

Research Paper

Evaluation of the Staying Alive programme: Training injection drug users to properly administer naloxone and save lives

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Abstract

Background: In response to the high rates of opiate-related overdoses and deaths in the United States, a number of overdose prevention programmes have been implemented that include training drug users to administer naloxone, an opiate antagonist. The purpose of this study was to evaluate the Staying Alive (SA) programme in Baltimore, Maryland, which trained drug users to prevent and respond to opiate overdose using techniques including mouth-to-mouth resuscitation and administration of naloxone.

Methods: Participants for the SA programme were recruited from multiple locations by Baltimore City Health Department Needle Exchange programme staff. A 1-h training was conducted by two facilitators. Participants who successfully completed the programme were provided with a kit that contained naloxone. Participants in the evaluation study were enrolled prior to the training session. The present analysis includes 85 participants who completed a pre- and post-test evaluation survey.

Results: At both time points, 43 participants reported having witnessed an overdose. Post-training, naloxone was administered by 19 with no reported adverse effects. Post-training, a greater proportion of participants reported using resuscitation skills taught in the SA programme along with increased knowledge specifically about naloxone.

Conclusions: Results from this study provide additional evidence to support the effectiveness of overdose prevention training programmes that include skills building for drug users to administer naloxone.

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Introduction

In response to the high rates of opiate overdose related medical emergency department visits and fatalities in the United States (Substance Abuse and Mental Health Administration, 2002, 2003), several opiate overdose preven-

tion programs have been implemented in Chicago (Maxwell, Bigg, Stanczykiewicz, & Carlberg-Racich, 2006), New York (Piper et al., 2007), San Francisco (Seal et al., 2005) and New Mexico (Sporer & Kral, 2007). These programmes aim to increase knowledge about overdose risk factors, enhance recognition of the signs and symptoms of opiate overdose, and train and practice in resuscitation methods such as rescue breathing (mouth-to-mouth resuscitation). They also train participants in developing overdose prevention strategies.

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Many programmes have included training in administration and provision of prescribed naloxone, an opiate antagonist. Naloxone is a safe and effective treatment used commonly by emergency medical personnel and in emergency rooms for the treatment of opiate overdose (Sporer & Kral, 2007).

Evaluations of several existing naloxone overdose prevention programmes have documented positive outcomes of successful reversals of opiate overdose by peer administered naloxone with few adverse effects to the victim (Dettmer, Saunders, & Strang, 2001; Galea et al., 2006; Maxwell et al., 2006; Seal et al., 2005; Sporer & Kral, 2007; Strang et al., 1999; Strang, Best, Man, Noble, & Gossop, 2000). For example, results from an evaluation in Chicago reported that 319 reversals were documented over a 5-year time period (Maxwell et al., 2006). Furthermore, decreases in injection drug use and increased entry into drug treatment after overdose training have been reported by drug users in San Francisco (Seal et al., 2005). These results lend support to the value of training drug users to properly intervene during opiate overdose.

The few published evaluations of overdose prevention training programmes using naloxone have included a small sample size (less than 25 participants) and focused primarily on reports of whether the programme led to reversals of opiate overdose using naloxone. Less has been reported about programme effects on knowledge specific to naloxone use and on level of comfort to intervene during overdose.

The Staying Alive programme (SA) was designed and implemented by the Baltimore City Health Department (BCHD). Participants were recruited by SA programme staff through street-based outreach and advertising at the BCHD Needle Exchange programme locations. The training was conducted at multiple locations throughout Baltimore City. Participants were enrolled by SA programme staff who explained the purpose of the training and obtained written consent, which was approved by the BCHD Institutional Review Board. The curriculum included a review of risk factors, signs and symptoms of opiate overdose and strategies for preventing opiate overdose. Skills training for intramuscular injection of naloxone, rescue breathing, and placing someone on their side (e.g. the recovery position) were also provided and participants were required to practice on models. Participants who successfully demonstrated the ability to properly administer naloxone were then provided with a naloxone kit which included three 5 cm³ syringes with intramuscular needles, one 10 mL bottle of 0.4 mg/mL naloxone, a face shield for rescue breathing, a sharps container and a prescription for naloxone with refills.

