

# Opioid Safety Education in Adolescent Students

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**Purpose:** Opioid overdoses profoundly impact thousands of families across the United States. Behind this issue lies the accessibility of opioid prescriptions right inside our medicine cabinets. Our goal was to educate adolescent students in Kentucky schools about this matter because they comprise a vulnerable population.

**Methods:** Pre- and posttestings were used to analyze 26 adolescents' knowledge, attitudes, and awareness regarding opioid overdoses pre- and post-intervention.

**Results:** Adolescents displayed significantly improved results from pre-test to post-test. Overdose Knowledge scores improved by 16% from pre- to post-intervention ( $p = 0.01$ ). Attitude to Act scores improved by 35% ( $p = 0.03$ ). Drug Disposal Awareness scores improved by 54% ( $p < 0.01$ ).

**Conclusions:** This study demonstrates that education improves adolescents' opioid overdose knowledge, attitudes, and awareness. The evidence shows that there are educational gaps that should be filled by teaching adolescents about the opioid epidemic and providing them with resources.

**Keywords:** opioid; overdose; safety; education; adolescent

## INTRODUCTION

Opioid overdoses have affected countless families across the United States, particularly in the past 20 years. From 2002 to 2017, there was a 4.1-fold increase in total number of opioid overdose deaths and 7.6-fold increase in total number of heroin overdose deaths.<sup>1</sup> In 2017, deaths due to fentanyl/fentanyl analog overdoses accounted for nearly 30,000 of 72,000 drug overdose deaths.<sup>1</sup> Compared to any other substance, fentanyl/fentanyl analogs contributed to the highest increase in drug overdose deaths from 1999 to 2017.<sup>1</sup> Fentanyl is approximately 50 times more potent than heroin and 100 times more potent than morphine.<sup>2</sup> Carfentanyl is about 10,000 times more potent than morphine.

For adolescents aged 15–19 years, the opioid overdose death rate more than tripled from 1999 to 2007; overdose death rates for this population were highest for opioid drugs, specifically heroin, from 1999 to 2015.<sup>3</sup> In 2013, Kentucky had the second highest age-adjusted drug overdose death rate in the United States, with pharmaceutical opioids remaining the primary cause.<sup>4</sup> Of these deaths, 87% were declared unintentional or

accidental.<sup>4</sup> Street drugs are not the only threat; in fact, at least half of all opioid overdose deaths involve a prescription opioid.<sup>5</sup> Pharmaceuticals forgotten inside household medicine cabinets pose a threat to children and families who can access these addictive and lethal substances.

In order to help combat this problem, naloxone has become widely available to healthcare professionals, law enforcement, and the community. Naloxone is accessible in local drugstores, but individuals at high risk of witnessing an overdose, such as adolescents, must be educated. One of our primary goals was to familiarize adolescents with naloxone and how it can be used to help save lives. In addition to general education on opioids and its effects, we hoped to provide adolescents with the knowledge and skillset required to intervene if confronted with an opioid overdose.

A range of efforts has been employed to address the opioid crisis. Past studies in adults have demonstrated that opioid knowledge and attitudes can improve with take-home naloxone training,<sup>6</sup> emergency department interventions,<sup>7</sup> and access to overdose resources.<sup>8</sup> Opioid safety education has been implemented in a

variety of settings; however, to our knowledge, none has involved educating adolescents in classrooms where they are most accustomed to learning. Our primary outcome was to investigate whether in-school education has a significant impact on opioid overdose knowledge, attitudes, and awareness in adolescents.

## METHODS

### Selection and Description of Participants

Adolescents have been especially impacted by the opioid crisis and thus were chosen as the subject population of our study. We used pre-/post-testing to analyze the knowledge, attitudes, and awareness of adolescents ( $n = 26$ ) regarding opioid overdoses. In order to focus on this population, we set an age requirement of 12 to 25 years old. Subjects were not excluded based on ethnicity, race, gender, or health status (e.g., pregnancy). They had a mean age of 15.3 years and came from different racial backgrounds: White, African American, and Hispanic.

