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School Nurse Reported Supply and Administration of Naloxone in Schools

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Abstract

Objective—To describe school nurse reported naloxone supply and administration in Pennsylvania, as well as nurse and school-level characteristics associated with naloxone availability.

Methods—Cross-sectional, on-line survey with school nurses in Pennsylvania. Data were collected (3/14/18–6/5/18) on school nurse demographic and professional characteristics, school characteristics, naloxone supply and administration, and when not available, reasons for not having a naloxone supply.

Results—A total of 362 school nurses met inclusion criteria, representing schools in 56 of the 67 Pennsylvania counties. Over half of the school nurses reported a naloxone supply in their school building (53.6%, n=194). Additionally, 5.2% of those who had a naloxone supply reported that it had been administered in their school or at a school sponsored activity. The most common reasons for not having naloxone available included lack of support and the belief that naloxone was not needed in their school.

Conclusion—Although many school nurses reported having a naloxone supply in their school, and a small percentage reported administration, particular barriers to access and use remain.

Keywords

opioids; naloxone; school health; school nurses

Introduction

The crisis of opioid overdose in the United States (US) has reached epidemic proportions. Every day in the US, over 130 people die from an opioid overdose (Centers for Disease Control and Prevention, 2018) and the opioid overdose death rate increased 12% from 2016–2017 (Scholl, Seth, Kariisa, Wilson, & Balldwin, 2019). In 2016, 3.6% of adolescents ages 12–17 years reported misusing opioids over the past year (United States Department of Health and Human Services, 2019). Naloxone is an opioid antagonist medication which can rapidly reverse opioid overdose, by quickly restoring normal respiration due to opioid overdose (National Institute on Drug Abuse, 2018). Naloxone has been shown to be safe, easy to administer, and when paired with a training program, effective in reducing opioid overdoses in the community (Walley et al., 2013). Expanding naloxone availability and access is a core strategy in public health efforts aimed at mitigating the opioid overdose epidemic (Abouk, Pacula, & Powell, 2019; United States Department of Health and Human Services, 2018). Schools can serve as a naloxone access point in the community, and for more than just the student population; teachers, staff, parents and other family members are on school grounds may also be at risk for an opioid overdose and in need of emergency response (Austin & Shanahan, 2017; Scholl et al., 2019).

School nurses are equipped for medical emergencies with life-saving interventions, including preparedness with automated external defibrillators (AEDs) (White et al., 2016) and epinephrine pens for anaphylaxis (Zadikoff, Whyte, DeSantiago-Cardenas, Harvey-Gintoft, & Gupta, 2014). Maintaining a supply of naloxone is another form of emergency preparedness that allows a school nurse to act as a health educator, model positive norms about harm reduction, and operate as an emergency responder who can manage an opioid-overdose in schools if needed (King, 2016). In a 2016 survey of school nurses in North and South Carolina, approximately 40% had encountered students with an opioid prescription, but less than 4% reported having naloxone in case of an overdose (Pattison-Sharp, Estrada, Elio, Prendergast, & Carpenter, 2017). Others have looked at the cost-effectiveness and indicated that the practice of having naloxone in schools is relatively inexpensive (Cipriano & Zaric, 2018). The National Association of School Nurses (NASN) has endorsed the presence of naloxone in schools as a means for safe and effective reversal of an opioid overdose (National Association of School Nurses, 2015). Despite these recommendations by NASN, little is known about how schools prepare for treating overdose, including how they have a supply, administer and perceive naloxone. Moreover, specific factors associated with or without having a naloxone supply at school have not yet been described.

The purpose of this study was to describe school nurse reported naloxone supply and administration in Pennsylvania, as well as nurse and school-level characteristics associated with naloxone availability. In February 2016, Pennsylvania announced the initiation of the first school naloxone program in the US, which facilitated the distribution of naloxone to

schools through March, 2018 (Pennsylvania Department of Health, 2018; Pennsylvania State Education Association, 2016). Through this program, a free 2-dose kit was first available to public high schools when the program started, and then added the inclusion of private/non-public schools. Pennsylvania is a geographically and demographically diverse state in the US that has been heavily impacted by the opioid crisis (Pennsylvania Department of Health, 2019). The opioid overdose death rate in 2017 for Pennsylvania of 43 per 100,000 far exceeded the US national average of nearly 22 per 100,000 (Centers for Disease Control and Prevention, 2019). Therefore, Pennsylvania was a unique state to examine naloxone in schools for this study.

