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Opioid Overdose Knowledge among College Students in a High Overdose Death State

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Abstract

Purpose: The goal of this study was to investigate university students' knowledge about identification of opioid overdose and actions to take in an overdose emergency.

Methods: A cross-sectional, anonymous, 36-item survey was developed and administered to West Virginia University (WVU) students. Overdose knowledge was assessed using the Opioid Overdose Knowledge Scale (OOKS). Demographic information, health insurance coverage status, previously receiving an opioid prescription, and knowledge about West Virginia Good Samaritan laws were also collected. Online survey responses were collected via REDCap.

Results: The study sample (n=214) was 90% white, 72.5% female, had a mean age of 24.8 years, and over half previously received a prescription opioid (51.9%). Additionally, 6.5% reported witnessing an overdose in the past year, and 15.9% previously received naloxone training. Overall, our participants had an average score of 30.9 out of 45 on the OOKS. Participants who previously received naloxone training scored higher overall on the OOKS than participants who did not ($p<0.001$). Similarly, participants who previously received a prescription for an opioid also scored higher than participants who had never had a previous prescription for an opioid ($p<0.001$).

Conclusions: University students' knowledge suggests that previous exposure to opioid prescriptions and naloxone training increase a student's knowledge about opioid overdose. This information is not surprising; however, this does make the case that students may benefit from brief overdose education programs that could be implemented across university health education curricula. However, a larger effort may need to be implemented to encourage students to participate in such programs.

Keywords

OPIOID OVERDOSE; WEST VIRIGINIA; COLLEGE STUDENTS

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INTRODUCTION

According to the 2017 National Survey on Drug Use and Health (NSDUH) an estimated 11.4 million people misused opioids with approximately 2.1 million people having an opioid use disorder.[1] That same year, approximately 1 in 4 young adults aged 18 to 25 were current illicit drug users. Irrespective of age, the 2017 estimates of current illicit drug use are primarily driven by the use of marijuana and misuse of prescription pain relievers such as opioids. With growing numbers of illicit drug use among young adults aged 18 to 25, college students represent a crucial age group with exposure to opioid pain relievers and potentially adverse consequences.[1]

Opioid use among college students is a serious public health concern. Given college culture, it is unsurprisingly that many students are at increased exposure to drugs including tobacco, alcohol, stimulants, and opioids.[2] Use of other substances such as marijuana, alcohol, and stimulants are among the risk factors for heroin use.[2] An early report found that opioid use among college students, primarily driven by an increased use of heroin, increased by 343% between 1993 and 2005; with more than 50% of college students being offered a prescription drug for nonmedical purposes by their sophomore year.[2] Furthermore, a study conducted in 2014 found that approximately 12% of college students reported lifetime nonmedical use of prescription opioid analgesics, 7% reported nonmedical use in the past year, and 3% reported nonmedical use in the past month.[3] Given the high addiction potential of opioids and risk of immediate severe consequences such as overdose; overdose education and prevention efforts are essential among college students.[4,5]

In addition to rising numbers of individuals using opioids, there is also a dramatic increase in the risk of opioid related overdose.[6] In part this is a result of the unpredictability of substances present in illicit drugs but also a rise in number of individuals receiving higher doses of prescription opioids for long-term management of chronic pain.[7] Even when taking opioid medications as prescribed, risk of accidental overdose remains a concern, especially when considering the risk of drug-drug interactions.[7,8] To combat this growing crisis the surgeon general and Centers for Disease Control and Prevention (CDC) recommend expanding the awareness and availability of naloxone, an opioid agonist to temporarily reverse the effects of an opioid overdose.[6,7,9-11] Several research studies have shown that when overdose education programs and naloxone are available to community members, those communities experience decreases in overdose related deaths.[12-14] In most states, people who are or who know someone at risk for opioid overdose can go to a pharmacy or community-based program, to get trained on naloxone administration, and receive naloxone without a patient-specific prescription.[15] Furthermore, most states have laws designed to protect health care professionals for prescribing and dispensing naloxone from civil and criminal liabilities as well as Good Samaritan laws to protect people who administer naloxone or call for help during an opioid overdose emergency.[15,16] Naloxone is increasingly being used by police officers, emergency medical technicians, and non-emergency first responders to reverse opioid overdoses; however, too few community members are aware of the important role they can play to save lives.

