Clinical Communications

Epinephrine use and training in schools for food-induced anaphylaxis among non-nursing staff

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Clinical Implications

- Schools with a high building to nurse ratio had a more than 2-fold odds of unlicensed staff administering epinephrine. Training should be extended to non-nursing staff to strengthen their ability to recognize and treat anaphylaxis in the absence of a nurse.

TO THE EDITOR:

Food allergies have been increasingly common among children in recent years.[1,2] As a result, food-related allergic reactions are not a rare occurrence at school,[3] and schools are expected to recognize and manage anaphylaxis with varying levels of preparedness.[4] Delays in treatment have been associated with fatal outcomes at schools[5,6] and increased biphasic reactions.[7]

Anaphylaxis training is often targeted at select school staff. Few studies have evaluated preparedness among non-nursing school staff. This study aims to assess epinephrine administration by unlicensed staff and evaluate knowledge levels regarding prevention, recognition, and treatment of food-related anaphylaxis among non-nursing staff in Colorado schools.

An anonymous written questionnaire was distributed at the Colorado school nurse training sessions in 2015. A separate study was completed among non-nursing staff (eg, teachers, administrators, etc.), in which an anonymous online questionnaire, adapted from another study,[8] was distributed by participating Colorado school nurses to non-nursing school staff from August 2015 until January 2016. A full description of these methods is described in this article's Online Repository at www.jaci-inpractice.org.

Among the nurse surveys, there was a 71% response rate (243 of 341 attendees). Nurses reported that they were responsible for an average of 1,788 students (median 1,500; interquartile range 770-2,200). Forty-three percent of nurses covered ≥4 school buildings (Figure 1).

The majority of nurses reported that school staff received anaphylaxis training (80%). Of these schools, nurses noted that only 50% of their staff received training, and 68% reported that training lasted 30 minutes or less.

Ten percent of nurses reported that epinephrine was given at least once by unlicensed staff during the 2014-2015 school year (≥31 epinephrine administrations), and 19% during the 2013-2014 school year (≥53 epinephrine administrations). There was no difference in the proportion of schools where epinephrine was given by unlicensed staff at least once among the 3 school settings (rural, suburban, urban) ($P = .085$), by nursing experience ($P = .21$), or by food-restriction policy (nut-free school, allergen-free tables, no food for celebrations, no sharing) ($P = .81$).

In 2014-2015, 6% reported that epinephrine was given by unlicensed staff at least once in schools with 1 nurse covering <4 buildings (≥10 epinephrine administrations). In contrast, significantly more unlicensed staff administered epinephrine at least once (16%) in schools with 1 nurse covering ≥4 buildings ($P = .013$, odds ratio [OR] 2.98, confidence interval [CI] 1.22-7.25) (≥21 epinephrine administrations).

Similar findings were observed in 2013-2014. Fourteen percent reported that epinephrine was administered by unlicensed staff at least once in schools with 1 nurse covering <4 buildings (≥22 epinephrine administrations). A higher proportion (26%) of epinephrine injections were given by unlicensed staff in schools with 1 nurse covering ≥4 school buildings ($P = .023$, OR 2.21, CI 1.11-4.40) (≥31 epinephrine administrations).

Among those schools where unlicensed staff gave epinephrine at least once during the 2014-2015 school year, the average number of students reported to be covered by a nurse was significantly higher (2,333 vs 1,504 students, $P < .001$).

One hundred and forty-three surveys were completed by non-nursing school staff, which included teachers (67%), office staff (14%), administrators (7%), custodians (1%), and other (18%) with a 31% response rate. Among those surveyed, a low percentage were very confident in their ability to recognize anaphylaxis (18%) or provide treatment (19%). Of 12 knowledge-based questions (Table E1, available in this article's Online Repository at www.jaci-inpractice.org), an average of 72% of these questions were answered correctly. The majority (87%) were able to identify the correct sequence of actions to take during anaphylaxis.

The burden on nurses to cover a large number of students and school buildings was evident with 1 nurse responsible for an average of more than 1,700 students and almost half of nurses covering ≥4 school buildings. Not surprisingly, this study demonstrated a more than 2-fold increased odds of epinephrine administration by unlicensed staff among schools where the nurse covered ≥4 school buildings in comparison to <4 buildings. Interestingly, type of food allergen restriction policy did not have any bearing on epinephrine being given by unlicensed staff. Nursing can be limited for various reasons, and this increased odds of unlicensed staff administering epinephrine highlights the importance of increasing nursing in schools[9] and training existing non-nursing school personnel so they can recognize anaphylaxis and know the initial steps of management if a school nurse is not immediately available.

