

National School Nurse Survey of food allergy and anaphylaxis policies and education

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Clinical Implications

- This large national study assesses the current state of school staff food allergy/anaphylaxis education/policies and epinephrine use, from the perspective of school nurses. It reveals key information regarding food allergy management in schools that may be used to direct future guidelines.

TO THE EDITOR:

Data support that food allergy (FA) prevalence has risen throughout the United States.¹⁻³ With increased prevalence has come increased need for policies and training that include the management of FA and anaphylaxis in the school setting. The aim of this study was to assess, from the perspective of school nurses (SNs), the current state of FA and anaphylaxis education and management to provide data that may assist in future prospective studies and with current and future policy implementation.

An anonymous 35-question electronic survey (Table E1, available in this article's Online Repository at www.jaci-inpractice.org) created based on a prior survey⁴ was distributed to National Association of State School Nurse Consultants from 38 states who were encouraged to share the questionnaire with school nurses from their states. Responses were gathered between May 13, 2016, and December 12, 2016. Statistical analyses were performed using Microsoft Excel version 15.40 (2017), GraphPad Prism version 7.00 (GraphPad Software, La Jolla, Calif; www.graphpad.com), and R Core Team (2017).⁵ Fisher's exact and χ^2 tests were calculated. This study was exempt from Institutional Review Board approval at the Icahn School of Medicine at Mount Sinai.

The survey was started by 1573 participants; 1430 completed information past the demographic questions and were included in the analysis. The response rates varied by state, ranging from 0% to 36% (highest response rates were from North Dakota 36%, Oregon 32%, Illinois 27.5%, Maine 23.3%, and Alaska 16.5%). Participants represented 24 states (Table E2, available in this article's Online Repository at www.jaci-inpractice.org). Nearly all were SNs (99.3%), 67.4% had >20 years of nursing experience (Table E3, available in this article's Online Repository at www.jaci-inpractice.org), and 93.4% reported students with FA in their school. The majority worked in public schools (84.1%). Respondents covered a range of school settings (suburban 44%, rural 32.2%, and urban 23.8%) and student ages (20% early childcare/preschool, 34% elementary, 23.9% middle school/junior high, and 20.2% high school). Sixty-five percent were responsible for 1 school building and 33.8% covered >1, with 13.9% responsible for ≥ 4 . The median number of students

under their oversight was 500 to <1000, with 23.5% responsible for ≥ 1000 students.

Half of the respondents reported receiving FA and anaphylaxis training "in the past 12 months," and 14.0% never received any training. Nearly half reported that >75% of their school staff (including administrators, counselors, and nutrition services) received training, but 14.8% reported <10% staff participation (Table E4, available in this article's Online Repository at www.jaci-inpractice.org). SNs often provided the education to school staff (68.3%), primarily in-person trainings (91.6%), with the median time for training of 15-30 minutes (Tables E4 and E5, available in this article's Online Repository at www.jaci-inpractice.org).

A total of 85.5% reported availability of stock epinephrine in their schools (Table E6, available in this article's Online Repository at www.jaci-inpractice.org). Whereas 96.3% reported that SNs are allowed to administer stock epinephrine, 53.0% reported that unlicensed staff can also administer stock epinephrine in their schools. For the 2015-2016 school year, more than 273 epinephrine administrations were reported by 15% of participants, representing approximately 426 school buildings and a quarter of a million students (Table I). Forty-six (16.8%) administrations were by unlicensed personnel or students, and 93 (34.1%) were to individuals without known allergy.

Respondents covering >1 school reported more epinephrine administrations than those who only covered 1 school, with a higher rate by unlicensed staff for those with known (6.4% [28/437] vs 0.7% [6/857], $P < .001$) and unknown (3.0% [13/433] vs 0% [0/850], $P < .001$) allergy. Respondents who covered ≥ 500 students, when compared with <500, recalled a higher number of epinephrine injections by anyone (21.0% [146/695] vs 7.8% [46/589], $P < .001$) and by unlicensed staff or students (4.2% [29/690] vs 0.9% [5/555], $P < .001$). Similar trends were seen when comparing participants who covered ≥ 1000 students with those with <1000 students.