While this crisis has spread nationwide, certain areas are disproportionately affected by the opioid epidemic. In February 2017, an analysis from the West Virginia Health Statistics Center showed that at least 818 people in the state died of drug overdoses in 2016–a nearly 13% increase from 2015[17] and of those deaths in 2016, approximately 86% involved at least one opioid.[18] In 2017, West Virginia remained the state with the highest prescription opioid-involved death rates with 17.2 per 100,000[19] and heroin overdose deaths with 14.9 per 100,000.[19] Furthermore, the state also led the country in synthetic opioid related deaths with 37.4 per 100,000.[19] This continues a multi-year streak leading the country in opioid-related deaths.

The objective of this study is to investigate opioid overdose knowledge among college students in a high-risk, high opioid exposure state. West Virginia University (WVU) student knowledge about identifying an opioid overdose and resources available in the event of an overdose emergency were evaluated using the opioid overdose knowledge scale (OOKS). We hypothesize that the target population (college students in a high risk state) will be under-educated in terms of identifying opioid overdose signs and symptoms, knowing what to do in an overdose emergency, and identifying resources related to opioid overdose.

METHODS

Sample and Design

A cross-sectional study of 214 WVU students was conducted using an online survey administered via an anonymous, public link. Participants were asked to complete a 36-question survey estimated to take approximately 10 minutes. It was administered independently of concurrent available naloxone training opportunities across the WVU campus. Responses were recorded in the online REDCap system,[20] a secure web application for building and managing online surveys and databases. Survey dissemination utilized university list-servers of electronic mailing lists for students the WVU Main and Health Sciences Campuses. Other electronic dispersion methods such as posting to university group webpages, collaborating with the student health organizations, and snowballing techniques were also utilized.

Study participants had to be 18 years of age or older, and able to speak and understand the English language. Participants were informed about the confidentiality of their responses initially, and again prior to initiation of the study survey. Ethical approval for this study was granted and on file with the WVU Institutional Review Board.

Measures

Sociodemographic information.—Participants were asked, via self-report, their age (in years), race, ethnicity, and relationship status. Participants were questioned on their access to healthcare in the dichotomous, yes/no form of “Do you have any kind of health care coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?”

Opioid Overdose Knowledge Scale.—The Opioid Overdose Knowledge Scale (OOKS) is a structured self-completion questionnaire.[21] The scale consists of multiple-

choice response items to classify changes in knowledge about overdose identification and management. The scale was originally administered family and friends of heroin users as well as healthcare professionals. It was originally assessed for internal reliability by Williams et al (2013; Cronbach's alpha=0.83) and was found to be suitable in measuring outcomes of take-home naloxone training among family and friends of opioid users.[21] The questionnaire also assessed previous experience dealing with an overdose, willingness, and confidence in administering naloxone.

Additional Questions.—In addition to the OOKS, several additional questions were selected to better understand the sample population. Questions regarding previous exposure to opioid medication such as: "Have you ever received a prescription for opioids (example: Vicodin®, tramadol, Oxycontin®, hydrocodone, morphine, etc.)?" and additional substance use questions were included to assess alcohol, cigarette and other tobacco use. Questions to evaluate nonmedical substances use such as opioids, stimulants, depressants, hallucinogens, and other substance of potential abuse were also included.

Questions regarding witnessing an opioid overdose, number of opioid overdoses witnessed, actions taken during such event(s) were included. Finally, participants were asked if they were aware of West Virginia's "Good Samaritan Law"[22] or if they had ever attended a naloxone/substance abuse training course or program. These questions were asked to identify a subset of the general population that may have prior opioid emergency training (i.e., first responders, health care providers, etc.).

