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Factors associated with help seeking by community responders trained in overdose prevention and naloxone administration in Massachusetts

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ABSTRACT

Background: Community overdose responders do not always seek help from emergency services when administering naloxone. We aimed to identify responder, overdose event, and community characteristics associated with help seeking from emergency services during overdoses reported by Massachusetts Overdose Education and Naloxone Distribution (OEND) enrollees, and to assess trends in help seeking over time.

Methods: We analyzed overdose reports submitted between 2007 and 2017 to the Massachusetts Department of Public Health. We used logistic regression, stratified by responder drug use status, to assess associations of characteristics with help seeking during an overdose.

Results: From January 2007 through December 2017, there were 69,870 OEND enrollees. 5,588 enrollees reported 10,246 overdoses. Help seeking was more likely among responders who did not use drugs. Among responders who did not use drugs, help seeking was more likely when: the responder was older or female, the victim was a stranger or client, and when naloxone did not work. Among responders who used drugs, help seeking was more likely when: the responder was female or had not previously reported responding to an overdose, the victim was a stranger or client or did not use fentanyl, naloxone took a longer time to work, and when the overdose was public or occurred more recently. The percentage of overdoses where help seeking occurred reached a maximum in 2016 at 50%.

Conclusions: Help seeking by OEND enrollees was significantly associated with several responder, victim, and event characteristics. Targeted interventions to promote help seeking are warranted, particularly as the lethality of opioid supplies rises.

1. Introduction

1.1. Background

Between 2000 and 2017, over 675,000 people died from drug overdoses in the United States, a majority due to opioids (Ahmad et al., 2018; Hedegaard et al., 2017). Despite increased public education and prevention efforts, overdose deaths continue to rise; in 2017, there were almost 50,000 recorded cases of deaths due to opioids, more than any other year on record (Ahmad et al., 2018). Opioid overdoses progress to death over seconds to hours and are often witnessed by bystanders (Baca and Grant, 2007; Ogeil et al., 2018; Powis et al., 1999). Because of this, community-based overdose education and naloxone distribution (OEND) programs have trained potential bystanders to prevent, recognize, and respond to opioid overdoses (Wheeler et al., 2015). The key elements for overdose response, consistent with American Heart

Abbreviations: OEND, overdose education and naloxone distribution; MDPH, Massachusetts Department of Public Health; MCSR, Massachusetts Controlled Substances Registration; BSAS, Bureau of Substance Addiction Services

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Association guidelines and analogous to Basic Life Support algorithms for cardiac arrest, include: seeking help from emergency services, performing rescue breathing, administering naloxone, and staying with the victim until help arrives or the victim recovers (Kleinman et al., 2015; Neumar et al., 2015). Yet, despite being trained in these elements, bystanders often do not take the first step of seeking help from emergency services (Bohnert et al., 2011; Doe-Simkins et al., 2009; Seal et al., 2005).

1.2. Importance

Calling for help has as of yet not been demonstrated to directly improve mortality after an overdose. Indeed, evidence shows that people who survive overdoses in the pre-hospital setting and refuse transport to an emergency department are unlikely to experience mortality in the short-term (Vilke et al., 2003; Wampler et al., 2011; Willman et al., 2017). Furthermore, overdose survivors may experience prolonged wait times and untreated withdrawal symptoms while in the emergency department, making it understandable why some may hesitate to help seek from emergency services. However, given the dire shifts in the drug landscape attributed to fentanyl, the fact that surviving an overdose represents a leading risk factor for subsequent overdose mortality (Larochelle et al., 2018; Stoove et al., 2009), and recent efforts to better engage and treat people with opioid use disorders in the emergency department (D'Onofrio et al., 2015), help seeking remains a relevant part of the OEND algorithm.

Much of the recent increase in overdose mortality has been attributed to the growing ubiquity of fentanyl, particularly in the Northeast, Midwest, and Southeast regions of the United States (CDC, 2016). There have also been case reports of fentanyl in the opioid supply in California (Armenian et al., 2017; Vo et al., 2016). Reports of cases where multiple doses of naloxone are needed to reverse the overdose are becoming more frequent (US DEA, 2017; Somerville et al., 2017; Sutter et al., 2017). Even when reversed, effects of fentanyl, due to its affinity for the μ opioid receptor and its pharmacokinetic properties, may last longer than naloxone and re-overdose may occur (Armenian et al., 2018). Complications such as aspiration or anoxic brain injury may necessitate further medical care (Solis et al., 2017). In addition, emergency departments are beginning to initiate treatment for patients with opioid use disorder, following preliminary evidence that this increases engagement with treatment after discharge (D'Onofrio et al., 2015). In 2018, Massachusetts adopted a state law mandating emergency departments to offer treatment to people with opioid use disorders (Commonwealth of Massachusetts, 2018). Furthermore, because police are oftentimes dispatched along with ambulances to 911 calls, a growing number of jurisdictions have implemented Good Samaritan laws granting legal protections to people who call for help, with preliminary evidence demonstrating that knowledge of these laws increases help seeking (Jakubowski et al., 2018). It is thus becoming more important, and feasible, to engage emergency services for management of opioid overdoses.