The purpose of the study was to evaluate programme effectiveness of teaching injection drug users about (1) recognition of opiate overdose signs and symptoms, (2) how to respond to opiate overdose (including administration of naloxone), (3) basic facts about naloxone and (4) opiate overdose prevention strategies.

Methods

Recruitment of participants for Evaluation Research study

Enrolment for the evaluation study was conducted from October 2004 through April 2005. After participants were enrolled into the Staying Alive programme, but prior to the programme session, evaluation staff approached participants and described the purpose of the evaluation study. Participants, who expressed interest in participating in the evaluation research study, then met individually with trained research staff who obtained written informed consent which was approved by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board. A brief assessment was administered prior to their participation in the programme and locating information was collected so that the evaluation staff could contact participants 6 months after the training. Participants were paid \$10.00 each for the pre- and post-test assessment.

The evaluation staff was unable to ask all participants to enrol in the evaluation component as the sessions were held at a variety of locations and times. Therefore, we were unable to assess to rates of participation. Of 250 participants who were enrolled into the evaluation study, participants who returned for the post-training ($n = 85$) were older (44 years versus 40 years; $p = 0.002$) compared to those who did not complete the post-survey. There were no statistical differences between groups on gender, number of personal overdoses, number of witnessed overdoses, knowledge about administering naloxone, rescue breathing, CPR, or placing someone in the recovery position (lying them on their side). The final sample for this study included 85 participants who completed both pre- and 6-month post-assessments.

Measures

Baseline measures

Data were based on self-reported gender, age, race/ethnicity, drug and alcohol use in the past 6 months, and number of lifetime overdoses experienced.

Overdose witness history and responses

Participants reported the total number of overdoses that they had witnessed in their lifetime. For the most recent overdose witnessed, participants were asked “What did you or the others present do for the victim?” Multiple responses, of eleven categories (e.g. called 911, mouth-to-mouth resuscitation, used ice or water, etc.) were allowed.

Baseline knowledge

Participants were asked three questions to assess their knowledge about risk factors for opiate overdose (e.g. drinking alcohol when using opiates, injecting quickly, using opiates after detoxification). During the enrolment process for Staying Alive, programme staff described naloxone as a

drug that is used to reverse opiate overdose. Two questions were used to assess knowledge specifically about naloxone (Narcan): “After a person has been revived with Narcan they can fall back into an overdose” and “The effect of Narcan lasts for 24 h (true, false, do not know). For each of these questions, the proportions of participants who answered correctly at both time points were calculated. Additionally, a variable was constructed to indicate whether participants’ knowledge on each item improved, stayed the same or declined. Participants were also asked at both time points whether they knew how to perform rescue breathing or place someone in the recovery position (yes or no).

Baseline level of comfort responding to overdose

Six items, with a three-point response category (agree, not sure, disagree), were used to assess participant level of comfort responding during various overdose scenarios at both time points. These scenarios included concern about arrest, getting a disease and hurting the victim.

Post-assessment measures

At the 6-month follow-up visit, participants were asked whether they had witnessed any overdoses in the prior 6 months and to describe their witness responses. Participants, that reported using naloxone during the most recent overdose, were asked about the location of the injection, the number of injections and amount used. Reasons for getting a naloxone refill were also asked.

Statistical analysis

Frequencies on all variables were examined. To compare differences between the full baseline sample ($n = 250$) and sample included in the present study ($n = 85$), Fisher’s exact chi square tests were used for dichotomous variables and t -tests were used for continuous variables.

Results

Baseline sample characteristics

The mean age of the sample ($n = 85$) was 44 years old. The majority were male (62%), African-American (82%), and had used opiates (95%) and had injected in the past 6 months (86%) (Table 1). Almost half (45%) reported having ever overdosed at baseline (mean overdoses = 1, S.D. = 3), though most (89%) had witnessed an overdose in their lifetime (mean witnessed overdoses = 6, S.D. = 9).

