

Injection Drug Users Trained by Overdose Prevention Programs: Responses to Witnessed Overdoses

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Abstract In response to the growing public health problem of drug overdose, community-based organizations have initiated overdose prevention programs (OPPs), which distribute naloxone, an opioid antagonist, and teach overdose response techniques. Injection drug users (IDUs) have been targeted for this intervention due to their high risk for drug overdose. Limited research attention has focused on factors that may inhibit or prevent IDUs who have been trained by OPPs to undertake recommended response techniques when responding to a drug overdose. IDUs ($n = 30$) trained by two OPPs in Los Angeles were interviewed in 2010–2011 about responses to their most recently witnessed drug overdose using an instrument containing both open and closed-ended questions. Among the 30 witnessed overdose events, the victim recovered in 29 cases while the outcome was unknown in one case. Participants responded to overdoses using a variety of techniques taught by OPPs. Injecting the victim with naloxone was the most commonly recommended response

while other recommended responses included stimulating the victim with knuckles, calling 911, and giving rescue breathing. Barriers preventing participants from employing recommended response techniques in certain circumstances included prior successes using folk remedies to revive a victim, concerns over attracting police to the scene, and issues surrounding access to or use of naloxone. Practical solutions, such as developing booster sessions to augment OPPs, are encouraged to increase the likelihood that trained participants respond to a drug overdose with the full range of recommended techniques.

Keywords Community-based organizations · Overdose prevention · Naloxone · Injection drug user

Introduction

Drug overdose remains a leading cause of death among injection drug users (IDUs) in the United States [1, 2]. Heroin has been a primary cause of death in drug overdose cases for the past decade though the steady rise in misuse of prescription opioids, including methadone and oxycodone, has greatly aggravated the problem [3]. Opiate drug overdoses are amenable to interventions since bystanders often witness a drug overdose [4] and death from opioid overdose usually occurs over a period of hours [2], allowing time for bystander response. Community-based organizations across the U.S. have responded to this public health crisis by devising Overdose Prevention Programs (OPPs, 188 programs in 2012), which train IDUs and other bystanders to recognize the symptoms of opioid overdoses and to respond appropriately [5].

The Chicago Recovery Alliance developed one of the first OPPs in the U.S. [6], and their model has been

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subsequently adopted and modified by other OPPs. Principal features of this training include: recognizing the signs of overdose; safely stimulating the overdose victim; checking airway and giving rescue breathing; calling 911; and administering naloxone, either intranasally or via intramuscular injection [7, 8]. Naloxone is an opioid antagonist that effectively reverses the effects of opioid overdose, including respiratory depression [9], is legal to possess with a prescription, is inexpensive, and has no psychotropic effects or abuse potential [10]. In some programs, IDUs are taught to remember the appropriate response techniques and sequence of steps with the mnemonic device SCARE ME: stimulate; call 911; airway; rescue breathing; evaluate; muscular injection of naloxone; and evaluate [7]. In this sequence, each method represents an incrementally more aggressive response should the previous step fail to revive the victim with injecting naloxone as the last resort.

Evaluations of the growing number of OPPs across the U.S. are increasingly common [5, 8, 11–16], and suggest that OPPs and the distribution of naloxone may have prevented numerous deaths from opioid overdoses with few complications [5]. However, studies indicate that barriers exist towards executing key features of SCARE ME among those trained by OPPs, such as stimulating overdose victims as recommended, undertaking rescue breathing, calling 911, or injecting naloxone [6, 11, 12, 16, 17]. Apart from describing barriers to calling 911 [6, 8, 11, 18, 19], limited research attention has focused on describing factors that may inhibit, discourage, or prevent IDUs who have been trained by OPPs to undertake recommended response techniques when responding to a drug overdose.

Towards this end, a qualitative analysis of IDUs trained by OPPs was undertaken to describe how participants executed key elements of SCARE ME in response to a witnessed overdose and circumstances that encouraged or inhibited recommended response behaviors.