In Colorado, schools are allowed to stock epinephrine autoinjectors. However, training of school staff was variable with nurses reporting only half of school staff receiving training. A recent nation-wide survey of epinephrine usage in schools similarly showed that the amount of training school staff receive is limited as only the school nurse and select staff were trained in 36% of surveyed schools.[4]

Further examination of non-nursing staff showed very low confidence in their ability to recognize and treat anaphylaxis. The percentage of knowledge-based questions that were answered

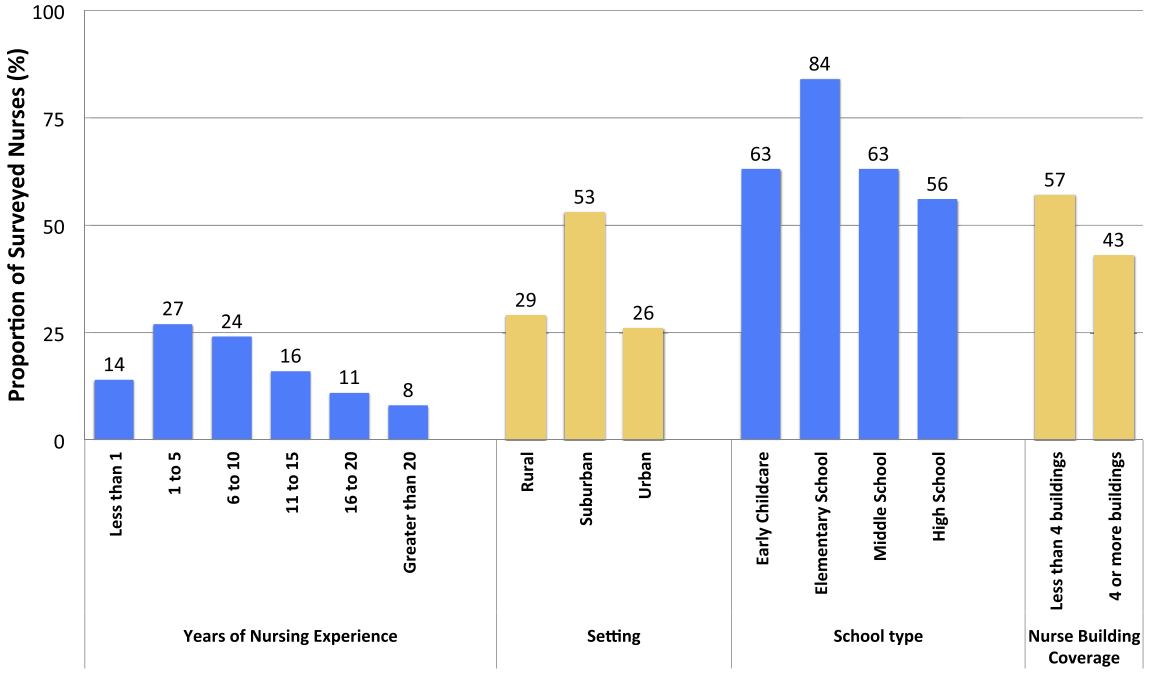

FIGURE 1. Nurse survey study group characteristics. Nurses often covered multiple school settings or school types (eg, rural and suburban or elementary school and middle school); therefore, percentages of surveyed nurses add up to greater than 100% for "Setting" and "School type."

correctly was fair with a score of 72%. However, almost all staff in this study chose the correct sequence of actions to take in the event of an anaphylactic reaction. This shows that many non-nursing staff have the knowledge to recognize and treat anaphylaxis. Currently, over half of schools in the United States limit epinephrine administration to nurses and select staff,[4] and there are no universal recommendations on how to train school staff. Improving and standardizing the quality of training would likely elevate confidence levels.

There were some limitations to this study. The use of surveys depended on surveyed subjects' recollection, possibly introducing recall bias. As for the non-nursing staff questionnaire, no information was available regarding how recently the staff received prior training. Future studies would benefit from collection of data prospectively at the time of the reaction. Focus groups of non-nursing staff could also better identify areas of improvement that should be addressed by training.

Nurses are faced with a high burden, covering a large number of students. Within schools with a high building to nurse ratio, more non-nursing staff are ultimately administering epinephrine, reflecting an increasing need for non-nursing staff to recognize and treat food-induced anaphylaxis. Education and training should be extended to all non-nursing staff to increase confidence and to improve anaphylaxis outcomes.

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Conflicts of interest: A. Tsuang declares no relevant conflicts of interest. H. Demain is the founder and director of Allergy Safe Kids, Inc. K. Patrick is employed by the Colorado Department of Education. M. Pistiner has received consultancy fees from Massachusetts Department of Public Health Early Education and Care; has received lecture fees from the Allergy Asthma Network and Maine Department of Public Health and School Nutrition Services; receives royalties for "Everyday Cool with Food Allergies"; has received payment for developing educational presentations from Allergy Safe Kids, Inc.; is cofounder and content creator of AllergyHome LLC; and attended a Kaleo Commercial Advisory board meeting in 2016. J. Wang has received consultancy and lecture fees from Aimmune; receives royalties from UpToDate; and has stock in JDP Therapeutics.

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