Indicators of programme effectiveness

Witness responses during overdose

Patterns of witnessed overdose during the evaluation period are shown in Table 2. Half of the sample ($n = 43$) reported at both time points having witnessed an overdose,

Table 1
Characteristics of baseline sample and 85 participants who completed pre- and post-assessment

Variable	Baseline n (%) 250 (100)	Pre- and post-sample n (%) 85 (34)
Gender		
Male	170 (68)	53 (62)
Female	80 (32)	32 (38)
Mean age (S.D.)*	42 (9)	44 (9)
Race		
African-American	180 (72)	70 (82)
White	67 (27)	15 (18)
Snorted heroin in past 6 months	100 (40)	34 (40)
Smoked crack in past 6 months	123 (49)	41 (48)
Used methadone to get high or “well”	89 (36)	35 (41)
Injected in the past 6 months	206 (82)	73 (86)
Ever personally overdosed	125 (50)	38 (45)
Ever witnessed an overdose	217 (87)	76 (89)

* $p < 0.05$.

Table 2
Patterns of witnessing overdose of 85 participants who completed pre- and post-assessment

Overdose witness patterns	n (%)
Reported at baseline and follow-up	43 (51)
Reported at baseline but NOT follow-up	33 (39)
Reported follow-up but NOT baseline	5 (6)
Never witnessed overdose at either time	4 (5)

39% had witnessed an overdose only at the post-assessment and 6% had only witnessed at the baseline. The focus of this study was on the effect of the SA programme on behaviors among individuals who witnessed overdose at both time-points. Common witness responses at baseline were: calling emergency services (e.g. 911) (65%), using ice or water on the victim (53%), attempting to stand or walk the victim (53%), and verbal rousing (25%) (Table 3). No participants reported using naloxone and few reported injecting the victim with salt or other drugs, applying pain or leaving the victim. After the training, 19 participants (44%) reported using naloxone.

Table 3
Changes in witness responses among 43 participants who witnessed overdose at both time points

	n (%)	
	Pre	Post
Call 911	28 (65)	21 (49)
Rescue breathing/CPR	8 (19)	10 (23)
Stimulation (sternum rub, tickle ear/nose)	1 (2)	4 (9)
Verbal rousing	11 (26)	7 (16)
Inject with Narcan	0 (0)	19 (44)
Use water or ice	23 (53)	17 (40)
Stood or walked	23 (53)	17 (40)
Inject with salt or illicit drugs	5 (12)	2 (5)
Applied pain	0 (0)	0 (0)
Left the victim	1 (2)	0 (0)

Table 4
Use of naloxone at most recently witnessed overdose post-training

	n (%)
Number of injections with naloxone	
1	14 (74)
2	4 (21)
≥3	1 (5)
Location of injection	
Shoulder/arm	12 (63)
Thigh	3 (16)
Buttocks	3 (16)
Abdomen	1 (5)
Amount of naloxone injected ^a	
1 cm ³ 's	8 (50)
2 cm ³ 's	3 (19)
≥3 cm ³ 's	5 (31)

^a Missing n = 3 cases.

A greater proportion of participants reported using specific stimulation techniques that were included in the training (e.g. sternum rub and tickling the nose) (9% post versus 2% pre). Of those who called 911 (n = 21), post-training, the police were reported to arrive 70% of the time, though zero arrests were reported. Reasons cited for not calling 911 included that the person regained consciousness (50%) or the witness thought they could revive without the assistance of emergency personnel (38%). A minority of individuals (4 of 24) identified “fear of police” as a reason for not calling for an ambulance.

Use of naloxone

Post-training, among the 19 participants who reported using naloxone during the most recently witnessed overdose, most reported injecting the victim one time (68%) and using 2 cm³'s or less (55%) (Table 4). The most common site for injection was the shoulder, followed by the thigh and buttocks. No participant reported injecting in the tongue or intravenously. Of the few participants (13%) who requested additional naloxone from the programme post-training, three cited the reason as contamination of the naloxone (i.e. inserting a used needle into the vial) and one reported that they gave their vial away. None reported that the naloxone was lost, stolen or confiscated.

Change in knowledge

At baseline knowledge levels about risks factors of opiate overdose were high. The majority of the sample knew that concurrent alcohol use (82%), “slamming” drugs (injecting very quickly) (81%), and recent detoxification treatment (92%) increases the risk of opiate overdose. Knowledge about the effects of naloxone was poor. Only 19% knew that there was a risk of relapse back into overdose after naloxone was administered and 86% incorrectly reported that the effect of naloxone lasts 24 h.