Methods

This study was designed to evaluate OPPs provided by two community-based organizations in Los Angeles: Homeless Health Care Los Angeles (HHCLA) and Common Ground Westside (CGW). HHCLA and CGW have offered overdose prevention training since 2006 and 2008, respectively. Trainings at both sites include instructions on how to recognize the signs of an overdose and appropriate overdose response techniques. Trainers use the SCARE ME mnemonic device to help participants recall key techniques and the order of response. Trainings include both a didactic instructional component and a hands-on component, in which participants are encouraged to practice response

skills learned during the session using role-play with a cardiopulmonary resuscitation (CPR) dummy and practice injection materials. Upon successful completion of the training, medical providers at the two sites prescribe naloxone to the trained participant and dispense 2–3 doses of naloxone as part of a kit that also contains the prescription for the naloxone, sterile intramuscular syringes, a rescue breathing mask, alcohol swabs, and a small “palm card” containing the SCARE ME instructions. The palm card and the kit are labeled with the agencies’ names and phone numbers. HHCLA operates its program out of a storefront in the Skid Row area of downtown Los Angeles, and CGW runs its program from two sites located on the West side of Los Angeles: an office in Santa Monica and an outdoor syringe exchange in Inglewood.

Study Sample

Participants in this analysis are drawn from a larger sample ($n = 107$) of IDUs recruited from HHCLA and CGW. The study used convenience sampling at both sites to sample *trained* individuals, who had received overdose prevention training from either program, and *untrained* individuals, who had never received training from HHCLA, CGW, or any other organization. Given this study’s focus on overdose prevention training, this analysis is limited to trained participants ($n = 30$).

Eligibility criteria included: received overdose prevention training by either HHCLA or CGW; aged ≥ 18 years; self-reported injection drug use in the past 30 days; witnessed an overdose since receiving overdose prevention training; and witnessed overdose occurred within the past 12 months. Recruitment and sampling was conducted by the study interviewer, who approached potential participants in the waiting areas of the two programs and assessed eligibility using a brief screening survey. All study procedures were approved by the Institutional Review Board at Children’s Hospital Los Angeles prior to implementation.

Data Collection

The interviewer-administered interviews were conducted using an instrument containing both closed-ended questions that generated quantitative data, and open-ended questions that generated qualitative data. The entire instrument was programmed with Techneos Entryware 6.3, and administered on a laptop computer while simultaneously recorded with a digital recorder to capture responses to open-ended questions. Interviews were conducted in private settings, such as an office at one of the study sites, or semi-private settings, such as coffee shops or park benches close to the site. Following each interview, participants received \$25 cash remuneration and were

provided with referrals for services (including the overdose prevention training program, if they were untrained).

Measures

The study instrument consisted of a series of modules focusing on overdose, drug use, risk behaviors, and socio-demographics. Data for this analysis is largely based upon a module centering on the most recently witnessed overdose, which begins by asking participants to “Tell me what happened at the most recent overdose you saw,” which was designed to elicit a preliminary description of the event from the participant’s perspective. A key closed-ended question that addressed the primary aspects of SCARE ME included: “What did you do to respond to this overdose?” Response options included: rubbed my knuckles on his/her chest or nose; called 911; gave rescue breathing or CPR; gave Narcan/naloxone; and non-recommend response techniques, such as injected with milk or salt, hit or slapped, and rubbed with ice. Following the question, the interviewer probed participants as to why they did or did not undertake particular behaviors. Another key qualitative question included: “Were there any negative things that happened as a result of the overdose?,” which was also followed by probes.

Data Analysis

Data consist of SPSS files and transcripts. Responses to closed-ended questions were uploaded from Entryware case files into a SPSS database and simple frequencies were analyzed. All digital recordings were transcribed verbatim into a Word document and entered into Atlas.ti for organization and coding of qualitative data.

The qualitative coding process began with a set of primary codes of interest, such as “call 911,” which were developed both empirically and theoretically. Based upon these primary codes, two analysts coded all transcripts. Codes were reviewed by the study team to ensure the consistent use of codes within and between transcripts. Following this primary level of coding, emergent themes were identified during a secondary level of coding by the first author, such as “conflict between trained/other bystander” and “discouraging 911 call,” which continued until all relevant themes were identified. All names are pseudonyms.

