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ORIGINAL PAPER

Naloxone Knowledge and Attitudes Towards Overdose Response Among Family Members of People who Misuse Opioids

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Abstract

Providing family members of individuals with opioid use disorders (OUD) naloxone is a cost-effective way to prevent overdose deaths. However, misconceptions and negative attitudes towards naloxone hinder family engagement with naloxone programs. This study examines factors associated with knowledge and attitudes toward naloxone among adults with close family members who misused opioids. Adults with family members (parent, step-parent, child, spouse, sibling, or step-sibling) who misused opioids ($N = 299$) completed a web-based survey. Participants were recruited through treatment providers, community groups, and social media. Surveys assessed naloxone knowledge, attitudes toward overdose response, demographics, completion of naloxone training, attitude toward medications for OUD, and family members' overdose history. Multiple regression was used to identify factors associated with naloxone knowledge (Model 1) and attitudes toward overdose response (Model 2). A graduate degree (B = .35, $p < .003$) and a history of overdose (B = 0.21, $p = .032$) were associated with greater naloxone knowledge. Age (B = .11, $p < .001$), race/ethnicity (B = -1.39, $p = .037$), naloxone training (B = 2.70, $p < .001$), and more positive attitude toward medications for OUD (B = 1.50, $p = .003$) were associated with attitudes toward overdose response. Family members are potential allies in reducing drug overdose deaths, and families may need broader education about naloxone. Awareness of previous overdose was associated with greater naloxone knowledge. Findings related to race/ethnicity suggest the need to reach family members of minoritized racial groups to provide access to naloxone training. Findings point to where education and distribution efforts may focus on increasing knowledge and improving attitudes among those closest to people with OUD.

Keywords Overdose prevention · Naloxone · Opioids · Affected families

Introduction

Opioid overdose is a significant public health burden worldwide and is a common cause of drug-related deaths in the United States (U.S.). Nearly 108,000 drug overdose deaths occurred in the U.S. in 2021, representing a 15% increase compared to the previous year and the highest number ever reported in a 12-month period [1]. Most of these deaths involved opioids, including synthetic opioids like fentanyl [1]. Expanding access to naloxone is a key harm-reduction strategy to reduce overdose fatalities. Naloxone is an opioid antagonist medication approved by the U.S. Food and Drug Administration to reverse opioid overdose. It works by binding to opioid receptors to reverse and block the effects of opioids [2]. Naloxone can be administered with a nasal spray or injected into the muscle, skin, or vein. Although naloxone was initially available in outpatient settings and

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only to patients prescribed it by a medical provider, many countries and U.S. states have expanded access [3]. In the U.S., all states and Washington DC have implemented policies to expand access to naloxone in community pharmacies or non-medical settings and remove requirements for in-person consultation with a prescriber [4]. In 2023, the U.S. Food and Drug Administration approved the first over-the-counter naloxone nasal spray. In addition, many countries, including Australia, Canada, Italy, and the United Kingdom, have made naloxone available without a prescription [3].

Community-based naloxone training programs have been developed and are crucial to naloxone distribution [5, 6]. These programs prepare laypersons to respond to opioid overdose by providing education about risk factors for opioid overdose, signs of opioid overdose, naloxone administration, and aftercare procedures. Research consistently shows naloxone training programs can improve knowledge and self-efficacy related to opioid overdose management and reduce opioid overdose death [7–16]. However, family members are underutilized allies in preventing opioid overdose fatalities, and naloxone training programs often do not reach the friends and family of people who use opioids [17].

Opioid overdoses frequently occur at home [18, 19], and close friends, partners, or family members are often the first to discover that an opioid overdose has happened [20, 21]. Family members can be well-positioned to intervene in an overdose. Family members who obtained naloxone have effectively used it to rescue both their own family members and others from opioid overdoses [16, 22–24]. However, affected family members without naloxone training may have limited knowledge of overdose management [16, 24]. While many family members may not perceive a need for overdose training [25], some affected family members have indicated they want training on naloxone administration [24]. Thus, family members of people who use opioids represent an overlooked and underserved population in efforts to expand access to naloxone and prevent fatal overdose.