Research has found rates of help seeking among *untrained* bystanders who respond to opioid overdoses between 21–53%, depending on the study (Bennett and Higgins, 1999; Darke et al., 2000; Powis et al., 1999; Seal et al., 2005; Strang et al., 2000; Tobin et al., 2005). Rates of help seeking among *trained* bystanders have varied between 23–74% (Dettmer et al., 2001; Doe-Simkins et al., 2009; Enteen et al., 2010; Piper et al., 2008; Seal et al., 2005; Sherman et al., 2008). While one study of attitudes in United Kingdom found that intentions of help seeking were present in over 95% of participants before and after OEND training (Strang et al., 2008), a study in Baltimore found help seeking rates went from 65% pre-training down to 41% post-training (Tobin et al., 2009). Another study in Massachusetts showed pre- and post-training rates of 27% and 23%, respectively (Doe-Simkins et al., 2014).

Prior research has aimed at understanding who and when people call for help. These studies found that help seeking was more likely when a responder: was female, had no personal history of overdose, had a history of an overdose that resulted in going to the hospital, or had a history of witnessing a fatal overdose. Help seeking was also more likely when the victim did not respond to other measures or when the overdose became fatal (Bohnert et al., 2009; Tobin et al., 2005; Tracy et al., 2005). Overdoses in public settings were shown in one study to be associated with increased help seeking compared to private settings, while it showed no association in another (Tobin et al., 2005; Tracy et al., 2005). Qualitative studies attempting to understand why people do not help seek found the following reasons: confidence in managing overdoses without help, the expectation that other bystanders present would do so, and a fear of having to interact with police (Baca and Grant, 2007; Darke et al., 1996; Davidson et al., 2002; Tobin et al., 2005; Tracy et al., 2005). These studies, however, have been limited by relatively small sample sizes, inclusion of only populations of people who use drugs, and cross-sectional study designs. Furthermore, there have been a growing number of state-funded community coalitions focused on overdose prevention and response, as well as fire and police departments that carry naloxone. The impact that these initiatives have on help seeking has not been well studied to date. No prior studies have studied help seeking over time.

The Massachusetts Department of Public Health has supported OEND programs since 2007 and has a database that links OEND enrollments to reported overdose rescue attempts. This database provides an opportunity to identify responder, overdose event, and community characteristics associated with help seeking. In identifying those more or less likely to help seek during an overdose, programs can target specific populations among which to emphasize help seeking. Alternatively, trainings among non-help seeking groups could emphasize alternative strategies to mitigate the harms from an overdose.

1.3. Goals of this investigation

Our goals were to identify what characteristics of overdose responders, overdose events, and communities were associated with help-seeking, and to find trends in help seeking over time. First, we hypothesized that several responder and event characteristics would be associated with help seeking. Among those not previously studied or with inconclusive findings, these included overdoses occurring in public versus those in private, and when the overdose was more severe, such as when the naloxone took more time to work, did not work, or poly-substance use was involved. We also hypothesized that Black and Hispanic responders would be less likely to seek help because of historically negative relationships with law enforcement. This effect has been demonstrated in other contexts of help seeking (ex. responding to cardiac arrest), although it has not yet been examined in the context of responding to overdoses (Desmond et al., 2016; Sasson et al., 2015). Second, we hypothesized that help seeking would be more common in communities with overdose prevention coalitions and emergency responders equipped with naloxone, because these programs would indicate less community-level stigma and a greater potential to help. This would be the first study assessing how these programs impact help seeking. Finally, we hypothesized that help seeking would increase over time due to the increasing severity of overdoses involving fentanyl, the implementation of Good Samaritan laws decreasing fears of legal repercussions, and increases in public awareness around overdose.

2. Methods

2.1. Study design and program description

We conducted a cohort study of people who refilled their naloxone kits after being trained by the MA OEND program, a collaboration between the Bureau of Infectious Disease and Laboratory Sciences, and the Bureau of Substance Addiction Services (BSAS). OEND services are provided by programs located in community-based medical and non-

medical settings. From 2006 to 2017, the number of agencies in Massachusetts providing OEND services increased from two to sixteen (Bharel, 2016).

Programs have trained, non-medical, public health workers provide education about how to prevent, recognize, and respond to an overdose. Under a program standing order, these OEND staff also distribute naloxone rescue kits. Venues where these agencies conduct OEND include syringe service/harm reduction programs, testing facilities, linkage programs, inpatient detoxification facilities, methadone maintenance programs, residential and intensive outpatient treatment programs, homeless shelters, street outreach, and home visits. Agencies target people who use drugs as well as people who do not, such as families of those who have substance use disorders (Bagley et al., 2018; Doe-Simkins et al., 2014; Walley et al., 2013a, b). All Massachusetts OEND programs utilize a MDPH-approved training curriculum adapted for intranasal naloxone (Doe-Simkins et al., 2014). Depending on the enrollees' previous experience and familiarity with overdose, the setting, and the number of people being educated, trainings last between five minutes to an hour.

