms present that indicated that it was life-threatening. Binge drinking on a monthly basis (ORs = 1.4) was associated with a medically serious overdose compared to never having an overdose. Compared to no drug use in the last year, use of one drug was associated with an OR of 1.8, two drugs was associated with an OR of 5.8, three drugs was associated with an OR of 8.4, and four or more drugs was associated with an OR of 25.1 of having had a medically serious overdose (all $p < 0.05$).

Conclusions: Most overdose experiences among ED patients were without clear intent of self-harm. The ED may be an appropriate setting for efforts to reduce overdose risk, especially among polysubstance users.

1. Introduction

The rate of drug overdose death increased 137% between 2000 and 2014 (Rudd, Aleshire, Zibbell, & Gladden, 2016). This increase has been driven in large part by prescription opioids, and in the last several years, heroin (Compton, Jones, & Baldwin, 2016). Additionally, in 2007, there were an estimated ~700,000 emergency department (ED) visits due to drug and medication poisonings (Xiang, Zhao, Xiang, & Smith, 2012). Non-fatal unintentional overdoses per year also increased 82 to 330 per 100,000 Americans between 2001 and 2013 (Centers for

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https://doi.org/10.1016/j.addbeh.2017.11.030
Received 10 March 2017; Received in revised form 10 November 2017; Accepted 15 November 2017
0306-4603/ Published by Elsevier Ltd.

Disease Control and Prevention, 2016).

In addition to changing prescriber behavior, overdose prevention strategies have sought to change the behavior of individuals at risk for overdose or likely to witness an overdose to improve bystander response. This includes programs providing naloxone (an opiate overdose antidote) and training on its use (e.g., Walley et al., 2013). A critical first step in such approaches is to identify which individuals are at greatest risk and where these individuals have contact with the healthcare system or community programs.

Formative survey-based research towards overdose prevention traditionally focused on chronic drug users. In these studies, prior non-fatal overdose history is a strong predictor of future overdose (Caudarella et al., 2016; Coffin et al., 2007), and individuals who have had an overdose themselves have witnessed more overdoses (Bohnert, Tracy, & Galea, 2012). Consequently, settings that serve individuals with a history of overdose may be well-suited for overdose prevention interventions. To date, interventions to improve overdose witness behavior and reduce overdose risk behavior have been implemented or pilot tested in needle exchange programs, HIV education drop-in centers, addictions treatment programs, and primary care (Albert et al., 2011; Coffin et al., 2016; Huriaux, 2007; Walley et al., 2013).

Individuals with substance use problems are overrepresented in EDs relative to the general community (Cunningham et al., 2003; Fuda & Immekus, 2006). ED physicians treat individuals immediately following overdoses and also prescribe opioids and sedatives, which are substance types implicated in many overdoses (Calcaterra, Glanz, & Binswanger, 2013). Additionally, for many individuals who use inner-city EDs, it is their primary source of care (Pane, Farner, & Salness, 1991). Consequently, ED-based universal screening methods, particularly in urban areas, may identify individuals at elevated risk for experiencing or witnessing an overdose and who may not be engaged in ongoing medical care.

The present study was designed to examine the overdose history of adults presenting at an urban ED in order to identify correlates of prior non-fatal overdose, with a focus on types of substance use, and to examine the nature of prior overdose experiences (e.g., intent, symptoms). This data will help inform overdose prevention interventions for the ED, as well as the field more generally. We had two primary hypotheses. First, we hypothesized that prior overdoses more commonly be "unintentional" rather than the result of suicidal behavior because of the relative proportions of overdose deaths in each of these categories (CDC, 2016). Second, we anticipated that past-year use of a greater number of drug types (i.e., polysubstance use) would be associated with overdose history due to the known role of drug-drug interactions in overdose risk (Cone et al., 2004).