The majority reported that their schools had specific allergen-restricted classrooms (66.5%, 870/1309), allergen-restricted tables for lunch/snack (64.3%, 843/1311), no sharing food policy (66.4%, 862/1299), and hand washing policy in place for all students (63.1%, 821/1301). A total of 37.1% (477/1287) reported having a school-wide allergen restriction policy.

This study includes responses from a large number of SNs in the United States regarding their experience with FA management in schools. Participants covering a greater number of school buildings or students recalled a higher incidence of epinephrine injections as well as a higher rate of epinephrine use by unlicensed staff or students for those with unknown allergy, possibly reflecting a larger student body or less effective implementation of FA management strategies in larger schools. A wide variation in staff training practices is evident, and the nursing role is significant with 68% reporting that SNs provide the majority of training. Although the Centers for Disease Control (CDC) Voluntary guidelines recommend "any staff member who might interact with children with FA or be asked to help respond to a FA emergency should be trained,"⁶ nearly 15% reported that <10% of their staff participated in any training, demonstrating an area for attention. Approximately 16% of epinephrine administrations were by non-nurses, further highlighting the importance of school staff training. These results add

TABLE 1. Epinephrine practices in schools (fall 2015-2016)

How many times have the following occurred?	Count (percentage)				No answer	Total answering the question
	Never	1	2	3 or more		
Epinephrine was administered in your school by anyone	1090 (85.0%)	135 (10.5%)	33 (2.6%)	24 (1.9%)	150	1282
Epinephrine was administered by unlicensed staff or students	1238 (97.3%)	25 (2.0%)	6 (0.5%)	3 (0.2%)	158	1272
Epinephrine was administered by a licensed school nurse to someone who didn't have a prior allergy history that was known to your school(s)	1209 (95.3%)	47 (3.7%)	7 (0.6%)	6 (0.5%)	161	1269
Epinephrine was administered by unlicensed staff to someone who didn't have a prior allergy history that was known to your school(s)	1258 (99.0%)	12 (0.9%)	1 (0.1%)	0 (0%)	159	1271
More than 1 dose of epinephrine was needed to treat a single event of anaphylaxis before help (eg, EMS) arrived	1243 (98.3%)	16 (1.3%)	4 (0.3%)	2 (0.2%)	165	1265

EMS, Emergency medical services.

to data from other studies⁷ reporting that training is not consistent across schools in the United States, reflecting an area of continued need.

A notable number of epinephrine administrations (34.1%) were to those with an unknown allergy history (Table 1). However, 14.5% of respondents covered schools that did not have stock epinephrine available (Table E6, available in this article's Online Repository at www.jaci-inpractice.org). Thus, these results lend further support for increased availability of stock epinephrine and laws/guidance that would allow for its administration.

Wide variability in school policies related to FA has been previously reported⁸ and is also evident in this study. In this study, 37.1% of participants report school-wide allergen restriction policies, whereas 66.5% had allergen-restricted classrooms. Further evaluation would be informative as there is a paucity of data regarding the efficacy of various school allergen restriction policies.⁹

There were several limitations to this study that include low response rate, responder recall bias, and selection bias. A disproportionate number of respondents represent a minority of states, so findings may not be generalizable. There is no reliable method to determine the number of SNs who were able to access the survey, but chose not to or to assess for nonresponder bias. As data were provided by SNs, information regarding schools without SNs is not captured. In addition, any epinephrine administrations that were not reported to the SNs would not be captured. Despite these limitations, this study reports responses from a large number of SNs in the United States on FA and anaphylaxis management in schools and offers the novelty of assessing who is administering epinephrine (ie, nurses vs unlicensed individuals) to those with known and unknown FA status.