Results

Demographic Characteristics

Participants were typically male, non-white, and heterosexual (see Table 1). A majority had a history of drug treatment, over half reported being HCV positive, one

Table 1 Demographic and descriptive characteristics of OPP participants (n = 30)

	n (%)
Recruitment site	
Homeless Health Care Los Angeles	23 (77 %)
Common Ground Westside	7 (23 %)
Age	40 (11.2; 21–59) ^a
Gender	
Male	18 (60 %)
Female	12 (40 %)
Race/ethnicity	
Non-Hispanic White	12 (40 %)
Hispanic	10 (33 %)
Black/African American	4 (13 %)
Multiracial	2 (7 %)
Native American	1 (3 %)
Missing	1 (3 %)
Sexual identity	
Heterosexual	26 (83 %)
LGBT ^b	5 (17 %)
Drug treatment (lifetime)	26 (87 %)
Homelessness (past 30 days)	13 (43 %)
HIV positive (self-report)	1 (3 %)
HCV positive (self-report)	16 (53 %)
Self-overdoses (lifetime)	4.4 (6.5; 1–30) ^a
Self-overdoses (past year)	1.4 (1.0; 1–4) ^a
Witnessed overdoses (lifetime)	13.5 (19.1; 2–100) ^a
Witnessed overdoses (past year)	2.4 (1.6; 1–7) ^a

^a Mean (SD; range)

^b Lesbian, gay, bisexual, or transgender

participant reported being HIV positive, and close to half were homeless in the past 30 days. The average number of overdoses participants *experienced* in the past year and lifetime was approximately 1 and 4, respectively. The average number of overdoses participants *witnessed* in the past year and lifetime was approximately 2 and 14, respectively.

Most Recently Witnessed Overdose Following Training at OPP

Among the 30 witnessed overdose events, the victim recovered in 29 cases while the outcome was unknown in one case (see Table 2). In most instances, the victim was a friend or sex partner of the participant. Overdose events occurred outdoors in a majority of cases. Police arrived at the overdose scene in one-fifth of witnessed events while paramedics responded to two-fifths of events.

Table 2 Characteristics of witnessed overdose events (n = 30)

	n (%)
Outcome of overdose	
Victim recovered at scene	21 (70 %)
Victim recovered at hospital	8 (27 %)
Victim died	0
Unknown	1* (3 %)
Participant relationship to overdose victim	
Stranger	4 (13 %)
Acquaintance/associate	6 (20 %)
Sex partner	7 (23 %)
Friend	13 (43 %)
Location of overdose	
Public/semi-public (street/squat/bathroom)	18 (60 %)
Private (house/apartment/motel)	12 (40 %)
Police/paramedics at overdose scene	
Police appeared on site	6 (20 %)
Ambulance arrived	12 (40 %)

* Victim was a stranger and participant left after 911 was called

Table 3 Responses to witnessed overdose events (n = 30)

	n (%)
Response to witnessed overdose by study participant	
Stimulated victim with knuckles	3 (10 %)
Called 911	7 (23 %)
Gave victim rescue breathing	10 (33 %)
Injected victim with naloxone	15 (50 %)
Response to witnessed overdose by other bystanders	
Stimulated victim with knuckles	0
Called 911	6 (20 %)
Gave victim rescue breathing	2 (7 %)
Injected victim with naloxone	2 (7 %)
Response to witnessed overdose (total)	
Stimulated victim with knuckles	3 (10 %)
Called 911	13 (43 %)
Gave victim rescue breathing	12 (40 %)
Injected victim with naloxone	17 (57 %)

Participants responded to overdoses using a variety of recommended techniques taught by the OPP. Injecting the victim with naloxone was the most commonly reported recommended response. Less frequently reported recommended response techniques included stimulating the victim with knuckles, calling 911, and giving rescue breathing (see Table 3). In most cases the participant was not the only witness at the overdose event; other bystanders also responded to the overdose victims in some cases (see Table 3), which either assisted or obviated the participant's need to undertake a response. In addition to these

descriptive findings, qualitative data revealed how and why participants did or did not undertake recommended techniques in response to a witnessed overdose.