Evaluation studies show that affected family members account for a small proportion of overdose training program participants [6, 12, 23, 26]. For example, in Simmons et al.'s evaluation of an online naloxone training program for lay responders, out of 2,450 training participants, only 10% were affected by family members [12]. A survey of 644 U.S. opioid overdose prevention programs in 30 states and the District of Columbia found that an estimated 12% of kits were distributed to friends or family members [6]. In addition, qualitative studies of affected family members highlight how a low perceived risk of overdose, stigma related to moral hazard, and confidentiality concerns are substantial barriers to naloxone uptake among families [25]. Mutual support groups have increasingly become the source of naloxone for many friends and family of people who use opioids. A survey of 260 adults who knew someone who used opioids found that half of the participants who had ever obtained naloxone received it from a mutual support group [25]. However, additional efforts may be needed to reach family members not engaged in such groups.

Knowledge of naloxone administration has clear implications for opioid overdose management. Attitudes toward overdose management, such as self-efficacy and concerns about legal repercussions, may also affect behavior in an overdose situation. Prior studies of naloxone training programs and people who use drugs have found age, gender, income, and urbanicity are associated with naloxone knowledge [8, 17, 27], and gender and race/ethnicity are associated with naloxone attitudes [17]. In addition, overdose experiences (i.e., witnessing or experiencing an overdose) have been associated with greater knowledge and more positive attitudes toward naloxone [17, 27].

While a few studies have examined naloxone training outcomes among affected family members [16, 23], less is known about family members' knowledge, attitudes, and experiences outside of training settings. This is a critical group to reach, as it involves individuals who may not be accessing naloxone training due to stigma and misconceptions. More than a decade ago, Strang et al. found that only one-third of the family members surveyed knew about naloxone and only one-quarter had received advice on overdose management [23]. Although mutual support groups for affected family members have reported greater dissemination of naloxone, there is also a need to reach beyond such groups and engage individuals who may experience greater stigma and isolation [22, 28]. Given the evolving landscape of the overdose crisis and naloxone programs and policy, a more recent examination of the perceptions of affected family members is warranted. The goal of the current study was to examine factors associated with knowledge and attitudes toward overdose response among adults with a close family member who misused opioids. Findings can help inform targeted naloxone training and distribution efforts to mobilize affected family members to reduce opioid overdose fatalities.

Methods

Sample

Adults with a family member who experienced opioid-related problems were recruited to complete a survey about their experiences. Publicly-funded treatment providers throughout Michigan and support groups for affected family members (e.g., Families Against Narcotics) distributed advertisements through email and social media.

Advertisements were also shared on a university social media platform. The study focused on close family members and was limited to adults with a sibling or step-sibling, parent or step-parent, child or step-child, or spouse with opioid-related problems. Examples of opioids were provided in the screening questions (e.g., Vicodin, Percocet, Norco, Lortab/Lorcet, Percodan, Tylox, Oxycontin, Hydrocodone, Morphine, Codeine, Heroin, Fentanyl).

A total of 299 family members participated in the survey and were included in the present study. The [BLINDED] institutional review board approved all study procedures, and participants provided informed consent to participate. Although individual incentives were not offered, participants could enter a drawing for one of five $50 gift cards.

Measures

Demographics Demographic measures were self-reported and included age (in years), gender, race/ethnicity, income, and education. While gender had three options (male, female, other), all family members identified as male or female. To compare individuals who are White to racial and ethnic groups that have been historically marginalized in the U.S. and underserved in healthcare [29], race/ethnicity was dichotomized to compare White family members to historically marginalized groups (i.e., Black or African American, Asian or Pacific Islander, Arabic or Middle Eastern, American Indian, Hispanic, Multiracial, other races/ethnicities). Income was measured using 12 categories (0 = less than $10,000, 1=$10,000 to $19,999, 2= $20,000 to $29,999, 3=$30,000 to $39,999, 4=$40,000 to $49,999, 5=$50,000 to $59,999, 6=$60,000 to $69,999, 7=$70,000 to $79,999, 8=$80,000 to $89,999, 9=$90,000 to $99,999, 10=$100,000 to $149,999, 11 = more than $150,000). The highest level of education was grouped into three categories, comparing those with a high school degree to those with a college degree and graduate or professional degree.