Results support that FA and anaphylaxis remain important health care concerns impacting children, and schools are taking steps to enhance management. These results demonstrate the variability in implementation and outcomes and highlight areas for improvement. Increased recognition of the resources and deficits currently present in schools enables health care providers to better support efforts to improve FA and anaphylaxis management in schools.

Acknowledgments

We acknowledge Ruiqi Huang, MS, for her assistance with data analysis. We would like to thank John Lee, MD, for technical and IT support of the survey tool. We would specially like to thank the National Association of State School Nurse Consultants for their review, participation, and distribution of the survey. The current survey is based on and modified for use with permission from Massachusetts School Nurse Research Network as well as modifications from a survey used for CO school nurses in CO DOE/Allergy Safe Kids/AllergyHome/Mount Sinai collaboration.

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This project was supported by the Icahn School of Medicine at Mount Sinai and MassGeneral Hospital for Children.

Conflicts of interest: M. Pistiner receives consultancy fees from Massachusetts Department of Public Health Early Education and Care, Kaleo, and DBV

Technologies; receives payment for developing educational presentations from Allergy Safe Kids, Inc.; is cofounder and content creator of AllergyHome LLC and AllergyCertified Training LLC; and is the recipient of an unrestricted grant from DBV Technologies. J. Wang receives research support from National Institute of Allergy and Infectious Diseases, Aimmune, and DBV Therapeutics; receives consultancy fees from Aimmune, ALK Abello, and DBV Technologies; receives royalties from UpToDate; and has stock options in JDP Therapeutics. M. N. Pham declares that she has no relevant conflicts of interest.

Received for publication May 16, 2018; revised March 6, 2019; accepted for publication March 7, 2019.

Available online March 23, 2019.

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2213-2198

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<https://doi.org/10.1016/j.jaip.2019.03.013>

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ONLINE REPOSITORY

TABLE E1. SURVEY INSTRUMENT

Food Allergies in Schools: Survey for School Nurses Please select the best answer:

1. Are you a nurse?
 1. Yes—if yes, that type of certification do you hold?
 - a. RN
 - b. LPN
 - c. Advanced practice nurse
 - d. Other
 2. No
 - a. Medical assistant
 - b. Certified medical assistant
 - c. Other
2. **How many years of nursing experience do you have?**
(Skip to #4 if the answer to #1 is NO.)
 - A. Less than 1 y
 - B. 1-5 y
 - C. 6-10 y
 - D. 11-15 y
 - E. 16-20 y
 - F. More than 20 y
3. **How many years of school nursing experience do you have?**
 - A. Less than 1 y
 - B. 1-5 y
 - C. 6-10 y
 - D. 11-15 y
 - E. 16-20 y
 - F. More than 20 y
4. **What state are you located?**
5. **Please select the best descriptor of the schools you serve (check all that apply):**
 - A. Public
 - B. Private
 - C. Charter
 - D. Other
6. **Please select the setting of the schools you serve (check all that apply):**
 - A. Urban (within a city)
 - B. Suburban (suburb of a city)
 - C. Rural
7. **What grades are you responsible for? (select all that apply)**
 - A. Early child care/preschool
 - B. Elementary school
 - C. Middle school/junior high school
 - D. High school
 - E. Other: please specify
8. **How many school buildings are you responsible for?**
 - A. None
 - B. 1
 - C. 2
 - D. 3
 - E. 4
 - F. 5
 - G. 6 or more
9. **How many total students are you responsible for?**
 - A. <100
 - B. 100 to <200
 - C. 200 to <300
 - D. 300 to <400
 - E. 400 to <500
 - F. 500 to <1000
 - G. 1000 to <2000
 - H. 2000 to <3000
 - I. 3000 to >4000
 - J. 4000 or more
10. **Do any of your students have food allergy?**
 - A. Yes
 - B. No
 - C. Unsure
11. **When was the last time you received food allergy education/training?**
 - A. In the past 12 mo
 - B. 12-24 mo ago
 - C. >24 mo ago
 - D. Never received training
12. **Who provides food allergy education/awareness of the following groups? (check all that apply)**