In order to address a diverse and at-risk population, subjects were pooled from three Kentucky schools: The Learning Center (TLC), Family Care Center (FCC), and Highlands High School (HHS). These schools were chosen based on the willingness of the faculty and

administration to facilitate the study in our subject population. TLC and FCC are alternative schools located in Lexington, KY (Fayette County). HHS is a public high school located in Fort Thomas, KY (Campbell County). Fayette County and Campbell County are ranked #2 and #3, respectively, of 120 Kentucky counties for heroin- and fentanyl-related deaths. Campbell County is also #5 in KY for overall overdose deaths.<sup>9</sup>

### Technical Information

Under protocol, IRB approval was obtained. Once fully informed of the objectives of the study, willing students aged 18 years or above were consented. If they were under the age of 18, student assent and parental consent were required. Either during or after school hours, all subjects were set up in classrooms to take the pretest Opioid Safety Household Assessment (OSHA), which consisted of three sections: Overdose Knowledge, Attitude to Act, and Drug Disposal Awareness. These questions were assimilated by the principal investigator and her faculty mentor, a child and adolescent psychiatrist. They assessed general opioid overdose knowledge, confidence to act in an overdose encounter, and awareness of drug disposal sites. Additional OSHA information is presented in Table 1.

**TABLE 1.** Opioid Safety Household Assessment questions.

Sample overdose knowledge statements	Answer choices
Opioid overdose deaths in Kentucky are becoming less common every year.	True, False
Liver, kidney, or heart disease might increase someone's risk of an opioid overdose.	True, False
The main cause of opioid overdose deaths is slowed breathing.	True, False
A person who has overdosed on opioids will look very awake and be breathing fast.	True, False
If naloxone is given to someone who is <i>not</i> having an opioid overdose, it will hurt them.	True, False
<b>Attitude to act statements</b>	
If I came across an opioid overdose, I would be able to recognize it and seek help.	Not at all, Disagree, Neutral, Agree, Strongly Agree
I feel confident in my level of training on opioid overdoses and naloxone use.	Not at all, Disagree, Neutral, Agree, Strongly Agree
I would feel comfortable using naloxone if I came across an opioid overdose right now.	Not at all, Disagree, Neutral, Agree, Strongly Agree
I am willing to act in any possible way that could help someone who has overdosed on opioids.	Not at all, Disagree, Neutral, Agree, Strongly Agree
<b>Drug disposal awareness statements</b>	
I know that there are places where I can drop off or throw away drugs.	Not at all, Disagree, Neutral, Agree, Strongly Agree

Note: OSHA consisted of 15 questions divided into three sections: Overdose Knowledge (10), Attitude to Act (4), and Drug Disposal Awareness (1).

Upon completion of the pretest, a research team member delivered a 10-min Microsoft PowerPoint presentation on opioids, including types, recognition of an overdose, and how to respond. Finally, the students completed the posttest OSHA, which consisted of the same questions as the pretest. The Overdose Knowledge scale scored one point for each correct true/false answer and zero point for each incorrect/incomplete answer. The Attitude to Act and Drug Disposal Awareness scales scored based on the level of agreement: 0 = not at all/incomplete, 1 = disagree, 2 = neutral, 3 = agree, and 4 = strongly agree. Each student received a pretest and posttest score in the three areas of Overdose Knowledge, Attitude to Act, and Drug Disposal Awareness.

**Statistics**

Two of six Attitude to Act statements were eliminated from the OSHA prior to data analysis due to irrelevance and unclear wording. These related to prior education on other substances and naloxone training. Results from the other four statements were used in the statistical workup. Students’ pretest and posttest scores were summed to give a total pretest and posttest score in each of the three areas. Differences in summed scores between pretest and posttest were evaluated using the paired sample *t*-test in Microsoft Excel. A cut-off value of  $p < 0.05$  was used to determine whether the results were statistically significant.