Overdose Experience and Attitudes toward Medications for Opioid Use Disorder Participants were asked whether their loved one had experienced an overdose (yes, no, unsure). This item was dichotomized for analysis to compare family members with a known history of overdose (= 1) to those with no history or who were unsure (= 0). Attitudes toward medications for opioid use disorder (MOUD) were assessed with a question asking participants to indicate their agreement with the following statement: "People who are taking medication for opioid addiction are not fully recovered." Response options were provided on a 5-point scale and dichotomized for analysis to compare those who completely disagreed or disagreed (= 1) to those who completely agreed, agreed, or were undecided (= 0). Finally, participants indicated whether or not they had received training on how to use naloxone (1 = yes, 0 = no).

Naloxone Knowledge Knowledge of naloxone administration was assessed using five items from the Naloxone Use subscale of the Opioid Overdose Knowledge Scale (OOKS) [30]: (1) If the first dose of naloxone has no effect, a second dose can be given; (2) There is no need to call for an ambulance if I know how to manage an overdose; (3) Someone can overdose again even after having received naloxone; (4) After recovering from an opioid overdose, the person must not take any heroin, but it is OK for them to drink alcohol or take sleeping tablets; and (5) Naloxone can provoke withdrawal symptoms. The five items use a true, false, or don't know response format. Each correct answer receives one point, while don't know and incorrect responses are scored 0, then summed for a total score ranging from 0 to 5. Higher scores indicate greater knowledge of naloxone administration.

Attitude Toward Overdose Response Attitudes toward overdose response were assessed using five items from the Opioid Overdose Attitudes Scale's (OOAS) Managing an Opioid Overdose Concern subscale [30]. These items include: (1) I would be afraid of giving naloxone in case the person becomes aggressive afterward; (2) I would be afraid of doing something wrong in an overdose situation; (3) I would be concerned about calling emergency services in case the police come around; (4) If I tried to help someone who has overdosed, I might accidentally hurt them; and (5) I would feel safer if I knew that naloxone was around. Given the widespread adoption of intranasal naloxone, we did not ask two of the overdose concern items focused on needles or naloxone injection. For comprehension and accessibility, we excluded a third item from the subscale that scored at the college level on the Flesh-Kincaid reading test. Participants rated each item on a scale from completely agree (= 5) to completely disagree (= 1). Negative items were reverse-scored, then the five items were summed for a total score ranging from 0 to 25. Higher scores indicate more positive attitudes toward naloxone and overdose management.

Analysis Plan

Descriptive statistics were calculated for all variables and correlational analysis was used to examine the pair-wise relationship among variables. The correlations provided no indications of multicollinearity among the independent variables. Then, multiple linear regression models were used to identify factors associated with naloxone knowledge

(Model 1) and attitudes toward overdose response (Model 2). All analyses were conducted in Mplus version 8.5. and used Full Information Maximum Likelihood Estimation (FIML) to handle missing data.

Results

Sample Characteristics

Descriptive statistics of the sample are reported in Table 1. On average, family members were 44.72 years old, and most respondents were female (81.6%). Although most family members self-identified as White (86.0%), 14.0% identified as a person of color. This group included people who identified as Black or African American ($n = 9$, 3.0%), Asian or Pacific Islander ($n = 4$, 1.5%), Arabic or Middle Eastern ($n = 6$, 1.9%), American Indian ($n = 10$, 3.4%), multiracial ($n = 9$, 3.0%), and other races/ethnicities ($n = 3$, 1.1%). Education varied, with 41.7% having a high school diploma or GED, 34.5% having completed a bachelor's degree, and 23.9% having a graduate/professional degree. The mean household income was 6.76 ($SD = 3.24$), representing $60,000 to $69,999. Nearly half (48.5%) of the participants knew that their family member had experienced an overdose. About 22.1% of family members reported a positive view of MOUD and 37.1% had completed overdose education and naloxone training. Naloxone knowledge was high with a mean of 4.32 ($SD = 0.75$) on a scale ranging from zero to five. Attitudes toward naloxone administration averaged 18.96 ($SD = 4.29$) on a scale ranging from zero to 25.