	School nurse provides	School provides	Parents provide	Local health care professionals provide	Other (eg, local support group, food allergy nonprofits)	No education/awareness provided
Staff						
Students						
Parents						

13. **How much time a year is spent on staff training about food allergies?**

- A. None
- B. <5 min
- C. 5-15 min
- D. 15-30 min
- E. 30-45 min
- F. 45-60 min
- G. >60 min

14. **Who participates in the staff training? (check all that apply)**

- A. Administrators
- B. Counselors
- C. Custodians
- D. Delegates
- E. Nutrition services
- F. Teachers
- G. Transportation/bus drivers
- H. Volunteers
- I. Substitute teachers
- J. Other: please specify _____

15. **Approximately what percentage of the school staff participate in the staff training?**

- A. 0%
- B. <10%
- C. 10% to 25%
- D. 25% to 50%
- E. 51% to 75%
- F. >75%

16. **What type of training is done? (check all that apply)**

- A. In-person training
- B. Written materials provided
- C. Video
- D. E-learning program
- E. Other: please specify _____

17. **Does your school have stock epinephrine autoinjectors?**

- A. Yes
- B. No
- C. Unsure

18. **Who is allowed to administer stock epinephrine autoinjectors in cases of anaphylaxis? (check all that apply)**

- A. School nurse
- B. Unlicensed staff
- C. Other: please specify _____
- D. Unsure

19. **Have you ever administered epinephrine for treatment of anaphylaxis?**

- A. Yes
- B. No
- C. Unsure

20. **How many times has the following occurred?**

Answer selections: 1, 2, 3, 4-6, 7-10, more than 10

	This school year (fall 2015-now)	Last school year (2014-2015)
Epinephrine was administered in your school by anyone (you included)		
Epinephrine was administered by unlicensed staff or students		
Epinephrine was administered to someone who did not have a prior allergy history that was known to your school(s)		
More than 1 dose of epinephrine was needed to treat a single event of anaphylaxis before help (eg, EMS) arrived		

21. **What method(s) are used to ensure that student medical information is up to date each year and after allergic reactions occur? (check all that apply)**

- A. School nurse/staff contacts the family by phone
- B. School nurse/staff contacts the student's physician
- C. Written note given to the student to bring to parent
- D. Email sent to the family
- E. Other: _____

22. **What school policies are currently in place for managing food allergies?**

	Yes	No	Unsure
Allergen-restricted school (eg, nut "free" school or nut aware school)			
Allergen-restricted classrooms (eg, nut "free" or nut aware classrooms)			
Allergen-restricted tables for lunch and snack (eg, allergen "free" or allergen aware tables)			
No food for school celebrations			
No sharing food policy			
Hand washing policy in place for all students			

23. Please indicate what most accurately reflects how you feel

	Very confident	Fairly confident	Somewhat confident	Not too confident	Not confident at all
How confident do you feel in your ability to manage students with life-threatening allergies?					
How confident do you feel in your knowledge about how to prevent exposure to food allergens?					
How confident do you feel in your ability to recognize the symptoms of anaphylaxis (a life-threatening allergic reaction)?					
How confident do you feel in your ability to treat anaphylaxis (a life-threatening allergic reaction)?					
How confident do you feel in your unlicensed assistive personnel's (eg, delegate, volunteer, trained staff) ability to recognize and treat anaphylaxis when you, the school nurse, are not in the building?					

24. Please indicate what most accurately reflects what you think.

	Strongly agree	Agree	Not sure	Disagree	Strongly disagree
Food allergies in school are an important issue.					
Yearly food allergy staff training is important.					
Families in your school have reasonable concerns and expectations about the management of their child with food allergies.					
It is reasonable to keep allergens out of the classroom where there are students with food allergies.					
It is reasonable to not allow outside food (like baked goods, candy, or fruit) in the classroom for celebrations or parties.					
Students with food allergies are at risk of being bullied by others in school.					
If you witness food allergy related bullying it is <i>your</i> responsibility to intervene.					
Students with food allergies should limit participation in school trips or labs.					