2.2. Selection of participants

The focus of this analysis was on help seeking during rescue attempts reported between January 1, 2007 through December 31, 2017 by Massachusetts OEND program enrollees who returned to the program for a naloxone refill.

2.3. Interventions/Data collection

As part of each training, OEND program staff complete an initial enrollment form for each new enrollee. This form includes information about the enrollee's demographics as well as his/her history of drug use, addiction treatment, and history witnessing and experiencing overdoses. When enrollees subsequently return for a refill of naloxone, staff complete a separate refill form. This form includes information about the use of the previous dose of naloxone and, if it was used during an overdose, the circumstances, actions taken, and outcomes of that event. Each enrollee has a unique program code that is used to link enrollment and refill records. The OEND agencies submit enrollment and refill forms to the MDPH regularly. This study was approved by the institutional review boards of the MDPH and the Boston University Medical Campus.

2.4. Measurements – descriptive variables and factors explored

From the enrollment questionnaire, we examined the following responder variables: age (categorized into ≤ 25, 26–40, 41–55, or ≥ 56), gender, race/ethnicity, zip code of residence, and lifetime history of witnessed overdoses. The following variables were collected only from people who reported using drugs: lifetime history of overdoses and recent histories of homelessness, incarceration, emergency department visits, and detoxification program enrollment. All of these variables were self-reported.

We derived two variables, drug use and training status of the responder, from the enrollment questionnaire. A person who used drugs was defined as someone who selected "user," "in treatment," or "in recovery," while a person who did not use drugs was someone who selected "non-user." An enrollee was considered trained if he/she had a completed enrollment questionnaire dated before the refill questionnaire. Untrained participants were defined as those who had a refill report submitted on the same date they were enrolled in the program; this represented people who had obtained naloxone elsewhere, presented to an OEND program for a refill, and were then enrolled at the same time.

From the refill questionnaire, we examined the following overdose event characteristics: year of rescue, gender of overdose victim, relationship of responder to overdose victim (friend, partner, client, family, or stranger), overdose setting (public or private), zip code of event, drugs used by overdose victim (including fentanyl), time for naloxone to work (less than 1 min, 1–3 minutes, 3–5 minutes, more than 5 min, or did not work), number of naloxone doses used, mortality outcome of event, presence of and quality of interaction with emergency services (positive, negative, neutral/unknown), and whether or not help seeking occurred. All of these variables were reported by the responder.

We derived the following three variables from the refill questionnaire: presence of a community prevention coalition where the overdose occurred, presence of a first responder naloxone program where the overdose occurred, and experience of the responder. Presence of a community prevention coalition was affirmative if the zip code of the overdose was within a municipality where a state-funded overdose prevention community coalition existed at the time of the event. Presence of a first responder naloxone program was considered affirmative if the zip code of the overdose was within a municipality covered by a fire or police department that had filed a Massachusetts Controlled Substances Registration (MCSR) for naloxone or received a BSAS naloxone grant before the date of the event. A responder was considered experienced if more than one refill form was linked to his/her program code.

2.5. Outcomes

Help seeking during an overdose was the primary outcome. We defined help seeking as an affirmative response to the question "Was 911/EMTs present?" or "Was 911 called?" The first question ("Was 911/EMTs present?") was the only one asked in a subset of earlier forms, after which both questions were asked on all forms. Missing information about help seeking was defined as help not sought.

2.6. Analysis

We calculated descriptive statistics from the OEND enrollment and refill forms. These included overall characteristics of overdose responders, and a help seeking frequency analysis stratified by people who did and did not use drugs. We then used logistic regression models to determine which independent variables were associated with help seeking. Initially, separate unadjusted models were fit for each independent variable. To minimize the potential for collinearity, we generated a Spearman correlation matrix for all covariates to verify that no pair of variables included in the same regression model was highly correlated ($r > 0.40$). Then, stratified adjusted models were fit for each independent variable. Because more individual characteristics were collected from people who used drugs compared to those who did not, we conducted stratified analyses by drug use status. We conducted a backward stepwise logistic regression procedure from a full model that included the forced-in variables of age, gender, and race/ethnicity. Because our analysis focused on assessing the associations between various factors and help seeking as a binary outcome, we used odds ratios even in the context of a common outcome (Cook, 2002). We used the p-value of 0.15 as the threshold for the backward model selection. Variables in the final adjusted model with p-value of 0.05 or below were considered significant predictors. In addition, we calculated help seeking as a percentage of total rescue reports for each year between 2007 and 2017. Finally, we calculated help seeking rates stratified by whether responders previously reported a positive, neutral, or negative interaction with emergency services. All analyses were performed using SAS software version 9.4.

Table 1
Characteristics of OEND enrollees in the MA OEND program 2007 to 2017: Overdose responders and overdose non-responders.