Table 1 Demographic and Substance Use Characteristics of the Sample of Adults with Family Members who Misuse Opioids (N = 299)

Variable	N	Percent (%)	Mean (SD)
Age (in years)			44.72 (15.04)
Race/Ethnicity			
White	257	86.0	
Historically Marginalized Racial/Ethnic Groups	42	14.0	
African American or Black	9	3.0	
Asian/Pacific Islander	4	1.5	
Arabic/Middle Eastern	6	1.9	
American Indian	10	3.4	
Multiracial	9	3.0	
Other	3	1.1	
Gender[2]			
Male	55	18.4	
Female	244	81.6	
Income[3]			6.76 (3.24)
Education			
High School Degree	125	41.7	
College Degree	103	34.4	
Graduate Degree	71	23.9	
Family Overdose History	145	48.5	
Positive Perception of MOUD	66	22.1	
Received Previous Naloxone Training	111	37.1	
Naloxone Knowledge[4]			4.32 (0.75)
Attitude toward Naloxone[5]			18.96 (4.29)

Note[1]: No participants identified as a gender other than male or female

Note[2]: Income categories are: 0=less than $10,000, 1=$10,000 to $19,999, 2= $20,000 to $29,999, 3=$30,000 to $39,999, 4=$40,000 to $49,999, 5=$50,000 to $59,999, 6=$60,000 to $69,999, 7=$70,000 to $79,999, 8=$80,000 to $89,999, 9=$90,000 to $99,999, 10=$100,000 to $149,999, 11=more than $150,000

Note[3]: Knowledge of Naloxone ranged from 0-5

Note[4]: Attitude for Naloxone ranged from 0-25

Note[5]: Medication for Opioid Use Disorder (MOUD)

Multiple Regression Results

Naloxone Knowledge. Results of the multiple regression model examining factors associated with naloxone knowledge are reported in Table 2. Family members with a graduate/professional degree (B = 0.35, $p = .003$) had greater naloxone knowledge than family members with a high school degree. Those who knew their family member had experienced a drug overdose (B = 0.21, $p = .032$) also had greater naloxone knowledge. Age, gender, race/ethnicity, income, attitudes toward MOUD, and self-reported completion of naloxone training were not significantly associated with naloxone knowledge.

Attitudes toward Overdose Response. Results of the multiple regression model examining factors associated with attitudes toward overdose response are reported in Table 3. Older age (B = 0.11, $p < .001$), completion of naloxone training (B = 2.70, $p < .001$), and more positive attitudes toward MOUD (B = 1.50, $p = .003$) were associated with more positive attitudes toward overdose response. Participants from marginalized racial/ethnic groups (B = -1.39, $p = .037$) had more negative attitudes toward overdose response. Gender, income, education level, and individuals with a family member who had experienced a drug overdose were not significantly associated with attitudes toward overdose response.

Discussion

Family members can play a crucial role in providing timely assistance during drug overdoses, yet they are often underutilized in the prevention of opioid overdose fatalities.

Table 2 Correlations Between Sociodemographic Characteristics and Substance Use-Related Variables

	Age	Gender	Race/ Ethnicity	Income	Edu: BA	Edu: MA+	Family Overdose	MOUD attitude	Training	Knowledge	Naloxone attitude
Age	1										
Gender	0.010	1									
Race/ Ethnicity	-0.153*	0.047	1								
Income	0.199**	-0.036	-0.123	1							
Edu: BA	0.164**	0.178**	-0.107	0.123	1						
Edu: MA+	-0.066	-0.171**	0.128*	0.166**	-0.405***	1					
Family Overdose	0.120	0.058	-0.056	0.007	0.084	-0.128*	1				
MOUD[4] attitude	0.013	0.065	0.017	0.079	0.106	-0.040	0.033	1			
Training	0.305***	-0.011	-0.111	0.001	0.091	0.060	0.096	0.130*	1		
Knowledge	-0.007	0.003	-0.142*	-0.003	-0.018	0.133*	0.158*	0.019	0.160*	1	
Naloxone attitude	0.507***	0.081	-0.177**	0.069	0.197**	-0.072	0.157*	0.193**	0.466***	0.172**	1

* $p < .05$, ** $p < .01$, *** $p < .001$

[1]Gender: 0 = male, 1 = female; [2]Race: 0 = White, 1 = Historically Marginalized Racial/Ethnic Groups; [3]Education: High school diploma is a reference group; and 4 MOUD = medication for opioid use disorder.