25. Have there been any instances of food allergy related bullying in your school?

- A. Yes
- B. No
- C. Unsure

27. Which method is an effective way to clean tables of allergens?

- A. Commercial cleaners
- B. Commercial wipes
- C. Soap and water
- D. All of the above
- E. None of the above

26. Which method is an effect way to clean hands of allergens?

- A. Soap and water
- B. Hand wipes
- C. Hand and sanitizing gel
- D. A and B
- E. None of the above

28. Which classroom item may be source of a potential food allergen?

- A. Paste
- B. Shaving cream
- C. Finger pain
- D. Macaroni art
- E. All of the above

29. Which of the following sequences of actions is in an appropriate order in the event that a child with a known allergy is experiencing anaphylaxis (a life-threatening allergic reaction)?
- A. 1st) Give epinephrine, 2nd) call 911, 3rd) call parents
 - B. 1st) Give epinephrine, 2nd) call parents, 3rd) call 911
 - C. 1st) Give antihistamine, 2nd) call 911, 3rd) give epinephrine
 - D. 1st) Call 911, 2nd) call parents, 3rd) give epinephrine
 - E. 1st) Call 911, 2nd) give antihistamine, 3rd) give epinephrine
30. If you know a child has eaten a food safely before you don't need to read the label again
- A. True
 - B. False
31. Using a sponge is a preferred method to clean the table tops in the cafeteria.
- A. True
 - B. False
32. Which of the following would not require epinephrine?
- A. A child who was just in the cafeteria and now has red, raised itchy marks on their face and is vomiting.
 - B. A child, who has no known allergies but is sick to their stomach, is coughing, and has hives all over their chest and back.
 - C. A child, who was on the soccer field, was stung by a bee, is now wheezing and feels dizzy.
 - D. A child who has a fever, had diarrhea earlier in the morning, and has just vomited in class.
33. Epinephrine autoinjectors are given in the:
- A. Shoulder
 - B. Buttocks
 - C. Thigh
 - D. Any of the above
34. For students with anaphylaxis, they should be transported to the hospital by:
- A. Ambulance
 - B. School transport
 - C. Parents
 - D. Any of the above
35. When should someone be transported to the hospital by an ambulance?
- A. Every time a person experiences anaphylaxis whether or not epinephrine was given
 - B. After epinephrine has been given to a student, but only if symptoms are worsening
 - C. Only if stock epinephrine has been given
 - D. Before epinephrine is administered in the case of severe anaphylaxis

TABLE E2. Location of responders

State	Count
Alaska	33
Arkansas	46
Connecticut	33
Delaware	8
Hawaii	3
Illinois	330
Kentucky	1
Maine	93
Massachusetts	117
Michigan	45
Nebraska	1
New Hampshire	1
New Jersey	3
New Mexico	14
New York	392
North Carolina	1
North Dakota	18
Ohio	1
Oklahoma	12
Oregon	64
Pennsylvania	1
Texas	2
Vermont	12
Virginia	155
No Answer	44
Total	1430