Enrollee Characteristic		Overall (n = 69,870)	Overdose non-responders (n = 64,282)	Overdose Responders (n = 5,588)	p-value
Person who used drugs		61% (42,543)	59% (37,714)	86% (4,829)	< .0001
Mean age (standard deviation)		38 (13.3)	39 (13.4)	35 (11.1)	< .0001
Female gender		51% (34,992)	51% (32,544)	44% (2,448)	< .0001
Race/Ethnicity	Hispanic	12% (8,478)	12% (7,846)	11% (632)	< .0001
	White	77% (53,456)	77% (48,975)	81% (4,481)	
	Black/AA	7.1% (4,941)	7.3% (4,669)	4.9% (272)	
	Other	3.6% (2,504)	3.6% (2,324)	3.2% (180)	
Lifetime history of witnessing an overdose		62% (42,912)	60% (38,286)	84% (4,626)	< .0001
Lifetime history of experiencing overdose*		46% (19,026)	45% (16,477)	55% (2,549)	< .0001
Recent history of homelessness*		36% (14,688)	35% (12,673)	45% (2,015)	< .0001
Recent history of incarceration*		23% (10,035)	23% (8,774)	27% (1,261)	< .0001
Recent history of emergency room visit*		57% (24,445)	56% (21,535)	62% (2,910)	< .0001
Recent history of enrollment in detoxification program*		54% (23,157)	54% (20,573)	55% (2,584)	0.0626
Record of OEND training prior to first rescue attempt among overdose responders		77% (4,142)	0% (0)	77% (4,142)	

Column percents were calculated based on available responses. Missing responses: Gender (n = 1047), Race/Ethnicity (n = 491), Age (n = 887), Witness OD (n = 825), Lifetime OD (n = 1548), Homelessness (n = 3319), Incarceration (n = 2033), ER visit (n = 2026), Detox (n = 1999), OEND training (n = 241).
*Question only applies to enrollee who actively uses drugs.

3. Results

3.1. Descriptive analysis: Characteristics of overdose responders

From 2007 through 2017, 69,870 people enrolled in the Massachusetts OEND program. Out of this total, 5,588 enrollees reported on 10,246 overdose events. The mean age of responders was 35 years, and most were white, male, and/or used drugs. A majority of all responders had previously witnessed an overdose. Slightly over half of responders who used drugs had survived an overdose themselves. Among people who used drugs, 45% had experienced homelessness in the previous year, 27% had been incarcerated, 62% had visited an emergency department, and 55% had been in a detoxification program. About three-quarters of all responders had been trained before a reported rescue attempt (Table 1).

3.2. Descriptive analysis: help seeking among people who used drugs and people who did not use drugs

Help seeking rates by responder, overdose event, and community level characteristics stratified by drug use status are presented in Table 2. People who did not use drugs had higher rates of help seeking in all age groups. Both females and males who did not use drugs had higher rates of help seeking compared to those who used drugs. Help-seeking rates by race/ethnicity of people who did not use drugs were all higher than among the groups of people who used drugs. People who did not use drugs and were trained also had higher rates of help seeking than trained people who used drugs. For each overdose event and community-level characteristic analyzed, people who did not use drugs consistently had higher rates of help seeking than people who used drugs. When naloxone did not work, however, the proportion of help seeking was 94%, the same for both people who did and did not use drugs.

3.3. Multivariable analysis: Characteristics associated with help seeking among people who used drugs

Among people who used drugs, help seeking occurred in 43% of overdose events. Help seeking was more likely when the responder was female compared to male (AOR 1.25 95% CI 1.10–1.42), when the overdose was in a public versus a private setting (AOR 1.65 95% CI 1.47–1.87), and when a longer duration was necessary for naloxone to work (compared to < 1 min, AOR 1.04 95% CI 0.87–1.24 for 1–3 minutes, AOR 1.34 95% CI 1.12–1.59 for 3–5 minutes, AOR 1.47 95% CI 1.22–1.77 for > 5 min). The odds of help seeking were particularly high when the naloxone did not work (AOR 27.41 95% CI 16.33–46.00). Each year, there was an increase in odds that the responder who used drugs would help seek (AOR 1.04 95% CI 1.01–1.08). Help seeking was less likely when the responder had previously responded to an overdose (AOR 0.74 95% CI 0.67 to 0.83), and when the responder was a friend/partner/family member to the victim compared to a stranger or client (AOR 0.43 95% CI 0.36 to 0.50). The remaining variables were not significantly associated with help seeking (Table 3).

3.4. Multivariable analysis: Characteristics associated with help seeking among people who did not use drugs

Among people who reported not using drugs, help seeking occurred in 71% of overdose events. Help seeking was more likely when the responder was older (compared to the 26–40 age group, AOR 1.96 95% CI 1.16–3.29 for 41–55 age group, AOR 4.29 95% CI 2.35–7.83 for 56 and older). Females were more likely to help seek than males (AOR 2.22 95% CI 1.49–3.33), and help seeking was more likely when the naloxone did not work when compared to when it worked in < 1 min (AOR 14.95 95% CI 3.12–71.65). Help seeking was less likely when the responder was a friend/partner/family member of the victim (AOR 0.18 95% CI 0.11 to 0.28). The remaining variables were not significantly associated with help seeking.

3.5. Help seeking over time

In the eleven-year period from 2007 through 2017, the number of rescue reports increased from 31 to 2,629 per year (Fig. 1). The percentage of reported cases where help seeking occurred increased between six of the ten intervening years of our observation period, with the lowest percentage in 2008 at 28% and the highest percentage in 2016 at 50%.