Stimulating the Victim

Upon recognizing the overdose, most participants' first response was to stimulate the victim in some way. Three participants reported stimulating the victim in the recommended manner (using the "sternum rub," i.e., rubbing knuckles on chest or nose; see Table 3):

The first time, he kind of came out of it. You know, he sat back up, and I poured some cold water on this face. I was kind of rubbing my knuckles in the middle of his chest. And then, another minute and a half, his whole face is blue [Fonzi].

Participants more commonly used "folk methods" or "home remedies" to stimulate the victim, such as pouring cold water, walking the person around, placing ice on the person, shouting their name, or slapping them. These methods, which were typically used prior to receiving overdose prevention training, were generally addressed in the training as less helpful and potentially more harmful than stimulating with the "sternum rub". As illustrated by Fonzi, sometimes participants used a combination of recommended and non-recommended techniques. In four cases, victims awoke from the overdose after a participant stimulated them using one or more home remedies:

I went over to his [boyfriend's] house. We both did some [heroin] – I gave him the shot – and he totally fell out. I didn't have my Narcan with me so I was smacking his face and putting ice on him. He was breathing and had a heartbeat but he was turning blue – his lips looked purple. I was kind of freaking out so I called a friend and said, "What do I do?" He told me to shoot him up with salt water but I couldn't find a vein. I'm like, "Do I call 911?" But, he [boyfriend] told me not to call 911 if he ODs. So, I'm sitting there crying and then finally he just wakes up. He just woke up [Brandy].

Not having access to naloxone and concerns over attracting police—as voiced by Brandy—were two commonly reported circumstances that constrained responses to an overdose. Consequently, participants often utilized any available tool or resource at their disposal to stimulate a victim.

Calling 911

Overall, 911 was called at 13 overdose events; the participant called 911 in 7 cases while someone else called in 6

instances (see Table 3). Nearly all reported fearing that calling 911 would draw police to the scene in addition to paramedics, which was particularly problematic for those with previous or ongoing criminal justice involvement. In light of such circumstances, participants sometimes debated with their drug-using partner whether or not to call 911:

I got ready to call the ambulance, 911. Then, she [wife] told me to just wait a minute ... She stopped me from calling them. She didn't want the police involved ... She had just left a program that she was put in and she didn't want to get locked up [Rex].

With the primary exception of those who witnessed a stranger overdose, most participants either used drugs with and/or gave drugs to the overdose victim. As a result, most feared their arrest or other's arrest (including the victim) by virtue of being high on drugs, having drugs or drug paraphernalia at the scene, or merely by being at the scene of the overdose. Moreover, in the event the overdose victim died, some feared that they would be held responsible if 911 were called and police responded.

Among those who called 911, several expressed sentiments, such as "somebody's life is on the line" or "I had to do what I had to do," since they viewed the imperatives of medical attention as overriding concerns of being arrested. For some, not fearing arrest helped to overcome others' ambivalence surrounding calling 911:

I kept saying, "Well, somebody call 911." And nobody responded so I walked away from the crowd and I called 911 [on his cellphone] ... I didn't want any static [about calling 911] from the people that were around ... I haven't been to jail for a long time, about 18 years ... I'm not on parole and I really don't care about that [Chato].

Witnessed overdoses occurred more frequently in public locations, such as streets or public bathrooms, than private locations, such as a house or apartment (Table 2). Moreover, calling 911 varied by whether the overdose occurred in a public or private location. When the event occurred in public, 911 was called a majority of the time (11 out of 18; 61 %). Participants reported feeling comfortable calling 911 when the overdose happened in a non-descript public location that afforded opportunities to leave the scene if necessary. If the overdose occurred in a private location, 911 was infrequently called (2 out of 12; 17 %). Several participants described being wary of calling 911 when the event occurred at someone's residence:

[Calling 911] was more of a concern [for the victim]. I didn't want his neighbors and everyone to see the paramedics and the police and fire truck, whatever, coming around [Suntan].

Similarly, when the overdose occurred outdoors near a location where drug use was common, such as a shooting gallery, participants feared that calling 911 could "burn the spot" for the future:

[Calling 911] never comes up because they don't want to burn the spot. Cause once someone dies or that stuff happens [911 response to overdose], the cops start coming around more often. They start harassing dope fiends and arresting them [Peaches].

