

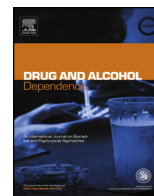


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Short communication

### Brief overdose education is sufficient for naloxone distribution to opioid users ☆,☆☆

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#### ABSTRACT

**Background:** While drug users are frequently equipped with naloxone for lay opioid overdose reversal, the amount of education needed to ensure knowledge of indications and administration is unknown.

**Methods:** We administered four instruments, assessing comfort and knowledge around opioid overdose and naloxone administration, to opioid users receiving naloxone for the first time ( $N=60$ ) and upon returning for a refill ( $N=54$ ) at community distribution programs. Participants completed the instruments prior to receiving naloxone; first-time recipients repeated the instruments immediately after the standardized 5–10 min education.

**Results:** Comfort with recognition of, response to, and administration of naloxone for an overdose event significantly increased after brief education among first-time recipients ( $p < 0.05$ ). Knowledge of appropriate responses to opioid overdose was high across all assessments; 96% of participants could identify at least one acceptable action to assess and one acceptable action to care for an opioid overdose. Facility with naloxone administration was high across all assessments and significantly increased for intranasal administration after education for first-time recipients ( $p < 0.001$ ). First-time recipients (before and after education) and refillers demonstrated a high level of knowledge on the Brief Overdose Recognition and Response Assessment, correctly identifying a mean of 13.7 out of 16 overdose scenarios.

**Conclusions:** Opioid users seeking naloxone in San Francisco have a high level of baseline knowledge around recognizing and responding to opioid overdose and those returning for refills retain that knowledge. Brief education is sufficient to improve comfort and facility in recognizing and managing overdose.

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#### 1. Introduction

Distribution of naloxone to laypersons is increasingly employed in response to the national epidemic of opioid overdose mortality (Centers for Disease and Prevention, 2012). Naloxone is a short-acting, high affinity opioid antagonist that rapidly reverses the effects of opioids through injection or intranasal administration.

Naloxone has no abuse potential and is remarkably safe, with essentially no effects in the absence of opioids (Sporer, 1999). Two decades of experience with naloxone distribution have demonstrated that it can be safely administered by laypersons and high-level observational data suggest that making this medication available to those at risk of experiencing or witnessing an opioid overdose results in community-level reductions in opioid overdose mortality (Walley et al., 2013; Kerr et al., 2009; Barton et al., 2005).

Early naloxone programs dispensed naloxone with brief, sometimes optional, education (Dettmer et al., 2001; Maxwell et al., 2006). As naloxone distribution programs emerged in more formal settings, such as university-based research studies, longer trainings were developed (Seal et al., 2005) and have become standard in selected locations. Some of the 27 states with additional legislative protections for naloxone distribution, such as Maryland, require lengthy trainings that may constitute significant barriers to

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☆☆ The findings and conclusions in this paper are those of the authors and do not necessarily represent the views of the San Francisco Department of Public Health.

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accessing naloxone (Public Health Law Research, 2014). As the overdose epidemic has expanded to prescription opioid users, many programs, such as those in busy medical clinics, again provide only brief education with naloxone prescriptions, addressing key elements like when and how to utilize naloxone. Multiple studies have demonstrated improved recognition and response to opioid overdose and use of naloxone after educational sessions (Doe-Simkins et al., 2009; Green et al., 2008; Walley et al., 2013; Williams et al., 2014). Recent work has demonstrated similar efficacy of education lasting 13 to 18 min (Jones et al., 2014). In fact, a recent paper from the Massachusetts naloxone program found that *untrained* respondents who utilized naloxone obtained by others exhibited high levels of competence with the medication (Doe-Simkins et al., 2014). While there is general consensus on the elements of education necessary for naloxone distribution (review of risk factors for, recognition of, and management of overdose, including naloxone administration), there is dramatic variation in practice regarding the duration – from 5 min to 8 h – of that education (Clark et al., 2014).

In San Francisco, the Drug Overdose Prevention and Education Project (DOPE) has been distributing naloxone since 2003, primarily through low-threshold drug services such as syringe access programs, with education lasting 5 to 10 min. We sought to determine if this brief education was sufficient to educate the target population on overdose recognition and management, including naloxone administration.

## 2. Methods

### 2.1. Setting

Study activities took place from February to July 2014 at four DOPE naloxone distribution sites at syringe access programs in San Francisco. The sites were selected for inclusion based on their longstanding relationship with DOPE and a high volume of opioid-using participants. This study was funded by Open Society Foundations and study procedures were approved by the University of California San Francisco Committee on Human Research, study ID 13-12060.