3.6. Help seeking after previous interaction with emergency services

In 2,249 reports of interactions with emergency services followed by a subsequent report by the same responder of another overdose rescue attempt, just over half (52%) reported the quality of the initial interaction as neutral or unknown, while there were almost twice as many reports of positive interactions (33%) than negative ones (16%) (Table 4). Regardless of whether the interaction was positive, negative, or neutral/unknown, help seeking occurred at a subsequent rescue attempt more often than not (67%, 65%, 62%, respectively), with no

Table 2
Help-seeking frequencies during overdose rescue attempts among users and non-users in the Massachusetts OEND program 2007–2017.

Characteristic	Response	Overall Responders who called for help	Responders who used drugs and called for help	Responders who did not use drugs and called for help
Responder Characteristics				
Age	25 and younger	46% (901 / 1977)	43% (792 / 1830)	74% (109 / 147)
	26-40	45% (2296 / 5117)	43% (2032 / 4706)	64% (264 / 411)
	41-55	49% (1156 / 2377)	44% (866 / 1969)	71% (290 / 408)
	56 and older	58% (319 / 550)	40% (118 / 298)	80% (201 / 252)
Gender	Female	51% (2304 / 4515)	46% (1774 / 3825)	77% (530 / 690)
	Male	43% (2433 / 5620)	41% (2081 / 5061)	63% (352 / 559)
Race/Ethnicity	Hispanic	47% (562 / 1198)	43% (454 / 1060)	78% (108 / 138)
	White	47% (3802 / 8161)	43% (3102 / 7154)	70% (700 / 1007)
	Black	47% (240 / 514)	44% (200 / 452)	65% (40 / 62)
	Other	49% (161 / 330)	43% (122 / 281)	80% (39 / 49)
Lifetime history of witnessing an overdose	Yes	46% (4003 / 8716)	43% (3361 / 7789)	69% (642 / 927)
	No	52% (723 / 1385)	46% (493 / 1075)	74% (230 / 310)
Lifetime history of experiencing overdose	Yes	43% (2077 / 4834)	43% (2077 / 4834)	–
	No	44% (1697 / 3834)	44% (1697 / 3834)	–
Recent history of homelessness	Yes	44% (1734 / 3944)	44% (1734 / 3944)	–
	No	43% (1843 / 4285)	43% (1843 / 4285)	–
Recent history of incarceration	Yes	42% (972 / 2290)	42% (972 / 2290)	–
	No	43% (2673 / 6146)	43% (2673 / 6146)	–
Recent history of emergency room visit	Yes	44% (2404 / 5408)	44% (2404 / 5408)	–
	No	41% (1253 / 3022)	41% (1253 / 3022)	–
Recent history of enrollment in detoxification program	Yes	43% (2023 / 4715)	43% (2023 / 4715)	–
	No	44% (1632 / 3735)	44% (1632 / 3735)	–
OEND training prior to first rescue attempt	Yes	46% (4231 / 9125)	43% (3440 / 7995)	70% (791 / 1130)
	No	50% (539 / 1085)	46% (443 / 961)	77% (96 / 124)
Overdose Event Characteristics				
Gender of victim	Female	45% (1671 / 3720)	42% (1397 / 3304)	66% (274 / 416)
	Male	47% (3021 / 6380)	44% (2424 / 5558)	73% (597 / 822)
Relationship of responder to victim	Friend	41% (2892 / 7097)	40% (2651 / 6622)	51% (241 / 475)
	Partner	37% (304 / 825)	37% (284 / 771)	37% (20 / 54)
	Client	90% (342 / 379)	75% (78 / 104)	96% (264 / 275)
	Family	60% (429 / 712)	51% (244 / 482)	80% (185 / 230)
	Stranger	66% (816 / 1233)	63% (638 / 1010)	80% (178 / 223)
Setting of overdose	Private	41% (2651 / 6446)	38% (2191 / 5728)	64% (460 / 718)
	Public	56% (2075 / 3697)	52% (1668 / 3186)	80% (407 / 511)
Polydrug use by victim	One drug only	46% (2903 / 6285)	43% (2351 / 5493)	70% (552 / 792)
	More than one drug	45% (1615 / 3627)	42% (1372 / 3267)	68% (243 / 360)
Known or suspected fentanyl use by victim	Fentanyl suspected	44% (751 / 1705)	42% (639 / 1539)	67% (112 / 166)
	No Fentanyl	47% (4032 / 8541)	44% (3256 / 7450)	71% (776 / 1091)
Time for naloxone to work	Less than 1 Min	41% (471 / 1156)	37% (373 / 995)	61% (98 / 161)
	1 - 3 Min	40% (1187 / 2933)	37% (973 / 2605)	65% (214 / 328)
	3 - 5 Min	46% (1343 / 2907)	43% (1098 / 2572)	73% (245 / 335)
	More than 5 Min	49% (1263 / 2603)	45% (1029 / 2289)	75% (234 / 314)
	Did not work	94% (407 / 434)	94% (340 / 363)	94% (67 / 71)
Victim outcome	Lived	46% (4554 / 9995)	42% (3709 / 8784)	70% (845 / 1211)
	Did not live	91% (180 / 197)	91% (152 / 167)	93% (28 / 30)
Doses of naloxone used	1	43% (1530 / 3573)	40% (1257 / 3139)	63% (273 / 434)
	2	48% (2479 / 5137)	45% (2047 / 4540)	72% (432 / 597)
	3	48% (336 / 703)	43% (262 / 615)	84% (74 / 88)
	4 or more	54% (356 / 661)	49% (268 / 551)	80% (88 / 110)
Experienced rescuer	Yes	43% (2331 / 5373)	41% (1962 / 4824)	67% (369 / 549)
	No	50% (2452 / 4873)	46% (1933 / 4165)	73% (519 / 708)
Community Level Characteristics				
Community coalition where overdose occurred	Yes	46% (773 / 1684)	44% (636 / 1458)	61% (137 / 226)
	No	47% (3863 / 8263)	43% (3141 / 7272)	73% (722 / 991)
First responder naloxone program where overdose occurred	Yes	48% (3198 / 6673)	45% (2636 / 5888)	72% (562 / 785)
	No	44% (1438 / 3274)	40% (1141 / 2842)	69% (297 / 432)