Another barrier to calling 911 was that many participants had a history of recovering from an overdose themselves or witnessed others recover without trained medical intervention. Furthermore, several expressed that paramedics "don't care" or are slow to respond to an overdose. Consequently, responding to the overdose themselves—without calling 911—was a pragmatic form of self-reliance for some:

I said, Maybe I could do something faster than these guys [paramedics] can ... From experience, from living on the streets of New York City, I put it upon myself, and said, "I can do this [inject naloxone]" [Pigeon].

Calling 911 appeared to be related to whether naloxone was injected or not by the participant or a bystander. 911 was called twice as often when the victim was *not* injected with naloxone (8 out of 13; 62 %) as when the victim was injected with naloxone (5 out of 17; 29 %). Having naloxone at an overdose event appears to have empowered some to forgo calling 911 and minimize risks or concerns associated with paramedics and police:

There are [drug] dealers on both sides of me, and he didn't want to call 911. I was the one who said, "Hey, let's call 911." And, they're like, "You'll pay the ultimate price." And so I said, "Well, I got some Narcan around here." But, if he would've stopped breathing, I definitely would've called [911] [Pirate].

As suggested above, several factors shaped a participant's decision about whether to call 911 or not, including the circumstances surrounding the overdose, the location of the event, negotiations with other bystanders, and the administration of naloxone. Overall, 911 was never called when naloxone was administered in a private location (0 out of 8; 0 %)—compared to calling 911 when naloxone was administered in public locations (4 out of 9; 44 %)—possibly because participants felt empowered to handle the overdose themselves while also being concerned about attracting police to someone's house or apartment.

Rescue Breathing

Rescue breathing was administered at 12 overdose events; the participant administered it 10 cases while another

bystander administered it in two instances (see Table 3). In addition to rescue breathing, several participants reported giving the victim CPR. While neither program taught CPR as part of the training—only rescue breathing—participants incorporated it into a response in some cases. Several participants reported learning CPR prior to overdose prevention training in other settings, such as prison or in the military.

Among participants who administered rescue breathing, two also called 911 when it appeared that rescue breathing was not working and naloxone was not available:

I poured water on him at first and then I kept shaking and shaking him 'cause I didn't have anything [naloxone] with me. He was turning blue. I was breathing for him for a minute 'cause I know the kid. I've known him since he was 15. But, he's too big for me, I couldn't handle him. I had to call 911 [Felix].

Most participants (8 out of 10) who gave rescue breathing also injected naloxone. In accordance with the SCARE ME recommendations, this participant describes performing rescue breathing first, and then injecting naloxone:

I checked his pulse and I could feel it so he was still alive. I did what she [OD trainer] told me to do, well my way. I lifted up his chin and picked up his nose. Then, I put that plastic [shield] and as I breathed I pumped his stomach like three or four times. As I see there was no result, nothing was happening, I picked up the liquid [Naloxone] [Peaches].

In some cases the overdose victim required two doses of naloxone. This participant describes continuing CPR after injecting naloxone while waiting for the naloxone to take effect:

I hit him once with Narcan and nothing would happen so I gave him CPR and I hit him twice with Narcan and he started coming through and then someone called the ambulance [Midas].

Injecting Victim with Naloxone

Half of all participants ($n = 15$) injected naloxone at the overdose while boyfriends of two trained participants also injected victims with naloxone for a total of 17 naloxone administrations (see Table 3). Generally, participants described feeling capable of injecting naloxone, and few difficulties were reported. Even when successfully administering naloxone, participants commonly reported that naloxone's effects took longer than anticipated—often due to the stress of the event:

I actually started doing CPR and she was totally unresponsive. Then, I remembered I had the Narcan [in my house]. And I waited another 2–3 min just to see and nothing happened so I injected her with Narcan and kept yelling her name. I actually had to keep doing CPR cause she was totally unresponsive. It took a while for that to kick in. I thought it would be shorter. It took a good 8 min or so before she actually sat up [Cleo].