Table 3 Multiple Linear Regression Analysis examining Naloxone Knowledge and Attitude Toward Naloxone

	Model 1: Naloxone Knowledge				Model 2: Attitude Toward Naloxone			
Variable	B	S.E.	Sig.	95% CI	B	S.E.	Sig.	95% CI
Age	-0.01	0.01	0.562	[-0.01, 0.01]	0.11	0.02	**< 0.001**	[0.08, 0.14]
Gender: Female[1]	0.07	0.12	0.555	[-0.16, 0.30]	0.59	0.60	0.321	[-0.58, 1.77]
Race/Ethnicity: Historically Marginalized Racial/Ethnic Groups[2]	-0.24	0.16	0.139	[-0.56, -0.08]	-1.39	0.67	**0.037**	[-2.70, -0.08]
Income	-0.01	0.02	0.470	[-0.04, 0.02]	-0.04	0.06	0.566	[-0.16, 0.09]
Education: Bachelor's degree[3]	-0.03	0.11	0.816	[-0.19, 0.24]	0.79	0.53	0.135	[-0.25, 1.83]
Education: Graduate degree[3]	0.35	0.12	**0.003**	[0.12, 0.57]	-0.01	0.56	0.991	[-1.11, 1.09]
Family overdose history	0.21	0.10	**0.032**	[0.02, 0.41]	0.41	0.43	0.342	[-0.43, 1.25]
Perception of MOUD	0.04	0.12	0.772	[-0.20, 0.27]	1.50	0.51	**0.003**	[0.50, 2.50]
Naloxone Training	0.19	0.10	0.058	[-0.01, 0.40]	2.70	0.45	**< 0.001**	[1.81, 3.58]

[1] Male was the reference group for Gender

[2] White was the reference group for Race/Ethnicity.

[3] High School Diploma is the reference group for Education

Previous studies have shown naloxone training can improve affected family members' self-efficacy and readiness to respond to a drug overdose [24]. However, naloxone training programs are not reaching many families affected by opioid misuse [17]. In the current study, we found that only 37.1% of family members in our sample had received training on naloxone administration, despite the increased resources devoted to expanding naloxone access. This finding aligns with recent studies indicating that family members comprise a small proportion of overdose prevention training attendees [26]. We also found no differences in naloxone knowledge based on whether family members had completed naloxone training. Families may get information about naloxone from other sources, such as support groups for affected families (e.g., online or in-person), internet sources, public service advertisements, friends, and family members.

Our study found that individuals with higher levels of education and those who knew their family member had experienced a drug overdose had greater naloxone knowledge. Higher educational attainment and personal experience with overdose may contribute to a better understanding of naloxone and its role in overdose reversal. Efforts should be made to ensure individuals of all educational backgrounds obtain information about drug overdoses and naloxone. Providing naloxone information in a range of settings (e.g., community programs, pharmacies, support groups, libraries, the internet) and making it accessible in different formats to accommodate diverse backgrounds and schedules may help to reach a broader range of family members. Family members who are aware of a loved one's overdose may be more likely to seek out information about naloxone through community training or other means. This finding is consistent with previous research indicating that individuals who acquire naloxone due to their family or friends' drug use were significantly more likely to have personal experiences with overdose, such as knowing someone who had overdosed, knowing someone who had died of an overdose, or witnessing an overdose [31]. Family members who had a

loved one that overdosed may also be more likely to seek support from mutual support groups that provide naloxone education (e.g., Families Against Narcotics).

Providing naloxone education is essential for family members regardless of substance use severity. With the toxicity of the unregulated drug supply [32], individuals without extensive drug use history may be at risk for drug overdose. Broad efforts to promote universal access to naloxone may help individuals who engage in infrequent or less severe drug use. It also may help reach individuals who are unaware of the extent of their loved one's drug use [33].