Methods

We deployed a cross-sectional, on-line survey through Qualtrics (Qualtrics Labs Inc., 2012) with school nurses in Pennsylvania. A link to study information and the on-line survey was posted to the Pennsylvania Association of School Nurses and Practitioners (PASNAP) website and recruitment materials were distributed via email. Participants were not required to be PASNAP members to participate. The only eligibility criterion was that they self-reported working as a school nurse in Pennsylvania. After electronic consent was obtained, participants completed the brief on-line survey, intended to take less than 15 minutes to complete. Based on this recruitment method it was not feasible to determine how many school nurses viewed the recruitment materials, and therefore a response rate could not be calculated. At completion of the on-line survey, participants were compensated \$15 via a mailed gift card. Data were collected between March 14, 2018 and June 5, 2018.

Survey

School Nurse Characteristics—Three items were used to describe school nurse characteristics: school nurse's age (years), length of time working as a nurse (years) and length of time working as a school nurse (years). For analyses, age was recoded to 10-year increments: 21–30, 31–40, 41–50, 51–60, and 61 years and older. Length of time working as a nurse and length of time working as a school nurse were both recoded to <10 years or 10 years.

School Level Characteristics—Four items were used to describe characteristics of the schools in which the participants worked: type of school, type of student population, county, and zip code. Type of school was classified as public, private, charter, or parochial. For analyses, these were categorized as public/charter and private/parochial. Type of student population was classified as elementary, middle, and high school: respondents could choose all that applied given the variety of settings in which school nurses work. For analyses, descriptive categories were created to reflect nurses who worked in multiple settings (e.g. elementary only, elementary and middle school, etc.). County in which the school was located was selected from a drop-down menu option of the 67 counties in Pennsylvania. Classification as rural or urban county was taken from The Center for Rural Pennsylvania, which defines rural or urban classification on population density; Pennsylvania has 19 urban and 48 rural counties (The Center for Rural Pennsylvania, 2014). The zip code of the school

was a write in field and was used to help cross check naloxone administration data among nurses to determine any potential overlap of incidents.

Naloxone Supply and Administration—Naloxone supply was determined by asking participants to report if naloxone was stocked in the school building(s) in which they worked. The options were “Yes,” “No,” and “Only some of them do.” This naloxone supply item was recoded to “Yes” for those who answered “Yes” or “Only some of them do,” and “No” for those who answered “No.” Participants were also asked to report whether they had received the naloxone through the Pennsylvania school naloxone program.

The survey asked participants to report on whether (1) they, (2) another school nurse, (3) EMS, or (4) another individual not already mentioned had ever administered naloxone in their school setting or school sponsored activity before. These four options were collapsed into one item on overall naloxone administration (Yes/No). In the results, we also report the specific category of individual who administered the naloxone.

Barriers for Having a Supply of Naloxone—Barriers to not having a supply of naloxone were captured by participants endorsing reasons for not having a naloxone supply. These barriers included: *Lack of school board support; Lack of administration support; Don't believe school needs it; Lack of funds; Another school building has naloxone; Lack of knowledge; Lack of training; Lack of staff support; Lack of parent support; Lack of community support; Lack of teacher support; Negative personal experience; Time constraints; and Other school nurses negative experience.*

Analysis

Descriptive statistics were used to analyze naloxone supply, administration, and reasons for not having a supply of naloxone. Chi-square statistics were used to compare school and nurse characteristics by naloxone supply. Institutional Review Board exempt status was received from the University of Pennsylvania.

Results

A total of 586 respondents consented to participation. Of those, n=25 did not complete the entire survey, n=14 were non-Pennsylvania school nurses, n=2 completed the survey twice (initial responses were used in analysis), and n=183 had invalid data (e.g. incongruent responses with licensure years > age, or incorrect zip codes for county). A total of 362 school nurses met inclusion criteria. At least one school nurse from 56 of the 67 counties in Pennsylvania provided responses to the survey. There was at least one school nurse from all 19 urban counties in Pennsylvania and 37 of the 48 rural counties. Table 1 describes the sample.