Across participants, a primary point of variability in response behaviors concerned how much naloxone to inject. Several participants who had more experience administering naloxone reported calibrating how much naloxone to inject so that the victim did not go into withdrawal:

We didn't give him as much [Narcan] as we're supposed to but gave him like one shot - a whole, 1 cc of it ... When you use as much as you're supposed to it makes you really sick [experiencing drug withdrawal]. If he would've needed it, we would've given him more but he started coming to [Smoochers].

Despite this participant's belief that he administered less than he was taught and his concern about causing drug withdrawal, his reported behavior reflects the training recommendations: both programs distribute 1 cc vials and instruct participants to give a 1 cc dose, followed by rescue breathing, followed by a second 1 cc dose if the victim is unresponsive.

Location of the overdose appeared to be a factor in whether naloxone was administered or not since naloxone was more frequently injected in private locations (8 out of 12; 67 %) compared to public settings (9 out of 18; 50 %). Furthermore, housing status was a factor among those who administered naloxone in these different locations. Homeless participants were the bystanders who administered naloxone at most public overdose events (6 out of 8; 75 %):

There's a trashcan there where everybody shoots up. I had my backpack and I had that baggie, the overdose kit ... His [stranger's] lips were getting purple already so I just remembered what she [trainer] had told me – to pick up the liquid from the vial and put it in him, skin popped it or muscled it ... And I gave him breathing [Peaches].

During the 13 events where naloxone was *not* administered, three primary factors were reported: participant did not possess any naloxone ($n = 7$); participant had naloxone but not with them ($n = 5$); and participant had naloxone but decided against injecting it (since victim was revived through stimulation) ($n = 1$). Among those not possessing naloxone, all were homeless and most of these overdose

events occurred in public settings. These participants commonly described losing their naloxone, having it stolen, not gaining a refill after using it, or having it taken by police:

The cops had me cuffed and they took it [naloxone]. She [officer] said, “Well, I’m not giving this back.” And she kept it. They said because it was narcotics [Charlie].

Discussion

In all known cases, overdose victims lived after receiving assistance from a study participant trained in overdose prevention, community bystanders, and/or paramedics; no fatalities were reported by these trained individuals. In response to an overdose, participants employed a variety of techniques taught by OPP, such as stimulating the victim, performing rescue breathing, calling 911, and injecting naloxone. Injecting naloxone was the most frequently employed response technique. It is important to note that the recommended techniques were not necessary in all cases. When stimulation was effective in waking someone up from a deep “nod,” for example, more aggressive response techniques were not required.

Stimulating an overdose victim with newly learned skills, such as the “sternum rub,” occurred less frequently than home remedies, similar to findings from other studies [6, 15, 16]. Rather, home remedies appeared at times to be more habitual and readily remembered in the midst of a chaotic event. Furthermore, some home remedies, e.g., slapping, applying ice, seemed difficult to unlearn since many participants regarded them as effective and had been using them for years. Ongoing training by OPPs on the use of recommended stimulation techniques, such as the “sternum rub,” coupled with opportunities to practice through hands on exercises (with CPR dummies) may help participants replace unproven home remedy stimulation responses with more effective SCARE ME techniques.

911 was called in close to half of all events, which is comparable to other studies [6, 8, 11, 12, 16]. While all were instructed to call 911 during training, participants reported significant concerns relating to police involvement or arrest if 911 was called [11, 18–20]. Since a majority of overdose events occurred in social settings with multiple bystanders, one person’s fear of arrest sometimes outweighed another’s concern for the victim’s well-being. Due to these competing concerns, participants and other bystanders often negotiated whether to call 911 or not. The location of the overdose, e.g., private versus public, was a particularly salient factor in whether a participant felt comfortable calling 911 or not, which is in contrast to

results from a quantitative study in Baltimore, MD, where the setting of the overdose was not associated with calling 911 after controlling for other factors [19].

