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Overdose Education and Naloxone Distribution Program Attendees: who attends, what do they know, and how do they feel?

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Abstract

Context—The United States is in the midst of an opioid overdose epidemic. Opioids killed more than 28,000 people in 2014, more than any year on record. One approach to addressing this growing epidemic is Opioid Overdose Education and Naloxone Distribution training (OEND). Little is known about these programs' participants and their effectiveness across different demographic groups.

Objectives—To examine (1) whether knowledge and attitudes improved over the course of the trainings; (2) do training outcomes differ by demographics; (3) what overdose experiences do attendees have, and whether those experiences influence their knowledge and attitudes.

Design—A pre and post-test was used to collect data on participants' demographics, overdose experiences, and opioid overdose knowledge and attitudes.

Setting—Surveys took place at community-wide OENDs were offered throughout Erie County, NY during October and November 2015.

Participants—Community members who elected to attend the trainings, were at least 18 years of age, spoke English, and were willing and able to participate were included in the sample (N=198).

Intervention—N/A

Main Outcome Measure—The Opioid Overdose Knowledge and Attitudes Scale

Results—Knowledge and attitude scores significantly improved from pre to post test, increasing by 23.1% and 15.4%, respectively (p 's <0.001). There were significant demographic differences in knowledge and attitudes at the pretest, but these differences were ameliorated by the OEND and did not persist at posttest. In addition, 62.9% of participants had never experienced, witnessed, or known someone who had overdosed.

Conclusions—Results indicate that OENDs are effective at improving knowledge and attitudes towards opioid overdose; none of the program participants in our training experienced an opioid overdose, indicating OENDs are not reaching the highest risk. Future programs should focus on

reaching current opioid users, overdose victims, and their families to ensure OEND are reaching the target audiences.

Introduction

Overdose death due to nonmedical and illicit opioid use is a serious and growing public health emergency. Nationally, from 1999 to 2013, there was more than a 3 fold increase in deaths due to prescription opioids and more than a 4 fold increase in deaths due to heroin.¹ In 2014 alone, nearly 29 000 died from opioid overdose, accounting for 61% of all overdoses in the United States.¹

Naloxone (Narcan) administration is the most effective strategy to prevent opioid overdose. Naloxone is an opioid antagonist that reverses the effects of opioid overdoses.² Naloxone is very safe, overwhelmingly effective, and can be administered intramuscularly (IM) or intranasally (IN), using a pre-loaded nasal spray.² IN has comparable effectiveness to IM,³⁻⁶ but has the added benefit of not requiring the use of needles to administer the drug. To respond to the current opioid overdose epidemic, many localities have expanded access to naloxone, including training and dispensing to lay community members.⁷ Trainings that target community members often include those who use nonmedical and illicit opioids, but also their family and friends. Peers and/or family are often “best” responders because they are usually first at the scene.⁸

Naloxone distribution and overdose prevention programs vary widely in their distribution, curriculum, and availability (e.g.,⁹). Further, it is unknown whether nonmedical opioid users attend such programs and if they are reaching opioid users and their friends and family. Therefore, the purpose of the present work is threefold. First, we will examine if naloxone administration knowledge and attitudes change over the course of an opioid overdose prevention program. Second, we will explore demographic differences in knowledge and attitudes before and after the prevention program. Finally, we will characterize the opioid overdose experiences of those who attend the OEND (users themselves, friends/family of users, and/or concerned citizens), and explore whether there are key differences in attitudes and knowledge among those groups.

Methods

Procedures

Erie County, NY Department of Health (ECDOH) held several Opioid Overdose Education and Naloxone Distribution (OENDs) trainings during the day and evening in urban, suburban, and rural locations throughout Erie County in October and November of 2015. The sessions lasted approximately ninety minutes and reviewed overdose identification, New York State's Good Samaritan Law, and naloxone administration. All OEND participants who were at least 18 years of age, willing, and able to speak and understand English were invited to participate in a program evaluation. All surveys were completed with paper and pen; surveys were coded to link pre and post-assessments. The University at Buffalo Institutional Review Board approved the protocol and study materials.

Measures

Opioid Overdose Knowledge and Attitudes—The Opioid Overdose Knowledge and Attitudes Scale¹⁰ was used to measure attitudes and knowledge for opioid overdose. Knowledge questions were distributed across four subscales, knowledge of (1) risk factors; (2) overdose signs; (3) appropriate actions to address an overdose; and (4) naloxone. For overall opioid overdose knowledge (Opioid Overdose Knowledge Scale, OOKS), the four subscales were combined for a total knowledge score (range 0 to 42; $\alpha=0.90$). Greater scores indicated greater knowledge for each subscale as well as overall opioid overdose knowledge.