**RESULTS**

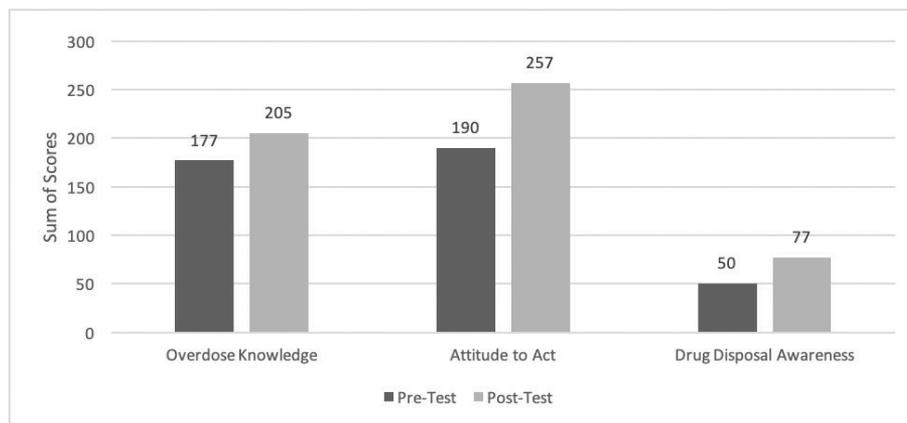
Twenty-six adolescent students’ pretests and posttest scores were used to calculate results. During scoring, we discovered that five students omitted one or more answers to various questions on the OSHA. All omitted answers simply counted for zero points toward scoring. Overall, 21 of 26 students provided answers to every question on both the pretest and posttest OSHA. The highest possible score per subject on the OSHA was 38.

For Overdose Knowledge, the summed pretest score for all participating subjects was 177. The summed posttest score was 205. This represents an increase of 28 points (or 16%) post-intervention. The paired sample *t*-test revealed a statistically significant increase in summed scores from pretest to posttest ( $p = 0.01$ ).

For Attitude to Act, the summed pretest score for all participating subjects was 190. The summed posttest score was 257. This represents an increase of 67 points (or 35%) post-intervention. The paired sample *t*-test revealed a statistically significant increase in summed scores from pretest to posttest ( $p = 0.03$ ).

For Drug Disposal Awareness, the summed pretest score for all participating subjects was 50. The summed posttest score was 77. This represents an increase of 27 points (or 54%) post-intervention. The paired sample *t*-test revealed a statistically significant increase in summed scores from pretest to posttest ( $p = 0.0005$ ).

Figure 1 depicts a graphical representation of pretest and posttest scores for each section of the OSHA.



**Figure 1.** Summed pretest and posttest OSHA scores. The figure depicts sums of 26 adolescents’ pretest and posttest OSHA scores. Scores increased from pretest to posttest, with statistical significance in all three sections: Overdose Knowledge ( $p = 0.01$ ), Attitude to Act ( $p = 0.03$ ), and Drug Disposal Awareness ( $p = 0.0005$ ).

## DISCUSSION

In this study, students' posttest scores significantly improved from pretest scores in all three OSHA sections. This is an important demonstration of the impact that basic education can have on improving awareness of a public health crisis. We used a 10-min Microsoft PowerPoint presentation to deliver the intervention, which provided a brief yet comprehensive overview of opioid overdoses. We believe that this information would be helpful not only to adolescents but also to families of at-risk individuals going forward. In the future, studies incorporating education to both adolescents and their families would be ideal.

One of the primary limitations of this study is its small sample size due to the challenge of obtaining parental consent for adolescents. Many consent forms were lost or not signed. These students who were under 18 years old could not participate. Because five subjects omitted one or more answers on the pretest or posttest, we did not have a complete data set for scoring. In order to increase generalizability, more studies with larger sample sizes should be conducted. In addition, studies outside of the state of Kentucky would provide a different perspective regarding the impact of opioid overdose education.

## CONCLUSION

Although posttest score improvement was statistically significant in each OSHA section, the study's low sample size is a significant limiting factor. Prior studies discussed above have demonstrated the impact of opioid safety education with adults in various settings. These studies embraced different methods, such as conducting in-person interviews or providing take-home naloxone training. Several other studies have demonstrated the impact of opioid education paired with pre- and posttesting. Our study attempted to apply this approach in adolescents, but a larger population of subjects is needed.

Speaking frankly about opioid overdoses in classrooms across schools in Kentucky has demonstrated that adolescents will listen and learn. Expanding opioid overdose education to different states in other settings, such as clinics and community centers, could impact this impressionable population at an even greater magnitude. The opioid crisis will likely remain a threat for many years to come, but steps can be taken to limit its

consequences. This study has demonstrated that educating, bringing awareness, and providing resources are important in helping adolescents understand opioid overdoses and how to prevent them.

## Conflict of interest and funding

The authors have not received any funding or benefits from industry or elsewhere to conduct this study.

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