

## Selected Topics: Toxicology



### NALOXONE USE AMONG EMERGENCY DEPARTMENT PATIENTS WITH OPIOID OVERDOSE

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**Abstract—Background:** Emergency department (ED) visits for unintentional opioid overdoses have increased dramatically. Naloxone hydrochloride (Narcan®) is an opioid antagonist commonly used to treat these overdoses. **Objective:** This study was undertaken to identify experiences regarding naloxone use among ED patients with opioid overdose. **Methods:** This prospective survey study was conducted at an urban level I trauma center. A survey was administered to eligible ED patients after unintentional opioid overdose. This study identified current and previous use of naloxone among ED patients with opioid overdose. **Results:** Eight-nine ED patients with accidental overdose of opioids participated (90% participation rate). Most participants reported a history of opioid overdose ( $n = 62$  [70%]). A significant minority stated they have had access to a naloxone kit ( $n = 28$  [31%]). Most participants with a naloxone kit stated that their frequency and dosage of opiate use did not change after access to naloxone ( $n = 17$  [63%]), and a few used opiates more often ( $n = 1$  [4%]) or less often ( $n = 9$  [33%]). There was a significant negative correlation between total dose and age (Spearman  $\rho = -0.27$ ;  $p = 0.01$ ). There was no association between dose and sex. **Conclusions:** Many patients presenting with opioid overdose have had a history of opioid overdose. Patients with opioid overdose required a highly variable dose of naloxone. Higher doses of naloxone were associated with lower age. Despite widespread availability of naloxone to consumers, a minority of patients in this study reported access to naloxone. Participants who had access to a naloxone kit stated that their

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**Keywords—**opioid; naloxone; opioid overdose

#### INTRODUCTION

The use of opioids for both medical and nonmedical use has increased steadily in recent years. The United States is the highest consumer of opioids, accounting for approximately 80% of worldwide use (1–3). More than 4 million people aged 12 years and older report current nonmedical use of prescription pain relievers (4). Unintentional drug overdoses and related deaths have increased dramatically from 1999 to 2016 (5–9). In 2015, opioid-related deaths increased to more than 33,000 deaths per year, and unintentional poisoning deaths have surpassed motor vehicle accidents as the leading cause of death due to unintentional injuries. Since 2013, the rates of deaths due synthetic opioids, such as fentanyl, have more than tripled (10).

Naloxone hydrochloride (Narcan®) is an opioid antagonist that can be administered by intravenous, intramuscular, subcutaneous, or intranasal routes. Naloxone was first approved by the Food and Drug Administration

in 1971 for the reversal of opioid overdose or intoxication. Naloxone is highly effective in reversing the clinical effects of opioid overdose (11–14). The number of naloxone prescription programs (NPPs), designed to provide naloxone administration for patients in the emergency department (ED), has increased steadily over the past decade and paralleled the increased use, abuse, dependence, and overdose of heroin and prescription opiates. Naloxone blocks the central effects of opioids and reverses respiratory depression and altered mental status. Naloxone is highly effective in reversing the clinical effects of opioid overdose (12).

There have been significant local, state, and federal efforts to provide home naloxone kits to laypersons (15,16). Many locations offer naloxone purchase without prescription (17–20). The Harm Reduction Coalition surveyed more than 100 managers of organizations known to provide naloxone reversal kits, and found that over an 18-year period, more than 150,000 people had received home kits, and 26,000 laypersons reported using kits to reverse opioid overdoses. NPPs are designed to provide training and home use naloxone rescue kits to individuals at high risk of opioid overdose. Proper education regarding the outpatient use of naloxone is imperative because it has a relatively short half-life compared to many illicit opioids. It is recommended that patients who receive naloxone in the community and show signs of immediate recovery should still seek medical care, as the recovery may be temporary. Proponents of naloxone in the community argue that these programs will save thousands of lives, as overdose patients are more likely to be recognized and receive timely administration of lifesaving therapy. Naloxone administration by trained community members is an off-label use, however, previous studies have shown an 83–100% survival rate post naloxone administration by bystanders. The Food and Drug Administration is working toward approved uses to improve access to naloxone (21). Some would argue that focusing on education and awareness programs are safer alternatives, as naloxone kits may actually increase patient abuse of opioids because they feel like they have a safety net (22). The effects of naloxone kits on opioid use are unknown.

## OBJECTIVE

This study was undertaken to identify experiences and perspectives regarding out-of-hospital naloxone use among ED patients with opioid overdose.

## METHODS

This prospective survey study was developed by a panel of three emergency medicine faculty with at least 10 years

**Table 1. Description of Study Participants**

Variable	Data
No. of participants	89
Age, y (n = 87)	
Range	20–67
Mean ± SD	40 ± 12
Median (IQR)	36 (30–50)
Sex, n (%)	
Male	60 (67)
Female	29 (33)
Ethnicity, n (%)	
African American	5 (6)
Asian	0 (0)
White	83 (93)
Hispanic	0 (0)
Multiracial	1 (1)
Other	0 (0)
Mode of arrival in ED, n (%)	
Walk-in	3 (3)
Ambulance	86 (97)
History, n (%)	
Opioid overdose	74 (94)
Suicidal ideation and opioid overdose	2 (3)
Other and opioid overdose	2 (3)
Missing data	11 (12%)
ETOH, n (%)	
Negative	2 (2)
Not done	87 (98)
Urine toxicology, n (%)	
Negative	3 (3)
Positive	3 (3)
Not done	83 (93)
Prehospital naloxone dose,* mg (n = 88)	
Range	0–26
Mean ± SD	5.8 ± 5.0
Median (IQR)	4 (2–8)
ED naloxone dose,† mg (n = 89)	
Range	0–4
Mean ± SD	0.1 ± 0.6
Median (IQR)	0 (0–0)
Total naloxone (prehospital and ED)‡ (n = 88)	
Range, mg	0–26
Mean ± SD, mg	5.9 ± 4.9
Median (IQR), mg	4 (2–8)
ED diagnosis	
Accidental overdose of heroin, n (%)	85 (99)
Heroin abuse, n (%)	1 (1)
Suicidal ideation or behavior, n (%)	0 (0)
Missing, n	3
ED disposition	
Discharge to home, n (%)	86 (99)
Hospital admission, n (%)	1 (1)
Missing, n	2

ED = emergency department; ETOH = alcohol; IQR = interquartile range; SD = standard deviation.

\* Eight subjects had zero.

† Eighty-four subjects had zero.

‡ Five subjects had zero.

of clinical experience. The study was approved by the Wright State University Institutional Review Board. This study was conducted at Miami Valley Hospital, an urban level I trauma center. The survey was not piloted before data collection. Consecutive patients were

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