Opioid overdose attitudes scale (OOAS) questions were distributed across three subscales, attitudes towards (1) competencies, (2) concerns, and (3) readiness to reverse an opioid overdose. Together the subscales comprise the total opioid overdose attitudes scale (range 26 to 130; $\alpha=0.93$). All questions were measured using a five-point Likert scale. The total scale was composed of 26 questions, with greater scores indicating more positive attitudes for opioid overdose prevention and naloxone administration.

Opioid Experiences—A series of questions assessed the individual's experiences with opioid overdose. These questions determined whether individuals had ever overdosed, witnessed an overdose, or known someone who has overdosed, but have not witnessed it directly. Follow-up questions asked the number of times each event had occurred; these experiences were only assessed at the pretest.

Demographics—Demographics were assessed in the pre-survey using questions based on the United States Census. Participants self-reported, with questions assessing sex, race/ethnicity, relationship status, level of schooling completed, and total household income.

Analytic Plan

Descriptive statistics for demographics and opioid experiences were examined for all participants. Demographics were collapsed into binary variables for race/ethnicity, relationship status, education, and income. Race/ethnicity and relationship status were collapsed because of the small number in some of the groups (e.g., $n=1$ for the “widowed” response option) which would obscure meaningful differences. Education was a binary variable for those without college education and those with at least a college education or greater. Finally, income was a binary variable representing those who had income less than or equal to \$60,000 and those who made more than \$60,000.

Mixed regression models were used to determine how scores changed over the course of the opioid overdose prevention program (i.e. pre to post-test). As pre and post scores are not independent, models, such as mixed regression, that address repeated measures needed to be used. Additionally, this method was advantageous because it allowed within and between person effects to be examined; that is, we could determine how overall knowledge changed (within person effect), but also, how one group changed compared to the others (between person effect). For example, this tested whether overall knowledge changed pre to post test, but also whether there were different changes for men and women over the course of the

program. Post hoc tests were used to examine whether mean scores differed by group; the Scheffe method was used to adjust for multiple comparisons.

Three sets of models were analyzed. First, analyses examined whether opioid overdose/naloxone administration knowledge and attitudes change over the course of an opioid overdose prevention training. Second, analyses explored demographic differences in knowledge and attitudes at the pre-test and at the post-test. Finally, analyses characterized the opioid overdose experiences of those who attended these programs (users themselves, friends/family of users, and/or concerned citizens), and explored whether there are key differences in attitudes and knowledge among those groups. Significance was determined using $p < 0.05$; trend-level significance was determined at $p < 0.08$.

Results

Participants

Participants were mostly female (77.3%) and white (84.3%; see Table 1 Participant Characteristics, in Supplemental Digital Content). The average age was 35.6 years old (range 20 to 66 years). Most participants were single (including separated, divorced, or widowed; 55.9%), had a college degree (59.8%), and were either part-time or not currently employed (including students, 58.1%). Finally, a slight majority of participants made more than \$60,000 per household, 1.5 times the average income for the area.

1. Changes in Opioid Overdose Knowledge and Attitudes due to the OEND—

Knowledge scores improved across all training sessions, with an average score increase of 9.7 out of 42 points, a 23.1% increase ($p < 0.001$). In the mixed regression model (see Table 2 in Supplemental Digital Content), all demographic groups had significant, positive score changes from pre to post test (at least $p < 0.01$), indicating all groups' knowledge improved over the course of the program. In addition, attitudes towards opioid overdose reversal and naloxone administration also improved across all training sessions, with scores improving by 20.0 out of 130 points, on average, a 15.4% increase ($p < 0.001$). Each demographic group had significant, positive attitude score changes from pre to posttest (at least $p < 0.001$, see Table 3 in Supplemental Digital Content).

2. Demographic Differences

2.1 Demographic Differences in Knowledge of Opioid Overdose Prevention and Naloxone Administration: There were differences for pre-test scores by demographic characteristics. Male participants had greater opioid overdose knowledge scores than female participants (3.5 points, $p < 0.001$) prior to the program. In addition, those who made more than 1.5 times the median county income had greater knowledge at the beginning of the program (2.4 points, $p < 0.05$). After the program, there were no significant differences in gender or income ($p > 0.05$).