### 2.2. Participants

Syringe access program staff asked clients who requested naloxone if they were interested in participating in a research study. Those who agreed were screened by the study research associate (RA), consented and enrolled if they were over 18 years of age, spoke English, and self-reported illicit opioid use. Two groups were enrolled: 60 persons receiving their “first-time” naloxone kit, and 60 persons receiving a naloxone “refill”. The decision was made to use both initial and refill participants to determine if the 5 to 10 min education was sufficient for both immediate and long-term retention. Participants received \$10 (first-time group) or \$5 (refill group) compensation after instruments were administered. Study procedures took from 15 to 45 min. As syringe access and naloxone is a low-threshold service, many potential participants did not enroll in the study because they did not have adequate time to complete the study instruments.

### 2.3. Intervention

First-time recipients received opioid overdose and naloxone education conducted by DOPE-trained naloxone educators after the first assessment; refill recipients had received this training from DOPE upon receiving their initial kit. Education was based on a standardized 5 to 10 min curriculum<sup>1</sup> reviewing how to recognize the signs and symptoms of an overdose, respond to an overdose, distinguish an opioid from a non-opioid overdose, and assemble and administer naloxone. Participants were then given a kit including two doses of intranasal (1 mg/mL) or injectable (0.4 mg/mL) naloxone hydrochloride, two atomizer devices, and an overdose prevention and survival brochure. First-time recipients then completed all assessments a second time. Refill recipients underwent the assessment before receiving their refill kit from DOPE staff and did not receive the education intervention.

<sup>1</sup> Supplementary material can be found by accessing the online version of this paper at <http://dx.doi.org/10.1016/j.drugalcdep.2014.12.009>.

### 2.4. Instruments

The RA administered four instruments to participants in both groups prior to receiving naloxone:

- 1) *Comfort scale*: participants were asked three questions assessing their comfort with recognizing and managing an overdose and administering naloxone on a Likert scale from 1 to 4, with 1 being not at all comfortable and 4 being very comfortable.
- 2) *Overdose response assessment*: participants were asked to list all “actions” they would take to identify and assist in an overdose event, including recognition of the event and responses before and after naloxone administration. Four study staff, including a medical doctor, coded the list of unique “actions” as related to assessment of an overdose (checking vital signs, performing physical or verbal stimulation, and establishing event details), or care for an overdose (conducting resuscitation, seeking medical help, and monitoring victim), and rated each action as beneficial or not to an overdose victim. Cases of discordant coding were discussed until consensus was achieved.
- 3) *Naloxone assembly and administration*: participants assembled a naloxone kit and demonstrated how to use it (intranasal or injectable; auto-injector was not available). Participants had access to the instructional image dispensed with the naloxone kits. Participants were evaluated on their ability to properly assemble and administer the device.
- 4) *Brief Overdose Recognition and Response Assessment (BORRA)*: the BORRA is a validated scale to test recognition of overdose symptoms and when to administer naloxone (Green et al., 2008). Participants were asked to identify 16 scenarios as definitely/probably an opioid overdose, an overdose but not an opioid overdose, not an overdose, unsure/not enough information. Participants were then asked if naloxone should or should not be administered in each situation.

### 2.5. Data analysis

Demographic and substance use data for participants were extracted from the DOPE registration and refill database, including the reason for and number of prior refills, based on the unique identifier provided by the participant at the time of study participation.

Means scores for the comfort scale and BORRA instruments were calculated pre- and post-education for the intervention group and differences were evaluated using paired *t*-tests. Differences in proportions for the overdose response assessment and the naloxone assembly and administration instruments were examined using Chi-square tests. Post-education data from first-time recipients were compared to the refill group using independent sample *t*-tests and Chi-square tests, for scores and proportions, respectively.

## 3. Results

### 3.1. Participant characteristics

Sixty first-time recipients and 54 refill recipients were included in the analysis (six refill recipients were excluded because they had previously participated in the study as first-time recipients). Participants in both the education and refill groups were predominantly male, homeless/unstably housed, with a mean age of 45 and 42 for the first-time and refill groups, respectively. Heroin was the most frequently reported drug of choice among both groups. Over 45% of total participants had a history of personal overdose, and over 65% had witnessed at least one overdose (Table 1).