Statistical Analyses

Descriptive statistics (frequencies and means) were calculated for gender, age, race, and substance to characterize the sample. Health insurance coverage (yes/no), attendance, receiving naloxone training (yes/no), awareness of West Virginia Good Samaritan law (yes/no), working or studying in a health field (yes/no) and ever receiving a prescription for an opioid medication (yes/no/unsure) were also accounted for in the sample. The OOKS scores were calculated for each of the four domains (knowledge of risk factors, signs of an overdose, actions to take, and naloxone) based on the OOKS scoring manual.[21] A composite score out of 45 total points was calculated for total OOKS score for each respondent. T-tests were used to compare OOKS scores for participants receiving naloxone training and participants who did not receive naloxone training. Additional t-tests were used to compare participants who received a previous prescription for opioids compared to participants who had never received a prescription. Ten participants were unsure whether they had previously received a prescription for an opioid and were excluded from this analysis. Data was analyzed using STATA (14.0).[23]

RESULTS

The study sample was 72.5% female (n=137), 90% Caucasian (n=193), and has a mean age of 24.8 years old (range: 18-69 years). A majority of the sample endorsed consuming 1-6 alcoholic beverages per week (40.4%) and never smokers (78.9%). Additional substance use for the sample is included in Table 1.

Thirty-four students received naloxone training (15.9%). When compared to students who did not receive naloxone training, students with previous naloxone training scored significantly better on the risk, signs, action, and naloxone domains (Table 2). Overall students with naloxone training had a total OOKS score of 36.2 (SD=3.23) compared to 29.9 (SD=5.22) students without training ($p<0.001$).

Sixty-three students surveyed reported being in a health field. Compared to students who were in non-health programs students who were enrolled in a health-related major performed significantly higher on the OOKS subdomains signs, actions, and naloxone (Table 3). However, there was no statistically significant difference between their scores on the risk subdomain. Overall, students enrolled in health-related studies had a higher mean OOKS score of 33.7 (SD= 4.3) compared to 29.8 (SD=5.4) for students in non-health programs ($p<0.00$).

One-hundred and eleven students have previously received a prescription opioid; ninety-three students had never received an opioid prescription and ten students were unsure. The ten students who were unsure if they ever received a prescription for an opioid and were excluded from the analysis, leaving a total sample of n=204 for this particular analysis. When compared to students with no previous prescription opioid, students with previous opioid prescriptions scored significantly higher on OOKS signs, action, and naloxone subdomains (Table 4). Overall, students with previous opioid prescriptions had a significantly higher OOKS total score of 32.3 (SD=4.6) compared to 29.6 (SD=6.0) for students without a previous opioid prescription ($p<0.001$). Previous receipt of a prescription opioid was the only substance use that show statistically significant differences between groups on OOKS performance.

Additionally, 6.7% of our sample (n=14) previously witnessed an overdose. Students who witnessed an overdose scored significantly higher on OOKS subdomains for signs ($p<0.01$) and action ($p<0.05$). There were no significant differences for OOKS subdomain scores for risk or naloxone (Table 5). However, students who previously witnessed an overdose had a total mean OOKS score of 34.2 (SD= 4.4) compared to 30.9 (SD= 5.4) for students who had never witnessed an overdose which is statistically significant ($p<0.05$).

DISCUSSION

Opioid overdose education and naloxone distribution have been effective at reducing overdose death rates in community settings.[13,14,24] Similar educational programs and widespread availability of naloxone kits in college campuses can also help to reduce this problem. However, most knowledge assessment studies have been conducted primarily in clinical health settings, and among current opioid users. Awareness of knowledge gaps surrounding knowledge about the resources available in overdose emergency situations could prove very helpful in providing lifesaving interventions.

College students with naloxone training scored higher on opioid overdose risk, signs, action, and naloxone administration scales. However, only a small portion of our study sample had attended such training despite attending school in a high death risk state. While students

with previous opioid prescription scored better overall on all domains compared to those who had not previously received an opioid prescription, their lowest score was on the action subdomain. This indicates that while students know how to identify an opioid overdose, more training is needed regarding what actions are necessary to take in the event of witnessing an overdose.