significant difference ($p > 0.05$) in the subsequent rates of help seeking between the three groups.

4. Discussion

4.1. Main discussion

We found that setting, responder gender, responder age, severity of overdose, responder relationship to victim, and experience were all independently associated with help seeking. Among people who used drugs, overdoses occurring in public versus private settings were significantly associated with help seeking. This is consistent with prior research that suggests that a greater level of anonymity in public and a lower risk of negative interactions each facilitates help seeking (Tracy et al., 2005). Qualitative research has revealed the perception that public settings are easier to flee, and having first responders come to a private residence, where neighbors may notice and illicit drugs may be kept, is undesirable (Klimas et al., 2014; Lankenau et al., 2013). Females who used drugs were also more likely to help seek compared to males, as demonstrated in previous studies (Tobin et al., 2005). In addition, people of older age who did not use drugs were more likely to help seek, although this effect was not seen among people who used

Table 3
Factors associated with help seeking during an overdose rescue attempt in MA OEND Program, unadjusted and adjusted models.

Variable	Unadjusted non-stratified OR (95% CI)	Adjusted: People who used drugs stratum OR (95% CI)	Adjusted: People who did not use drugs stratum OR (95% CI)
Responder Characteristics			
Drug use: Did Use vs Did Not Use	**0.32 (0.26, 0.39)**	N/A	N/A
Age Group			
≤ 25	1.03 (0.90, 1.18)	1.00 (0.86, 1.16)	1.71 (0.93, 3.14)
26-40	REF	REF	REF
41-55	1.16 (1.00, 1.35)	1.06 (0.90, 1.24)	**1.96 (1.16, 3.29)**
≥ 56	**1.70 (1.27, 2.27)**	0.87 (0.57, 1.31)	**4.29 (2.35, 7.83)**
Gender: Female vs. Male	**1.37 (1.22, 1.53)**	**1.25 (1.10, 1.42)**	**2.22 (1.49, 3.33)**
Race/Ethnicity			
Black/AA	1.00 (0.75, 1.34)	1.01 (0.73, 1.39)	0.61 (0.26, 1.43)
Hispanic	1.01 (0.85, 1.21)	0.97 (0.81, 1.16)	1.54 (0.84, 2.84)
Other	1.09 (0.83, 1.44)	1.00 (0.73, 1.37)	1.71 (0.82, 3.57)
Non-Hispanic White	REF	REF	REF
Lifetime history of witnessing overdose	**0.78 (0.67, 0.90)**	Removed	Removed
Lifetime history of experiencing overdose	0.95 (0.84, 1.07)	Removed	N/A
Recent history of homelessness	1.02 (0.90, 1.15)	Removed	N/A
Recent history of incarceration	0.94 (0.82, 1.07)	Removed	N/A
Recent history of emergency dept visit	1.09 (0.96, 1.23)	1.13 (1.00, 1.29)	N/A
Recent history of enrollment in detox program	0.95 (0.84, 1.07)	Removed	N/A
Previous rescue attempt	**0.76 (0.69, 0.83)**	**0.74 (0.67, 0.83)**	0.73 (0.51, 1.04)
Overdose Event Characteristics			
Relationship to victim			
Friend/Family/Partner	**0.28 (0.25, 0.33)**	**0.43 (0.36, 0.50)**	**0.18 (0.11, 0.28)**
Stranger/Client	REF	REF	REF
Setting: Public vs. Private	**1.83 (1.65, 2.03)**	**1.65 (1.47, 1.87)**	1.46 (0.95, 2.25)
Polydrug use by victim	0.94 (0.85, 1.02)	Removed	1.21 (0.84, 1.76)
Fentanyl use	**0.88 (0.78, 0.99)**	**0.75 (0.64, 0.87)**	Removed
Time for naloxone to take effect			
< 1 min	REF	REF	REF
1-3 min	0.99 (0.85, 1.15)	1.04 (0.87, 1.24)	1.20 (0.72, 1.99)
3-5 min	**1.25 (1.08, 1.45)**	**1.34 (1.12, 1.59)**	1.38 (0.80, 2.38)
> 5 min	**1.37 (1.17, 1.60)**	**1.47 (1.22, 1.77)**	1.44 (0.79, 2.64)
Did not work	**21.92 (14.16, 33.94)**	**27.41 (16.33, 46.00)**	**14.95 (3.12, 71.65)**
Doses of naloxone used			
1	REF	REF	REF
2	**1.25 (1.13, 1.37)**	Removed	1.39 (0.97, 1.97)
3	**1.22 (1.02, 1.47)**	Removed	1.72 (0.71, 4.16)
4+	**1.56 (1.30, 1.88)**	Removed	1.82 (0.92, 3.61)
Year of Refill	**1.05 (1.03, 1.08)**	**1.04 (1.01, 1.08)**	Removed
Community Level Characteristics			
Community coalition where overdose occurred	0.97 (0.85, 1.10)	1.11 (0.96, 1.28)	Removed
First responder naloxone program where overdose occurred	**1.17 (1.06, 1.31)**	Removed	Removed