The majority (57%) of refill recipients sought a refill to replace a lost naloxone kit, 41% had used their kit during an overdose event, 2% had an unknown reason for refill, and none reported the kit had been used on them. A mean of 392 days (SD = 605) had passed since the most recent refill. Sixty-nine percent of participants had received at least one refill prior to the refill they received during this study, with a mean of 5.5 refills (SD = 5.7) and 3.6 reversals (SD = 4.2).

### 3.2. Comfort scale (Table 2)

After the education, first-time recipients reported increased comfort with identifying overdose (75–97%), managing overdose (58–98%), and administering naloxone (58–98%). Refill recipients reported high levels of comfort in all domains, with a small but significant difference compared to first-time recipients in comfort administering naloxone.

**Table 1**  
Demographics and substance use characteristics at time of initial naloxone receipt.<sup>a</sup>

	First-time recipients N (%)	Refill recipients <sup>a</sup> N (%)
Gender, males	44 (73%)	33 (62%)
Age, mean (SD)	45 (11)	42 (11)
Race/Ethnicity		
Caucasian	31 (51%)	33 (65%)
African American	18 (30%)	5 (10%)
Latino	5 (8%)	4 (8%)
Mixed/Other	6 (10%)	9 (17%)
Homeless/unstable housing	48 (80%)	34 (65%)
Drug of choice (heroin)	45 (76%)	24 (69%)
Poly-opioid use (≥1)	22 (37%)	18 (51%)
Methadone	19 (32%)	14 (40%)
Cocaine/crack use	27 (45%)	18 (51%)
Methamphetamines	28 (47%)	26 (74%)
Benzodiazepine	16 (27%)	12 (34%)
Alcohol use	35 (59%)	16 (46%)
Prior personal overdose/mean #	28 (47%)/2.5	20 (54%)/4.0
Ever witnessed overdose	40 (67%)	32 (84%)
Ever administered naloxone to another	5 (8%)	7 (18%)
Ever witnessed naloxone administration	17 (29%)	19 (50%)

<sup>a</sup> Demographics and substance use data were collected at the time of first naloxone dispensation. Thus, for refill recipients, some data are missing and substance use data may not reflect participant characteristics at the time of study participation.

### 3.3. Overdose response assessment (Table 2)

Most (96%) first-time (pre- and post-education) and refill recipients were able to identify both at least one acceptable action to assess and at least one acceptable action to care for an overdose

**Table 2**  
Results.

Instrument	First-time recipients		p value Pre- vs. post-education	Refill recipients Refill N (%)	p value Post-education vs. refill
	Pre-education N (%)	Post-education N (%)			
Comfort scale (somewhat/very comfortable)					
Identifying overdose <sup>*</sup>	45 (75%)	58 (97%)	<0.01	53 (98%)	0.45
Managing overdose <sup>*</sup>	35 (58%)	59 (98%)	<0.01	51 (94%)	0.09
Administering naloxone <sup>*†</sup>	35 (58%)	59 (98%)	<0.01	49 (91%)	0.02
Overdose response assessment					
Assessment					
≥ 1 beneficial action	59 (98%)	60 (100%)	≥0.99	54 (100%)	n/a
# beneficial actions mentioned per recipient, mean (SD) <sup>†</sup>	4.4 (2.2)	5.7 (2.3)	<0.01	5.0 (2.1)	0.06
Care					
≥ 1 beneficial action	57 (95%)	59 (98%)	0.62	53 (98%)	≥0.99
# beneficial actions mentioned per recipient, mean (SD) <sup>†</sup>	2.2 (1.6)	3.1 (1.3)	<0.01	3.5 (1.8)	0.10
Naloxone assembly and administration					
Intranasal naloxone					
Uncap device/vial	36 (92%)	43 (100%)	0.10	35 (97%)	0.46
Insert naloxone vial into device	36 (92%)	43 (100%)	0.10	35 (97%)	0.46
Spray 1/2 dose up each nare <sup>*†</sup>	23 (59%)	37 (86%)	<0.01	18 (50%)	<0.01
Injectable naloxone					
Uncap syringe/vial	21 (100%)	17 (100%)	n/a	18 (100%)	n/a
Fill syringe	21 (100%)	17 (100%)	n/a	18 (100%)	n/a
Inject in muscle	20 (95%)	17 (100%)	≥0.99	18 (100%)	n/a
BORRA					
Opioid overdose, mean correct/total <sup>*</sup>	7.5/9	7.9/9	0.02	8.0/9	0.25
Naloxone indicated, mean correct/total	8.0/9	8.1/9	0.36	7.7/9	0.06
NOT opioid overdose, mean correct/total <sup>†</sup>	6.2/7	6.6/7	0.02	6.5/7	0.20
Naloxone NOT indicated, mean correct/total <sup>†</sup>	5.9/7	6.4/7	0.03	6.4/7	0.48

<sup>\*</sup> Significance between first-time recipients pre- and post-education.