Changes in knowledge about naloxone were observed post-training. On the item regarding the risk of overdose relapse after revival with naloxone, knowledge was improved

for 46% of the sample, 19% were correct at both time points and 35% did not know at both time points or their knowledge decreased. On the question about the length of time naloxone is effective, knowledge was improved for 30% of the sample, 8% were correct at both time points and 62% did not know at both time points or their knowledge decreased.

Change in level of comfort when responding to overdose

At baseline, the majority of the sample reported being comfortable when responding during a witnessed overdose (Table 5). Changes in level of comfort were less striking when comparing responses after the training. For example, 45% of the sample reported at both time points that they were comfortable giving medical treatment to a person who had overdosed. Nearly one-quarter of the sample reported increased level of comfort post-training and 32% were negative or unsure at both time points. Regarding concern about getting a disease by helping an overdose victim, 54% were not worried at both time points, 15% became less worried, and 32% remained worried or unsure. Regarding concern about hurting the overdose victim by performing rescue breathing, 44% were not worried at both times, 25% became less worried, and 32% remained worried. Change was observed on the item that asked about administering Narcan as opposed to calling paramedics; while 35% agreed with this route at

Table 5
Level of comfort responding during witnessed overdose of 85 participants who completed pre- and post-assessment

	n (%)	
	Pre	Post
I am uncomfortable giving medical treatment to a person who overdosed		
Agree	22 (26)	16 (19)
Disagree	50 (59)	58 (68)
Not sure	13 (15)	11 (13)
If I had an outstanding warrant I would not call 911 for an overdose victim		
Agree	8 (9)	5 (6)
Disagree	70 (82)	77 (91)
Not sure	7 (8)	3 (4)
I would be worried about getting a disease by helping someone who is overdosing		
Agree	18 (21)	17 (20)
Disagree	59 (69)	58 (68)
Not sure	8 (9)	10 (12)
I would rather call 911 for someone who is overdosing than do rescue breathing		
Agree	43 (51)	30 (35)
Disagree	31 (36)	48 (56)
Not sure	11 (13)	7 (8)
I worry that I may hurt the person by performing rescue breathing		
Agree	24 (28)	20 (24)
Disagree	47 (55)	58 (68)
Not sure	14 (16)	7 (8)
I would rather give Narcan than call the paramedics		
Agree	30 (35)	53 (62)
Disagree	39 (46)	24 (28)
Not sure	16 (19)	8 (9)

baseline, 62% agreed post-training. Post-training, most participants agreed that drug users in the community respected them because they had been trained to intervene during drug overdoses (62%), that they feel responsible for helping other drug users prevent drug overdose (73%), and that teaching drug users how to prevent drug overdose was very important (74%).

Discussion

Consistent with previous evaluations of naloxone overdose prevention programmes (Dettmer et al., 2001; Galea et al., 2006; Maxwell et al., 2006; Seal et al., 2005; Sporer & Kral, 2007; Strang et al., 1999, 2000), our data indicate that the Staying Alive programme was effective in increasing the use of naloxone during opiate overdoses, resulting in 22 reversals by 19 individuals. Furthermore, the programme was effective in training on overdose response skills not involving naloxone. On average, frequency of inappropriate responses (leaving the victim or applying pain) decreased. We observed a decrease in the rate of calling for an ambulance from 65% at baseline to 49% post-intervention. In the majority of these cases when the ambulance was not called it was due to the overdose victim regaining consciousness or the witness feeling confident that they could revive them without external medical assistance. This underscores the importance of including clear messages about overdose relapse potential when naloxone is used. Programmes should thoroughly review methods for assessing resuscitated victims for relapse (such as monitoring their level of consciousness) and programme participants should be encouraged to call for medical services if they observe or suspect relapse. Moreover, programmes should stress the importance of avoiding further use of opiates, alcohol or other drugs after naloxone resuscitation because of relapse potential.