Over half of the school nurses reported having a supply of naloxone in their school building (53.6%, n=194). These 194 school nurses worked in 44 Pennsylvania counties (17 urban counties, 27 rural counties). Of the nurses that reported having a supply of naloxone in their schools, 75.8% (n=147) indicated that their schools received naloxone from the Pennsylvania school naloxone program. Additionally, 5.2% of those who had supply of

naloxone reported that it had been administered for a suspected overdose in their school or at a school sponsored activity by themselves (n=1), another nurse (n=2), or EMS (n=7). Naloxone administration occurred in seven counties in Pennsylvania, with each administration endorsement associated with a unique zip code.

Table 2 describes the comparison of school and school nurse characteristics by those that did and did have a supply of naloxone in their school. School nurses with 10 years working as a nurse were more likely to have a supply of naloxone at their school than those with <10 years (56.6% vs 31.7%, $p<0.01$). There were also overall significant differences by type of schools in which the school nurse worked ($p<0.01$). Pairwise comparisons (with a Bonferroni correction $p<0.005$) indicated that school nurses working in a high school only (68.4%) and high school and others (61.9%) were more likely to have a supply of naloxone than the school nurses working in elementary school only (40%) and elementary and middle schools (31.1%) (all pairwise comparisons $p<0.001$). As described in Table 2, there were no differences by years working as a school nurse, age of school nurse, type of school or whether the school nurse was from a rural or urban county.

Among the 167 nurses who reported not having a supply of naloxone, the following reasons for barriers were reported: Lack of school board support (24.6%); Lack of administration support (24%); Don't believe school needs it (20.4%); Lack of funds (18.6%); Another school building has naloxone (14.4%); Lack of knowledge (8.4%); Lack of training (8.4%); Lack of staff support (3%); Lack of parent support (2.4%); Lack of community support (3%); Lack of teacher support (1.2%); Negative personal experience (1.8%); Time constraints (1.8%); and Other school nurses negative experience (0.6%).

Discussion

In this study, we found that among school nurses in a large, demographically, and geographically diverse state, approximately 54% of school nurses had a supply of naloxone in their school building. Of those that had naloxone, 5.2% reported that the overdose reversal drug was used at their school by themselves or another individual. We also found that 83.6% of the counties in Pennsylvania had at least one school reporting a naloxone supply, indicating geographic diversity in rural and urban counties the practice of having a supply of naloxone. Notably, few nurses reported a lack of community support as a barrier, though approximately 20% didn't believe they needed naloxone in their school building. These results contribute to our understanding of the supply and administration of naloxone in schools and lay a foundation for the potential improvement of wider community access to this life-saving treatment.

A cost-effectiveness study in Toronto, Canada indicated that school naloxone programs are relatively inexpensive but was unable to determine if a school naloxone program would be cost-effective. In part, their analysis was based on the assumption of 0.1 to 5 opioid overdoses per year in the school (Cipriano & Zaric, 2018). Our results on school nurse reported administration in school buildings may add data to estimate cost-effectiveness. In addition, with other emergency preparedness protocols in schools, such as those for AEDs and epinephrine pens, the lack of supply of a medication is not the only barrier to use

(Hogue, Muniz, Herrem, Silvia, & White, 2018). Similar to AEDs and epinephrine pens, appropriate training, policies, support from key school stakeholders and, accessibility of the emergency medication are key to removing barriers. As rates of opioid overdoses remain high across the US, more data are needed to describe storage of naloxone in schools, track administration of naloxone on school grounds, and identify training needs of school personnel. Further research is also needed to understand the cost effectiveness of expansion of naloxone access in school settings.

Although NASN endorses the presence of naloxone in schools (National Association of School Nurses, 2015), not all states in the US have the same standards of school nursing practice for naloxone supply and administration in schools. States will vary with respect to their nurse practice acts, as well as state department of education provisions related to school health. Nurses working in schools and or with school communities must be aware of the state laws and legislation; if nurses are working in states that do not have clear provisions relative to naloxone presence in schools, advocacy may be warranted for standard policies that align with NASN's recommendations. In Pennsylvania, the school naloxone distribution program ended in 2018, approximately during the time of data collection. Given that this was available to high schools, that may be the reason that school nurses working in high schools were more likely to report having a supply of naloxone. Further research would be needed to identify whether the absence of such a program would impact whether a school nurse has a supply of naloxone.