<sup>†</sup> Significance between first-time recipients post-education and refill.

event. The mean number of acceptable responses first-time recipients mentioned for *assessing an opioid overdose* increased after education (from 4.4 [SD=2.2] to 5.7 [SD=2.3];  $p < 0.001$ ). Refill recipients mentioned a mean of 5.0 (SD = 2.1) acceptable responses for *assessing an opioid overdose*. The mean number of acceptable responses first-time recipients mentioned for *providing care for an opioid overdose* increased after education (from 2.2 [SD = 1.6] to 3.1 [SD = 1.3];  $p < 0.001$ ). Refill recipients mentioned 3.5 (SD = 1.8) acceptable responses for *providing care for an opioid overdose*.

### 3.4. Naloxone assembly and administration (Table 2)

Participants were asked to assemble and demonstrate naloxone administration; 75 participants chose to receive intranasal and 39 chose injectable. Appropriate naloxone assembly was high for first-time recipients, both before and after education, and refill recipients. Proper administration of intranasal naloxone into both nares was more likely to be demonstrated by first-time recipients after education compared to first-time recipients before education ( $p < 0.006$ ) and refill recipients ( $p < 0.001$ ).

### 3.5. BORRA (Table 2)

Participants displayed a high level of knowledge of overdose recognition with an overall mean of 13.7 out of 16 correctly identified overdose symptom scenarios. There was a small but significant increase in recognition of overdose, non-overdose and non-naloxone administration events among first-time recipients after education; there was no change in recognition of naloxone indications. There were no differences between refill recipients and first-time recipients after education.

#### 4. Discussion

We found that opioid users seeking both initial and refill naloxone kits have high baseline levels of knowledge of opioid overdose, including comfort with responding to overdose, knowledge of overdose symptoms and indications for naloxone, knowledge of appropriate actions to take in response to overdose, and ability to assemble and utilize intranasal or injectable naloxone. Brief education improved the level of comfort with using naloxone, ability to properly administer intranasal naloxone, and capacity to discriminate opioid overdose from other medical conditions. Those returning for refills possessed similarly high levels of comfort and knowledge on all instruments, with the exception of not always knowing to administer the intranasal naloxone into both nares, indicating that most of the benefit of the brief education is retained over time.

Our findings are in accordance with previous research demonstrating the efficacy of brief naloxone education across multiple programs in the United States (Gaston et al., 2009; Green et al., 2008; Jones et al., 2014). The impressive knowledge base of non-trained recipients should encourage further investigation into brief education or written instructions, as would be needed for over-the-counter access to naloxone.

##### 4.1. Limitations

Baseline knowledge of overdose recognition and response among opioid users in San Francisco may be somewhat higher than in other studies (Green et al., 2008; Jones et al., 2014). This difference may be due to the longstanding presence of overdose prevention programming in San Francisco and reflect informal sharing of knowledge among regional opioid users. Thus, generalizability may be limited in settings where overdose prevention programming is novel or to populations less familiar with opioid overdose, such as family members. In addition, longer education may provide ancillary benefits that we did not capture in these brief assessments (such as reduced overdose risk behaviors or strategies to cope with related trauma). Nonetheless, these results support low barrier access to naloxone for opioid users.

#### 5. Conclusions

We found that opioid users seeking naloxone in San Francisco have high baseline knowledge of opioid overdose and naloxone administration and those returning for refills retain that knowledge. Brief education improves comfort, overdose recognition, and proper administration of intranasal naloxone and is likely sufficient to ensure safe and effective naloxone programming.

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##### Contributors

E. Behar contributed to research conception, study design, data collection and analysis, and manuscript preparation. G.M. Santos contributed to research conception, study design, data analysis and manuscript preparation. C. Rowe contributed to data analysis. E.

Wheeler contributed to data collection. P.O. Coffin contributed to research conception, study design, data analysis and manuscript preparation. All authors have read and approved this version of the manuscript.

##### Conflict of interest

No conflict declared.

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##### Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.drugalcdep.2014.12.009>.

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