While knowledge about signs and symptoms of opiate overdose was high at baseline, knowledge about naloxone was poor. However, naloxone knowledge did improve as assessed after completion of the programme. Given limitations on time and resources, these results suggest that overdose prevention programme time is better spent on teaching naloxone specific information and skills training (e.g. naloxone administration) than teaching or reviewing information that already widely shared among drug users. Programmes ought to ensure that participants understand the risks of overdose relapse and the duration of effect of naloxone may have an influence on naloxone use during overdose.

One unique aspect of this evaluation is our focus on hypothesized factors, beyond knowledge about overdose, which may affect individual behaviour to intervene during an overdose. Factors such as fear of arrest and cost of medical care have been described as barriers to calling for medical assistance (Davidson, Ochoa, Hahn, Evans, & Moss, 2002; McGregor, Darke, Ali, & Christie, 1998) have been described in the literature. In the present study we sought to mea-

sure whether fear of disease, having a warrant, or fear of hurting the overdose victim were obstacles to intervention and whether they may have been changed as a result of the programme. Results indicate that there were no statistically significant effects on level of comfort in a number of domains. In this sample, a minority of the participants identified having an outstanding warrant as a barrier to calling 911 for an overdose victim pre- and post-programme. This result was surprising given the number of studies that have identified fear of police as the major impediment to calling 911 (Davidson et al., 2002; Ochoa, Hahn, Seal, & Moss, 2001; Tracy et al., 2005). A positive correlation between fear of police and having a warrant as a barrier to calling 911 would be expected. Unexpectedly, participant concern about giving medical treatment, getting a disease or hurting the individual when responding to an overdose was also low at both timepoints. Additional quantitative and qualitative research about the influence of police and/or police policies is needed to better understand barriers to intervening during overdose.

A significant change was observed on preference to administer naloxone as opposed to calling paramedics. This change may be due in part to either their own use of naloxone or learning about others successful use in treating a drug overdose. This may indicate increased self-efficacy to intervene or changes in perceived norms about helping. In fact, one of the main reasons cited why the ambulance was not called was witness confidence in reviving the victim, which suggests that training programmes should include content that addresses the value of having a resuscitated overdose victim monitored for relapse and including information about the role that paramedics can serve in providing medical evaluation and care in the case of overdose relapse.

Several limitations of this study should be noted. All data for this study are based on self-report and in our measures of witness responses we did not specify whether the responses were performed by participant or others present. Therefore, in cases where use of naloxone was reported we are unable to say whether the participant who was trained in the Staying Alive programme was the one administering it. Indicators of effectiveness of the programme on training individuals to administer naloxone cannot be specified to the participant in the study. However, the reported use of naloxone does suggest that the programme was highly effective in making naloxone available to drug users. Moreover, in cases where the participant did not themselves administer the naloxone, it is likely that stories about successful peer-administration of naloxone were diffused in the drug using community to study participants and others. Helping responses such as administering naloxone are socially desirable and therefore increases in appropriate responses could be inflated. Even if the responses about administering naloxone are inflated it does indicate a strong interest in utilizing the medication. It should also be mentioned that self-report of adverse events may be underestimated. Another limitation is potential selection bias of the final sample included in the study. The retention of the baseline sample was poor due to a number of

issues including collection of erroneous or inaccurate locating information and high levels of transience of the baseline sample. Therefore, results of the study have limited generalizability. Despite these limitations, this study has several strengths and is an important contribution to the literature on overdose prevention. We used a pre–post-study design to evaluate effectiveness of improving responses during overdose and our data was restricted to participants who reported witnessing at both time points allowing us to measure change within the same individuals. Because of the nature of the population and the relatively small number of people who got both pre- and post- we are certain that the number of reversals reported is largely underestimated. In fact, informal reports to the programme staff of all clients indicate 127 lives saved during the course of the programme. This evaluation also includes measures specific to knowledge about naloxone which can be used to inform future programmes and larger evaluations.

In conclusion, this study indicates that drug users are motivated to respond during an overdose and can be trained to properly and safely administer naloxone. Our study provides additional evidence to support overdose prevention programmes as effective in improving knowledge specific to naloxone use and in training active injection drug users to save lives with naloxone.

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