2. Methods

2.1. Study design and setting

Data were obtained from a screening survey of a randomized controlled trial examining the efficacy of brief interventions to reduce drug use among adult ED patients (Blow et al., 2017). The study occurred at a Level 1 Trauma Center in Flint, Michigan called Hurley Medical Center (HMC). HMC is the only public hospital in Flint. A Certificate of Confidentiality from the National Institute of Drug Abuse (NIDA) was obtained, and the University of Michigan and HMC Institutional Review Boards approved study protocols.

Sampling details are provided in a prior report (Bonar et al., 2014). Recruitment occurred from February 2011 through March 2013, with days of the week covered on a rotating schedule. Recruitment periods were randomly sample and primarily occurred during evening shifts (triage from 4:00 pm to 12:00 am) with a small number of daytime and overnight shifts. Research staff identified initially eligible patients ages 18–60 using the ED's electronic tracking system. Exclusions determined through this screening step included conditions that precluded informed consent (e.g., acute psychosis, unconscious, medically unstable) and acute suicidality. For shifts when potentially more patients would be seen in the ED than could be recruited, random selection procedures (rotating ED sections, pre-selected random digits matched to patient account numbers) were used to select a sub-set of patients to approach to enhance generalizability. In total, 13,230 patients present in the ED during study shifts were not approached, with the most common reasons included random selection (n = 6880), enrollment in other studies or previously being screening for this study (n = 1569), and being too sick to recruit (n = 941; see details in Bonar et al., 2014).

Research staff approached potential participants identified through these methods. Of 10,818 patients eligible to approach, 6160 (57%) were able to be contacted by research staff (e.g., not missed due to discharge). Of those approached, 4573 (74.2%) patients provided written informed consent and took a 15-minute computerized self-administered screening survey. Compensation was a dollar store gift ($1.00 value).

2.2. Measures

2.2.1. Overdose experiences

Lifetime overdose experience was assessed via the question "Have you ever taken too much drugs, alcohol, or medications/pills, or more than your body could handle?" This item was intentionally broad in its definition in order to have a sensitive measure of overdose experiences because it was unknown whether ED patients would identify relevant experiences with the term "overdose." Thus, this definition includes what are considered "adverse drug events," as well as alcohol poisoning or "black outs." Participants reporting a history of overdose responded to additional items about the most serious/worst overdose using the following prompt: "Think about your worst experience or when you felt the sickest from taking too much drugs, alcohol, or medications/pills." These items assessed symptoms, treatment received, substances involved, and intent of the overdose.

Several indicators were generated from information about the worst overdose. A "Severe Overdose" event was identified with any of the following symptoms: lost consciousness, difficulty or stopped breathing, skin turned blue or pale, collapsed, could not be woken up, heart attack, and convulsions. Several categorical indicators classified the most serious overdose experiences by the substances involved. For these variables, tobacco and marijuana were not considered due to the lack of evidence that consumption causes fatal overdose. The most serious overdose experience was coded as involving stimulants if the participant reported taking cocaine, methamphetamine, or prescription stimulants, and coded as involving opiates or sedatives if the participant reported taking heroin, prescription sedatives, or prescription pain medications. An additional group was defined as an overdose that only involved alcohol. Participants were able to be classified in multiple categories related to substance type with the exception of the alcohol-only category.

2.2.2. Demographics

Items from the Substance and Outcomes Module-User's Manual (SAOM) (Smith, Ross, & Rost, 1996) gathered participant's age, gender, marital status (coded to married/living together verses all others), current employment status (yes/no), and education (coded to less than high school diploma verses high school diploma or higher). Race/ethnicity items were obtained from the National Survey of Drug Use and Health items (NSDUH; Office of Applied Studies, 2009); low frequencies of race options other than African American prompted the creation of a binary variable for race (African-American vs. non-African American). An additional binary variable indicated Hispanic ethnicity. Self-rated health was assessed using one item from the Short Form-12 (Ware, Kosinski, & Keller, 1996), which asks participants, "In general, would you say your health is…" with options of "excellent," "very good," "good," "fair," and "poor." Responses were recoded into a binary