2.2 Demographic Differences in Attitudes towards Opioid Overdose Prevention and Naloxone Administration: All demographic groups' attitudes improved over the course of the program (at least $p < 0.01$; see Table 2 in Supplemental Digital Content). As with

knowledge, there were differences between groups prior to the training. Male participants had more positive attitudes than female participants at a trend level (5.1 points, $p < 0.08$). White participants had significantly greater scores than other races/ethnicities on the pre-assessment (8.3 points, $p < 0.05$), indicating white participants had more positive attitudes towards responding to opioid overdoses and naloxone administration when entering the program than other racial/ethnic groups. These differences did not persist over the course of the program (post assessment $p > 0.05$).

3. Overdose Experiences among Attendees—Across all five training sessions, no participants experienced an overdose. However, some participants had witnessed an overdose (14.1%) or have known someone who had overdosed (33.0%). 62.9% of participants have neither witnessed an overdose nor known someone who has overdosed. Of those who witnessed an overdose, the mean number of overdoses witnessed was 3.0, with a range of 1 to 10. For those who knew someone who overdosed, but did not witness it directly, they knew of 2.8 overdoses, on average, with a range of 1 to more than 20 overdoses.

3.1 Knowledge among those Who Have Witnessed an Overdose or Who Have Known Someone Who has Overdosed: Those who have witnessed an overdose before had greater overall overdose knowledge (2.8 points, $p < 0.05$; see Table 4 in Supplemental Digital Content), as well as knowledge of overdose signs (1.0 points, $p < 0.01$) and naloxone use (1.1 points, $p < 0.05$) than those who had never witnessed an overdose prior to the training program. These differences did not persist after the training program (post-program knowledge scores $p > 0.10$).

There were also differences for those who have known someone who has overdosed, but did not witness it directly. These individuals had marginally greater overall opioid overdose knowledge (1.7 points greater, $p < 0.08$), as well as greater naloxone knowledge (2.0 points, $p < 0.01$). Again, these differences did not persist at the post-evaluation ($p > 0.10$).

3.2 Attitudes among those Who Have Witnessed an Overdose or Who Have Known Someone Who has Overdosed: There were several attitude differences between those who have witnessed overdoses before and those who had not witnessed an overdose before (Table 1). For those who had witnessed an overdose, prior to the program they had significantly more positive attitudes overall (9.2 points, $p < 0.001$), as well as more positive attitudes regarding their competence (5.9 points, $p < 0.001$) and fewer concerns (2.6 points, $p < 0.001$) when responding to an overdose. The differences persisted even after the education program, with overall attitudes (5.7 points, $p < 0.05$) and marginally greater attitudes towards competency (2.6 points, $p < 0.08$).

There were several differences between those who have known someone who has overdosed, but have not witnessed it directly, and those who have not known someone who overdosed. Overall attitudes were more positive for those who have known someone who has overdosed before (5.2 points, $p < 0.01$), as well as fewer concerns (1.6 points, $p < 0.01$) and greater readiness (1.7 points, $p < 0.01$) to respond to an overdose.

These differences also persisted over the course of the program, such that, those who have known someone who has overdosed had significantly greater overall attitudes (6.0 points, $p<0.01$), fewer concerns (1.8 points, $p<0.01$), and greater readiness (1.6 points, $p<0.07$) to respond to an overdose. Surprisingly, attitudes towards competencies for responding to an overdose were not significantly different between those who have and have not known someone who overdosed at the beginning of the program, however, were significantly different after the education program (2.6 points, $p<0.05$).

Discussion

The present research indicates that the OEND training does improve knowledge and attitudes for participants. This is consistent with other work that has found OEND programs successful at improving knowledge and attitudes (e.g.,^{11,12,13}). However, little previous research has examined the demographics of OEND attendees and their proximity to overdose, and whether such characteristics influence OEND knowledge or attitudes; the present research study addresses this gap.

Importantly, the present OEND training overcame any pre-training knowledge or attitude differences, including knowledge differences by income and attitude differences by race/ethnicity. At the conclusion of the program all participants, regardless of demographic characteristics, attained similar knowledge and attitude scores, indicating that all participants benefitted from the program. These findings indicate that lay people and the wider public are accessing naloxone training.

Further, these results show that the program is sufficient for a wide range of educational and demographic backgrounds; no differences emerged in knowledge over the course of the program, suggesting that the OEND training is accessible for those with different educational experiences and demographic characteristics. As heroin use has widened in geographic distribution, the need to reach diverse populations for prevention has also expanded. What was once concentrated in cities is now wide-spread through urban, suburban, and rural environments.¹⁴ Therefore, it is crucial that education programs work for a wide-range of educational and demographic backgrounds.