Limitations

This analysis is limited in that it was not an epidemiologic investigation of each school or district in Pennsylvania, rather self-report from school nurses, and thus supply rates and administration cannot be generalized. However, most of the counties in Pennsylvania had at least one school nurse responding and there was representation from urban and rural counties. There are also limitations of on-line surveys, as indicated by the respondents with incongruent data that were not included in analyses. Both quantitative and qualitative data on administration would be helpful to determine school nurse needs related to naloxone and opioid overdoses in schools.

Conclusion

The majority of school nurses in this on-line survey responded that they had a naloxone supply in their school. However, improvements on these rates can be made so that all school have this harm-reduction measure. Opioid deaths remain unacceptably high, and with an effective harm-reduction measure of naloxone, it is important to spread the positive norms associated with uptake of naloxone. Barriers, particularly those related to lack of support or beliefs that naloxone is not needed in a community, needs to be addressed to promote increased access in communities. School nurses are in a position as both health educators and emergency responders regarding opioid overdose and may be an untapped resource to spread the adoption of community access to naloxone through normative behaviors.

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Table 1:

Sample Description

	Total Sample (n=362) ^a
Years as a Nurse, No. (%), y	
<10	41 (11.3)
10	321(88.7)
Years as a School Nurse, No. (%), y	
<10	170 (47.0)
10	190 (52.5)
Not Reported	2 (0.6)
Age, No. (%), y	
21–30	16 (4.4)
31–40	51 (14.1)
41–50	100 (27.6)
51–60	140 (38.7)
61+	50 (13.8)
Not Reported	5 (1.4)
Type of School, No. (%)^c	
Public/Charter	338 (93.4)
Private/Parochial	23 (6.4)
Not Reported	1(0.3)
School in Urban or Rural County, No. (%)	
Urban	265 (73.2)
Rural	97 (26.8)
Type of Student Population, No. (%)	
Elementary only	86 (23.8)
Middle only	29 (8)
High school only	76 (21)
Elementary and Middle	45 (12.4)
High School and others ^b	126 (34.8)
Naloxone in School Building	
Yes	194 (53.6)
No	167 (46.1)
Not Reported	1 (0.3)

^aData are presented as number and percentage of school nurse respondents. Percentages have been rounded and may not total 100.

^bCould include combination of high school with middle and/or elementary; high school and elementary and middle school

Table 2:

Comparison of Nurse and School Characteristics by Presence of Naloxone

	Naloxone in School Building (N=194)	No Naloxone in School Building (N=167)	p-value
Years as a Nurse, No. (%), y			
<10	13 (31.7)	28 (68.3)	<0.01*
10	181 (56.6)	139 (43.4)	
Years as a School Nurse, No. (%), y			
<10	83 (49.1)	86 (50.9)	0.10
10	110 (57.9)	80 (42.1)	
Age, No. (%), y			
21–30	6 (37.5)	10 (62.5)	0.71
31–40	29 (56.9)	22 (43.1)	
41–50	52 (52.5)	47 (47.5)	
51–60	77 (55)	63 (45)	
61+	28 (56)	22 (44)	
Type of School, No. (%)^a			
Public/Charter	184 (54.6)	153 (45.4)	0.15
Private/Parochial	9 (39.1)	14 (60.9)	
School in Urban or Rural County, No. (%)			
Urban	138 (52.3)	126 (47.7)	0.36
Rural	56 (57.7)	41 (42.3)	
Type of Student Population, No. (%)			
Elementary only	34 (40)	51 (60)	<0.01*
Middle only	16 (55.2)	13 (44.8)	
High school only	52 (68.4)	24 (31.6)	
Elementary and Middle	14 (31.1)	31 (68.9)	
High School and others ^b	78 (61.9)	48 (38.1)	

^a2016–2017 school year public high schools (including charter) could obtain naloxone from a PA state-sponsored free 2-dose kit program; in 2017–2018 school year open to all public and non-public high schools

^bCould include combination of high school with middle and/or elementary; high school and elementary and middle school

* significant <0.05