In addition to fear, many believed that calling 911 was unnecessary once the victim had been revived—particularly if naloxone had been administered [11]. This belief may be substantiated by emergency medicine policies in other locations that indicate low mortality among overdose victims who received naloxone from paramedics but were not admitted to the hospital [21]. Nonetheless, since OPPs train laypeople rather than medical personnel, it is prudent that OPPs continue to recommend that responders call 911 and encourage the victim to seek medical assistance after the overdose. At the same time, legal reforms such as “Good Samaritan Laws,” which provide limited immunity from prosecution for responders and bystanders [22, 23], may help alleviate fears of police response and increase the frequency with which bystanders call 911. Lastly, some participants described being accustomed to dealing with crises on their own, including overdoses, and that electing not to call 911 was a form of self-reliance.

Rescue breathing given by the respondent or another bystander was reported in 40 % of cases. Rescue breathing was not undertaken in some instances since the victim was revived using another method. It is notable that most participants who performed rescue breathing also injected naloxone. Potentially, participants who accomplished both were more experienced at responding to an overdose, were more recently trained, or the severity of the overdose necessitated both responses.

Recently, the American Heart Association (AHA) has changed its CPR guidelines to recommend chest compressions only, or “hands-only” resuscitation, as the appropriate response to sudden cardiac arrest, and the public will increasingly be trained in this new method. In the case of opioid overdose, however, death occurs slowly from a lack of oxygen due to respiratory depression over a period of time. Therefore, mouth-to-mouth resuscitation, or rescue breathing, is the necessary response [24]. In light of the new AHA recommendations, a continued focus on educating responders about the necessity of providing rescue breathing in the event of opioid overdose is critical.

Naloxone was administered in 57 % of cases, a rate which is comparable to other studies [11, 16, 17]. Most participants reported being comfortable injecting naloxone; the primary reasons for not injecting naloxone at the event were that participants were not carrying it or no longer had a supply. Housed participants more typically reported being without their naloxone, usually because they left it at home, while homeless participants more frequently described losing their naloxone or having it confiscated. In some cases, participants used their naloxone during a prior overdose but did not obtain a refill. In addition to access to

naloxone, knowing how much naloxone to inject was an issue for some; these individuals were concerned that injecting too much might harm the victim. Moreover, many were aware that opioid withdrawal would follow administering naloxone [20]. Consequently, naloxone was titrated to reduce the severity of withdrawal in several cases.

We offer several recommendations to contend with barriers identified in this analysis. OPP should place continued emphasis on hands-on exercises, such as practicing rescue breathing with a CPR dummy, drawing naloxone out of a vial, and performing an IM injection, which may help participants learn response skills more effectively than didactic instruction alone. Booster training sessions should be made available, particularly when participants obtain naloxone refills, so that proper response techniques can be relearned or reinforced. Multiple doses of naloxone should be made available so that participants can perform several reversals before seeking a refill. Networks of drug users should be trained together to help develop and reinforce positive response norms, e.g., stimulating appropriately, calling 911, among groups of users.

To address barriers to calling 911 and to minimize the likelihood of having naloxone confiscated, continued outreach to police departments to help educate officers about OPPs and about the lawful possession of naloxone with a prescription should be emphasized. “Good Samaritan” laws and public health campaigns could help reduce participant fears about calling 911. While considerably more costly than the injectable form, distributing naloxone in intranasal form [25] could increase the ease of administering the drug during an overdose and further reduce the likelihood that the naloxone and the syringes required for its administration will be confiscated if they are perceived as drug paraphernalia.

This study has several limitations. First, participant accounts of the most recently witnessed overdose may be subject to recall bias, e.g., fusing of events, since most had experienced or witnessed multiple overdose events in their lifetime, and the most recent event may not be representative of other events. Second, results may be subject to selection bias since only those trained individuals who returned to sites for services, e.g., syringe exchange, were sampled. Third, experiences and behaviors reported by participants may not generalize to individuals trained in other geographical locations or cultural settings.

In conclusion, IDUs who are trained by OPPs report successfully responding to drug overdoses—no participants in this study reported that an overdose victim died. Key barriers that may inhibit an IDU from responding as trained include actions taken by other bystanders, folk methods, fear of police, access to naloxone, and location of the overdose. Pragmatic solutions are available to increase the likelihood that participants trained by OPPs respond to a drug overdose with the full range of effective techniques.

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