Legend: Removed = removed during stepwise regression procedure, N/A = Not Applicable to the Non-User cohort.
Missing values in independent variables are removed from each model.

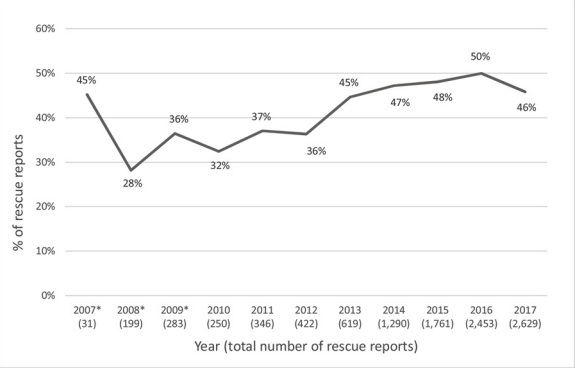

Fig. 1. Help seeking as a percentage of total rescue reports over time 2007–2017.
*21/31 rescue reports in 2007, 187/199 reports in 2008, and 55/283 reports in 2009 used a different version ("Was 911/EMTs present?"), instead of the subsequent standard (combination of "Was 911 called?" and/or "Was 911/EMTs present?") of the question used to determine our main outcome.

Table 4
Quality of interaction with emergency services and help-seeking at subsequent overdose events.

Quality of previous interaction with public safety (Total = 2,249)		Help Sought at Next Overdose Response	p-value
Positive	33% (734)	67% (492/734)	0.0519
Negative	15% (354)	65% (229/354)	
Neutral/Unknown	52% (1,161)	62% (715/1,161)	

drugs. Older people who did not use drugs may represent parents of people who used drugs and are therefore more likely to call for help.

Among both people who did and did not use drugs, the longer it took naloxone to take effect, the more likely the responder was to help seek, although this effect did not reach statistical significance in the latter group. Furthermore, the strongest association with help seeking in our analysis was when naloxone did not work. This implies that help seeking followed naloxone administration despite the fact that the OEND training algorithm prioritizes help seeking before naloxone administration. This pattern suggests that many responders view help seeking as a last resort.

Characteristics associated with a lower likelihood of help seeking

included, among both people who used and did not use drugs, responders who identified themselves as friends, partners, or family members of the victim. While one might assume that the closer the relationship with the victim, the more inclined the responder is to ensure their safety, it may be that they are more concerned about protecting them from the stigma of an overdose. Among people who used drugs, other characteristics associated with a lower likelihood of help seeking included previously recorded overdose response and suspected fentanyl use by the victim. Studies have found that help-seeking rates decreased after training because trained responders felt confident in their ability to handle the situation without assistance; a similar sense of confidence may apply to those who have experience responding to an overdose (Tobin et al., 2009). As for the fentanyl association, it is likely that fentanyl use by the victim was underreported, owing to the practical challenges for the responder, let alone the person using drugs, to know whether or not there is fentanyl in the drug supply.

While most other studies have cohorts made up exclusively of populations who use drugs, ours also includes a large population of people who do not, such as families of, and professionals who work with, people who use drugs (Ambrose et al., 2016; Bohnert et al., 2009; Lankenau et al., 2013; Tobin et al., 2005; Tracy et al., 2005). As we hypothesized, our data showed that people who used drugs were significantly less likely to help seek compared to people who did not use drugs. Most overdose intervention programs target people who use because they represent the group most likely to witness an overdose. Yet research has found that they oftentimes do not call for help because of fears of adverse consequences, familiarity with drugs, and confidence in their abilities to manage overdoses alone (Tracy et al., 2005). These factors are often not present for people who do not use drugs.