Prescription drug misuse and related overdose deaths in college campuses have gone up substantially in recent years.[25] Recent state legislature changes have improved layperson access to naloxone in order to reduce drug overdose deaths.[7,12,26,27] However, acceptance and availability of naloxone in college communities has been hindered due to denial of risk, stigma, and lack of awareness or resources.[28] Training and educating campus police departments and students, making naloxone kits available next to fire extinguishers in case of emergencies, and distributing information online can all be utilized to reduce the problem of overdose deaths in and around college campuses and in communities. It can not only improve risk behaviors of students taking the training but also empower them to intervene in an overdose situation making an impact on the whole community. Our study shows that student who take naloxone training are equipped with knowledge to tackle an overdose if they are to witness one. However, such trainings are not provided by all universities; and as see in our study, the overall percentage of students reporting participation in such training programs is low, which may represent an additional barrier.

Results from our study also demonstrate that students with prior exposure to opioid prescriptions (as measured by self-report of receipt of previous opioid prescription), scored better on the OOKS than students who had not previously received an opioid prescription. This could be explained by several factors. It is possible that students who previously received an opioid prescription were also educated by their health care provider (i.e. physician, pharmacist etc.) about the potential risks associated with opioid medication and the proper use of their medication. Additionally, students who received an opioid prescription would be likely to have multiple points of contact in the healthcare system. For example, the doctor who prescribed the medication and the pharmacist who would distribute the medication. This would allow for several points of intervention where the person could be educated on the appropriate use as well as the potentials risks associated with prescription opioids. Another plausible explanation is that in light of the ongoing opioid epidemic, students were more aware of the intrinsic risks associated with opioid prescriptions and upon being prescribed an opioid were more inclined to research these risks on their own increasing their knowledge related to opioid overdose.

We acknowledge several potential limitations to this study. First, the survey was restricted to online distribution, no other dissemination methods were utilized; limiting our sample size to students who check and have access to internet services. Second, this study is observational in nature and this is open to the limitations of such designs including self-report and reporting bias. The cross-sectional design of the survey does not allow us to make any claims about causality. Furthermore, there was no intrinsic safeguards to prevent the same student from taking the survey twice because of the anonymous nature of the survey. Third, questions regarding marijuana use were not included due to an oversight in survey construction, yielding an incomplete picture of substance use in this sample. Finally,

students at WVU are attending an institution in a state that is at the epicenter of the opioid epidemic which may skew results of this study. Since we did not account for student's place of origin (i.e. home city, country, or zip code of residence) we could not analyze knowledge gaps based on students residing in WV versus outside of the state.

CONCLUSIONS

College students with naloxone training or previous prescription opioid use have higher opioid overdose knowledge than their counterparts. However, all students showed a lack of knowledge about proper actions to take in case of an opioid overdose. Naloxone education and training programs need to emphasize the such aspects by not only focusing educational training on education about overdose risk, but how bystanders should react in these situations. Our study shows that while students do demonstrate key aspects of knowledge associated with signs and risks associated with opioid overdose, overall student participation in naloxone training programs was low. Ultimately, while naloxone training is effective for increasing student knowledge about signs, risks, actions, and naloxone administration, greater effort needs to be put forth to engage students in these training programs especially given the number of students with previous exposure to opioid medications. Thus, a shift in focus to engage students in naloxone trainings may be more appropriate than altering the trainings themselves at this time.

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Table 1.