TABLE E3. Survey participant characteristics

How many years of nursing experience do you have?	Count (%)
1-5 y	70 (5.0%)
6-10 y	106 (7.6%)
11-15 y	121 (8.6%)
16-20 y	160 (11.4%)
>20 y	945 (67.4%)
No answer	28
How many years of school nursing experience do you have?	Count (%)
< 1 y	66 (4.7%)
1-5 y	328 (23.3%)
6-10 y	272 (19.3%)
11-15 y	260 (18.4%)
16-20 y	266 (18.9%)
>20 y	218 (15.5%)
No answer	20
When was the last time you received food allergy education/training?	Count (%)
In the past 12 mo	707 (49.4%)
12-24 mo ago	237 (16.6%)
>24 mo ago	238 (16.6%)
Never received training	200 (14.0%)
No answer	48
What type of school do you work at?	Count (%)
Public	1144 (84.1%)
Private	156 (11.5%)
Charter	27 (2.0%)
Other	34 (2.5%)
No answer	126
What setting of school(s) do you serve?	Count (%)
Urban	343 (23.8%)
Suburban	635 (44.0%)
Rural	464 (32.2%)
No answer	59
What grades are you responsible for?	Count (%)
Early child care/preschool	567 (20.0%)
Elementary	963 (34.0%)
Middle school/junior high	675 (23.9%)
High school	572 (20.2%)
Other	53 (1.9%)
No answer	16
How many school buildings are you responsible for?	Count (%)
1	919 (65.0%)
2	177 (12.5%)
3	105 (7.4%)
4 or more	196 (13.9%)
None	17 (1.2%)
No answer	16
How many total students are you responsible for?	Count (%)
<500	649 (45.6%)
500 to <1000	439 (30.9%)
≥1000	333 (23.5%)
No answer	9

TABLE E4. Food allergy education and training

Approximately what percentage of the school staff participate in the staff training?	Count (%)
0%	31 (2.3%)
<10%	172 (12.5%)
10% to 25%	160 (11.6%)
26% to 50%	139 (10.1%)
51% to 75%	205 (14.9%)
>75%	669 (48.6%)
No answer	54
How much time a year is spent on staff training about food allergies?	Count (%)
<5 min	67 (4.8%)
5-15 min	328 (23.3%)
15-30 min	386 (27.5%)
30-45 min	190 (13.5%)
45-60 min	151 (10.7%)
>60 min	223 (15.9%)
None	61 (4.3%)
No answer	24
Who participates in staff training?	Count (%)
Teachers	1316 (92.0%)
Administrators	1086 (75.9%)
Counselors	745 (52.1%)
Nutrition services	594 (41.5%)
Transportation/bus drivers	475 (33.2%)
Custodians	364 (25.5%)
Substitute teachers	258 (18.0%)
Classroom aides/assistants/volunteers/ED techs/paraprofessionals	221 (15.5%)
Delegates	192 (13.4%)
Other	96 (6.7%)
Training type	Count (%)
In-person training	1264 (91.6%)
Written materials provided	747 (54.1%)
Video	534 (38.7%)
E-learning program	314 (22.8%)
No training	6 (0.4%)
Don't know	2 (0.1%)
Other	13 (0.9%)
No answer	50 (3.5%)

TABLE E5. Food allergy and anaphylaxis training: who provides the training?

	School nurse provides	School provides	Parents provide	Local health care professional provides	Other	No education/awareness provided
Staff	1293 (68.3%)	209 (11.0%)	232 (12.3%)	74 (3.9%)	44 (2.3%)	41 (2.2%)
Students	1018 (47.6%)	143 (6.7%)	414 (19.4%)	376 (17.6%)	50 (2.3%)	137 (6.4%)
Parents	763 (41.1%)	86 (4.6%)	79 (4.3%)	615 (33.1%)	131 (7.1%)	182 (9.8%)

TABLE E6. Stock epinephrine and epinephrine administrations

Does your school have stock epinephrine autoinjectors?	Count (%)
Yes	1101 (85.5%)
No	184 (14.3%)
Unsure	3 (0.2%)
No answer	140
Who is allowed to administer stock epinephrine autoinjectors in cases of anaphylaxis?	Count (%)
School nurses	1208 (96.3%)
Other nurses	350 (27.9%)
Unlicensed staff	665 (53.0%)
Unsure	15 (1.2%)
Other	181 (14.4%)
Do not have epinephrine	31 (2.5%)
Have you ever administered epinephrine for the treatment of anaphylaxis?	Count (%)
Yes	562 (39.3%)
No	779 (54.5%)
Unsure	1 (0.07%)
No answer	88

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