These results indicate that the OEND program improves knowledge even for those we expected to be knowledgeable. However, these results indicate that the majority of OEND attendees were not connected to a potential opioid overdose. The lack of opioid users and close family and friends attending OENDs training is concerning. OEND programs are a critical pathway for distributing naloxone to those at risk for an opioid overdose, and without opioid users or close contacts in attendance, they are not able to access the drug. As many other OENDs operate with syringe exchange programs (e.g.,¹⁵⁻¹⁷) it is possible that current users prefer that setting, rather than a 'community-wide' approach. This can be understood within the context of strong stigma surrounding drug abuse;^{18,19} opioid-users may not feel comfortable attending sessions in which they could run into acquaintances who have no knowledge of their drug use. However, needle exchange programs target heroin users, where they can exchange syringes in addition to receiving OEND. Such programs are less likely to attract individuals who use prescription opioids, particularly those who have no need to

exchange needles. Prescription opioid users are an important target audience, particularly as deaths from prescription opioids have grown significantly.¹ Thus, prescription opioid users represent a missed opportunity to further reduce the mortality associated with opioid overdose. Novel strategies to connect those individuals with OEND are needed.

Implications for Policy and Practice

Taken together, these results indicate that OEND programs are not reaching individuals at risk for opioid overdose. Instead, these programs are reaching concerned family/friends of individuals at risk of overdose as well as concerned citizens who have no connection with someone at risk of overdose. It is likely that worried family and friends attend OEND programs because they know someone currently using opioids but has not yet overdosed; this is beneficial as family and friends are important sources of naloxone reversal kits.^{8,20}

The present study conducted a standard pre/post-test evaluation for OEND and is subject to limitations. It is possible that participants did not disclose that they had experienced an opioid overdose or presented more positive attitudes because of social desirability bias. However, participants were given time to complete the survey independently and privately, and all anonymity procedures were emphasized prior to distributing the survey. In addition, some questions were reverse-coded to limit participants' ability to select all the positive responses without reviewing the questions. Finally, OEND participants were not followed to see if and when they used their naloxone kit, so we cannot confirm when or how these kits were used. Longitudinally following OEND participants would provide more accurate information about the kits' use, circumstances in which the kits are used, and whether the kit is successful in reversing the overdose. Such research would provide conclusive effectiveness for OEND programs and the overdoses they reverse and emphasize the importance on naloxone-related policy. In addition, future work should consider how best to engage both current opioid users and their significant others in OEND programs, as the present work illustrates only the latter are engaged in the community-wide OEND. The opioid epidemic requires innovative tools to reverse the mortality associated with overdose, and OENDs are one such program. Distributing naloxone to family and friends with appropriate education does improve knowledge and attitudes, and programs should continue to engage these groups while emphasizing that opioid users could benefit from such programs as well.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Mean Opioid overdose attitudes scores by pre and post test

		Have Witnessed OD Before		Known Someone Who Has OD Before	
		No	Yes	No	Yes
OOAS Total	Pre	90.66 [89.0, 92.2]	99.9 ^{***} [95.9, 103.8]	90.1 [88.3, 91.9]	95.3 ^{**} [92.7, 97.9]
	Post	111.2 [109.6, 112.8]	116.9 [*] [113.0, 120.9]	109.9 [108.1, 111.8]	115.9 ^{**} [113.3, 118.5]
OOAS Competencies	Pre	27.4 [26.6, 28.3]	33.3 ^{***} [31.1, 35.4]	27.6 [26.6, 28.6]	29.4 [28.0, 30.8]
	Post	41.8 [40.9, 42.7]	44.4 [^] [42.3, 46.5]	41.3 [40.3, 42.3]	43.9 [*] [42.5, 45.3]
OOAS Concerns	Pre	21.3 [20.8, 21.8]	23.9 ^{***} [22.7, 25.1]	21.1 [20.6, 21.7]	22.7 ^{**} [22.0, 23.5]
	Post	25.0 [24.5, 25.5]	26.1 [24.9, 27.3]	24.5 [24.0, 25.1]	26.3 ^{**} [25.5, 27.1]
OOAS Ready	Pre	41.9 [41.2, 42.6]	42.7 [41.0, 44.4]	41.4 [40.7, 42.2]	43.1 [*] [42.0, 44.2]
	Post	44.4 [43.7, 45.1]	46.4 [44.7, 48.1]	44.1 [43.3, 44.9]	45.7 [^] [44.7, 46.8]

Significance indicates differences between “yes” and “no.” For example, the significant difference for OOAS total indicates that there was a difference in overall attitudes between those who have witnessed an overdose and those who have not on both the pre-test and the post-test.

In addition, significant differences between demographic groups are indicated by shaded cells.

[^]
p < 0.08

^{*}
p < 0.05

^{**}
p < 0.01

^{***}
p < 0.001

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