Findings related to race and ethnicity and naloxone attitudes suggest the need for greater naloxone education among families from historically marginalized racial/ethnic groups. Targeted interventions, however, should consider the complex relationship between racism and harm reduction [34]. Resistance to harm reduction in Black communities has been documented and attributed to "respectability politics" [35]. Findings related to race and ethnicity and naloxone attitudes suggest the need for greater naloxone education among families from marginalized racial groups. Historically, drug use in Black communities has been used to justify racism; Black individuals may distance themselves from drug use as a means of self-preservation [34]. Other research suggests lay responders worry about consequences if they were found carrying naloxone, such as being labeled an "addict" by the police [33, 36]. Given racial disparities in drug policy implementation and impact [37], fear of legal repercussions may be a particular concern among historically marginalized racial/ethnic groups. More widespread availability of naloxone may help to reduce the stigma associated with naloxone and may benefit groups that have been historically marginalized. However, future research is needed to examine the concerns surrounding naloxone among historically marginalized racial/ethnic groups. Identifying culturally relevant methods for naloxone training and reducing the stigma toward naloxone may help to reduce the rapidly rising overdose death rates among historically marginalized racial/ethnic groups [38].

Older age was associated with more positive attitudes toward naloxone. Most overdose deaths occur among adults aged 35 to 44 [39]. Parents of people within this age group are an important target for naloxone education and distribution programs. Parents comprise the majority of the membership of mutual support groups for affected family members [28], which have been identified as a major source of naloxone education among family members [25]. However, adolescent overdose death rates are rising rapidly [40]. Research suggests during the adolescent years, siblings have a greater effect on adolescent substance use than parents [41]. Siblings of adolescents may therefore be well positioned to intervene in an overdose situation. Younger family members, such as siblings, should be prioritized as targets for naloxone training initiatives.

More positive attitudes toward MOUD were associated with more positive attitudes toward naloxone. Involving families in treatment may be one way to provide information on overdose education and encourage attendance of naloxone trainings. However, with the toxicity of the current drug supply, many people who overdose may not meet the criteria for a substance use disorder and, therefore may not be in substance use treatment. It is also possible that individuals who do not access MOUD due to stigma also have misconceptions about naloxone. Individuals with OUD who are not treated with agonist medications may be at increased risk of overdose, and friends and family members of these individuals are important targets of naloxone training programs. Broadening naloxone and harm reduction education to include parents and other family members of both treatment seeking and non-treatment-seeking persons may help to reduce future fatalities.

Limitations and Future Research

Although the current study adds to our understanding of naloxone knowledge and attitudes among families affected by opioids, several limitations should be considered. First, the recruitment approach relied on emails sent from a state agency to publicly funded treatment providers and mutual support groups like Families Against Narcotics. Family members that are engaged in peer support programs may be overrepresented. Due to small cell sizes, we collapsed across different racial and ethnic groups to compare individuals from historically marginalized racial/ethnic groups to individuals who identified as White. Future research should further examine the effectiveness of naloxone education for affected family members across socio-demographic groups. Finally, while attitudes toward harm reduction interventions among Black communities have been examined [34], less is known about attitudes among other historically marginalized groups. Qualitative methods may also be useful to explore the knowledge and attitudes of Black families more deeply. Additional research, including studies utilizing qualitative methods, may help us better understand how family members obtain knowledge about naloxone.

Conclusion

Public health approaches to educating family members and the broader populace about naloxone may help to further reduce overdose deaths among those who misuse opioids. This study's results highlight the important role of family members in preventing opioid overdoses. However,

additional work is needed to provide naloxone education and training to individuals of all education levels and backgrounds, including families of people not accessing MOUD or other forms of treatment for OUD. In addition, future studies are needed on naloxone attitudes, access, and utilization among historically marginalized racial/ethnic groups.

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Availability of Data and Materials The data that support the findings of this study are available from the corresponding author upon request.

Declarations

Conflict of Interest The authors have no conflicts of interest to report.

Ethics Approval This research was approved by the Wayne State University Institutional Review Board.

Informed Consent Informed Consent was obtained from all individual participants included in the study.

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