Selected characteristics of the study sample

	N	%
Gender		
Female	137	72.5
Male	48	25.4
Other	4	2.1
Age in years (Mean[SD])	24.9	7.6
Race		
White	193	90.6
Other	21	9.4
Education		
High school graduate/GED	8	3.8
Some college	96	45.3
Some graduate school	51	24.1
College graduate	21	9.9
Graduate degree	36	17.0
Health Field		
Yes	63	29.6
No	150	70.4
Health insurance		
Yes	201	93.9
No/Unsure	13	6.1
Relationship Status		
In a relationship	110	51.4
Not in a relationship	104	48.6
Alcohol consumption		
<1 per week	67	32.2
1 to 6 per week	84	40.4
>=7 per week	16	7.7
Never used alcohol	33	15.9
Smoking status		
Current smoker	21	9.8
Former smoker	24	11.2
Never smoked	169	79.0
Drug Use in the past year*		
Used opioids like heroin, opium	-	-
Used prescription opioids	15	7
Used stimulants (cocaine, amphetamine, methamphetamine)	23	10.8
Used prescription stimulants (amphetamines, methylphenidate)	29	13.6
Used prescription depressants (barbiturates, benzodiazepines, sleep medications)	18	8.4
Used dissociative drugs (ketamine, PCP, DXM)	-	-

	N	%
Used halllucinogens (LSD, magic mushrooms, etc.)		
Club drugs (ecstasy, roofies, GHB, etc.)	11	5.1
Other compounds (e.g. anabolic steroids, inhalants, nitrites, etc.)	20	9.4
Aware of WV's Good Samaritan Law		
Yes	136	63.6
No	58	27.1
Witnessed an opioid overdose		
Yes	14	6.5
No	194	90.7
Not sure	-	-
Received naloxone training		
Yes	34	15.9
No	180	84.1
Received prescription opioids		
Yes	111	54.4
No	93	45.6

* Fields containing a "-" include data that was suppressed due to small sample size.

Table 2.

Difference in OOKS domains by naloxone training

	Received Naloxone training (n=34)	Did not receive Naloxone training (n=180)	
	Mean±SD	**Mean±SD**	**Significance[a]**
Risk	8.12±1.45	7.10±2.21	0.011
Signs	7.00±1.12	6.08±1.48	0.001
Action	10.29±0.72	9.31±1.34	<0.001
Naloxone Use	10.79±2.11	7.49±2.78	<0.001
Total Score	36.21±3.23	29.99±5.22	<0.001

Note:

[a]Significance is based on 2-tailed independent sample t-tests.

Table 3.

Difference in OOKS domains by students enrolled in health-related programs

	Enrolled in Health-Related Program (n=63)	Not Enrolled in Health-Related Program (n=150)	
	Mean±SD	**Mean±SD**	**Significance[a]**
Risk	7.24±1.97	7.26±2.21	0.946
Signs	6.62±1.46	6.05±1.45	0.009
Action	9.86±0.948	9.29±1.40	0.004
Naloxone Use	10.0±2.35	7.16±2.75	<0.001
Total Score	33.71±4.30	29.76±5.43	<0.001

Note:

[a]Significance is based on 2-tailed independent sample t-tests.

Table 4.

Difference in OOKS domains by the receipt of prescription opioids

	Received prescription opioids (n=111)	Did not receive prescription opioids (n=93)	
	Mean±SD	**Mean±SD**	**Significance[a]**
Risk	7.54±1.82	6.97±2.37	0.053
Signs	6.54±1.25	5.95±1.65	0.004
Action	9.74±1.08	9.15±1.46	0.001
Naloxone Use	8.42±2.93	7.53±2.97	0.032
Total Score	32.25±4.61	29.60±6.02	<0.001

Note:

[a]Significance is based on 2-tailed independent sample t-tests.

Table 5.

Difference in OOKS domain scores by previously witnessing an overdose

	Previously Witnessed an Overdose (n=14)	Did Not Witness an Overdose (n=194)	
	Mean±SD	**Mean±SD**	**Significance[a]**
Risk	8.00±1.57	7.21±2.14	0.178
Signs	7.57±1.40	6.16±1.43	<0.001
Action	10.14±0.77	9.44±1.31	0.048
Naloxone Use	8.71±2.64	8.04±2.95	0.408
Total Score	34.43±4.36	30.85±5.38	0.016

Note:

[a]Significance is based on 2-tailed independent sample t-tests.