Several characteristics that we hypothesized would be associated were not significantly associated with help seeking. We expected to find an association with race and ethnicity because of historically strained relationships between law enforcement and racial and ethnic minorities (Fielding-Miller et al., 2018; Sasson et al., 2015) but did not find a significant difference in rates of help seeking. While this is encouraging at the surface, more work is warranted to understand how structural racism impacts help seeking as well as engagement in harm reduction and addiction treatment services. We also expected that people who used other drugs in addition to opioids would experience more severe overdoses and thus have higher rates of help seeking, though this was not found. It may be that polysubstance use is an important overdose risk factor but does not appear to impact the likelihood of help seeking once the overdose has happened (Jones and McAninch, 2015; Visconti et al., 2015). Alternatively, polysubstance use may have been underreported owing to the difficulty of knowing what substances someone else used.

We also hypothesized that the presence of a community coalition or first responder agency with a naloxone program would lead to greater destigmatized awareness about overdoses and thus lead to greater rates of help seeking. Yet the existence of such programs in the areas where an overdose occurred was either insignificant or removed during the stepwise regression in the adjusted models. There is a need for further research to better understand how OEND programs, first responder agencies, and community coalitions can work together to maximize help seeking, such as research on police non-attendance policies like those implemented in parts of Canada (Karamouzian et al., 2019). The impact of these policies on help seeking among those who fear legal repercussions, even with Good Samaritan Laws in place, should be studied.

Overall, help seeking from emergency services occurred in 47% of overdose reports, consistent with previous studies (Ambrose et al., 2016; Tobin et al., 2005; Tracy et al., 2005). Over time, help seeking increased between most subsequent years, including between four of the past five. This was expected considering growing public awareness of overdoses, the establishment of Good Samaritan laws passed in Massachusetts in 2012, and the increasing fatality threat attributed to fentanyl (Jakubowski et al., 2018; Somerville et al., 2017).

In our analysis of the association of the interaction between responders and emergency services and help seeking at the subsequent overdose, we found there were more positive interactions than negative ones. While the rate of subsequent help seeking was slightly greater among those who previously had a positive interaction than those who had a negative one, it was not the significant difference we expected. Thus, fear of repeating a previous negative experience with emergency services did not appear to be a driving reason for why responders did not help seek. Importantly, whether people had a positive, negative, or neutral interaction with emergency services, only two-thirds or less of the responders decided to help seek again on their subsequent response. This may partially be explained by the effect of experience on help seeking described earlier, but further efforts are warranted to understand how emergency services themselves can further encourage people to help seek.

4.2. Limitations

This study has several limitations. First, we conducted this study in Massachusetts where conditions are not generalizable to other states, though the Massachusetts experience may provide insight into how things may evolve in other states. Massachusetts was an early adopter of health insurance expansion in 2006, experienced an increase in overdoses from heroin and then a surge from fentanyl earlier than many other states, and concomitantly expanded access to community overdose education and naloxone earlier than other states. Second, while OEND program staff were trained to collect and regularly review data, the primary goals of these agencies were programmatic; thus, form completeness may have occasionally been sacrificed, leading to missing data. Third, overdose rescue reports were collected by convenience, rather than systematically. Information about overdose events was gathered only when responders returned to the programs on their own initiative for a naloxone refill, so overdose events were likely undercounted. We do not know how those who came back for a refill and completed an overdose rescue attempt report were different from those who did not, and how this would bias the results. However, there are no large cohort studies with systematic follow-up among overdose responders, and this study represents the best data available to understand factors associated with help seeking. Fourth, several characteristics in the refill questionnaire, primarily those asking about polydrug and fentanyl use by the victim, were likely underreported given the unpredictability of the drug supply. Fifth, because no centralized database listing of community overdose prevention coalitions exists, we used other data sources to determine when communities had a coalition funded by state grants. The existence of several coalitions predated this funding, so our list of overdoses that occurred in a coalition-covered area was undercounted, again potentially masking a true association.

4.3. Implications

Opioid overdose is a true medical emergency that can result in medical complications in the short-term and marks a risk factor for subsequent fatal overdose. To increase help seeking, post overdose care by ambulance responders and emergency departments should include treatment of post-naloxone withdrawal and engage survivors into longer-term treatment for opioid use disorders and overdose risk reduction. Good Samaritan laws that protect rescuers and overdose victims from arrest and prosecution should be promoted among people who use opioids and law enforcement themselves to address fears of arrest. For those still unwilling or unable to call for help, it is important to support alternative strategies. These include rescue breathing while waiting for naloxone to work and staying with the person after administering naloxone to ensure that overdose does not recur.

4.4. Conclusion

This study included overdose rescue reports over a span of 11 years from a large cohort of community responders that were trained in OEND. Help seeking by community responders was significantly associated with several responder and victim characteristics and increased between six of the last ten intervening years between 2007–2017 in Massachusetts. This information should guide the development of targeted interventions to further increase help seeking and support alternative strategies among specific populations in order to keep overdose victims safe.

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Contributors

JL, SR, AW conceived the study. LF, SR, ZX, BC, KC, AW oversaw the data collection. ZX provided statistical guidance. LF managed the database and conducted the analyses. JL drafted the first draft of the manuscript, and all authors contributed substantially to its revision. AW takes responsibility for the paper as a whole. All authors have approved the final article.

Declaration of Competing Interest

No conflict declared.

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