

Disparity between the presence and absence of food allergy action plans in one school district

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ABSTRACT

The Joint Task Force of the American College of Allergy, Asthma and Immunology and the American Academy of Allergy, Asthma and Immunology; the American Academy of Pediatrics; and the National Association of School Nurses all recommend emergency action plans (EAPs) that direct therapy of allergic reactions in children. This study investigated the school nurse's perception of food allergies and their use of EAPs in food-allergic students in a large, socioeconomically diverse school district. An electronic and paper survey was developed and administered to all elementary and middle school nurses in Greenville County, SC. Forty-three of the eligible school nurses participated for a response rate of 64% (43/67). All of the participants worked at schools that had at least one student with food allergies (mean, nine students with food allergies per school; SD, seven students). Forty-four percent (19/43) of schools had a written action plan for all their food-allergic students, whereas in 42% (18/43) of schools, one-half or less of the food-allergic students, had an action plan. Seventy percent (30/43) of schools made at least one accommodation for students with food allergies and 23% (10/43) of schools made multiple accommodations. At least three additional school personnel were trained in administering rescue medications besides the school nurse in 86% (37/43) of schools, but in 5% (2/43) of schools no additional adults were trained to give rescue medications. Although multiple organizations recommend EAPs for food-allergic students, our study highlights their inconsistent use in this school district.

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Food allergies are a growing health concern in the United States and other westernized nations with recent studies showing the number of children who suffer from food allergies increasing rapidly.^{1–4} In the United States, food allergies affect up to 6% of pre-school and school-age children with the most common allergens including cow's milk, hen's egg, peanuts, tree nuts, wheat, soy, fish, and shellfish.^{5–6} Food allergy reactions can be life-threatening and are the leading cause of anaphylaxis outside of the hospital setting.⁷ In addition, up to 50% of all anaphylactic reactions in children are caused by food allergies and many of these occur while in school.^{7,8} School-age children pose a unique risk for food allergy anaphylaxis because they spend a considerable amount of time without their parents and rely on other adults for supervision. Previous studies have shown food reactions are not un-

common in the school setting, with 18% of known food-allergic children having at least one food reaction at school in the previous year.⁹ However, even children who have not been diagnosed with food allergies are at risk for allergic reactions in the school setting. Sicherer *et al.* reported that 25% of undiagnosed food-allergic children have their first reaction to a food while in the school or day care setting.¹⁰

Current estimates in the United States are that up to 2 million school-age children are affected with food allergies.¹ Students with food allergies are protected by federal law under the U.S. Rehabilitation Act of 1973, Section 504, and the Individuals with Disabilities Education Act.¹¹ Section 504 of the U.S. Rehabilitation Act of 1973 prohibits an educational institution that receives federal funding from discriminating based on a student's disability. In addition, the Individuals with Disabilities Education Act requires that children with disabilities, including food allergies, are provided the necessary services and/or special education to attend school.¹²

The Joint Task Force of the American College of Allergy, Asthma and Immunology and the American Academy of Allergy, Asthma and Immunology recommend that physician-prescribed treatment protocols be used to direct treatment of allergic reactions in children.^{13,14} In addition, the Executive Committee of the American Academy of Pediatrics Section on Allergy and Immunology recommends the Food Allergy Ac-

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tion Plan developed by the Food Allergy and Anaphylaxis Network (FAAN) be used in schools for children with food allergies.^{15,16} Finally, the National Association of School Nurses has identified the need for individual health care plans for students with food allergies.¹⁷ With the American College of Allergy, Asthma and Immunology; American Academy of Allergy, Asthma and Immunology; American Academy of Pediatrics; and the National Association of School Nurses all recommending food allergy emergency action plans (EAPs), our goal was to investigate the school nurse's perception of food allergies and the use of EAPs in food-allergic students in the Greenville County South Carolina School District.

To date, there have been no studies investigating the school nurse's perception of food allergy in South Carolina schools and their adherence to food allergy action recommendations. Prior studies, in other states, have shown poor school adherence to providing food EAPs for students with food allergies. A study of 101 public elementary schools in Michigan showed only 16% had food allergy EAPs.¹⁸ In addition, a survey of school nurses in Indianapolis showed only 19% had an allergy program.¹⁹ A national study by Sicherer *et al.* to investigate peanut or tree nut reactions in school or child care locations found an emergency plan in place in only 33% of allergic reactions in the school or child care settings.¹⁰ More recently, a 2007 survey of attendees at a regional school health conference in Illinois found 64% (60/94) stated their school had a food allergy action plan but only 15% were identical to the current FAAN plan.²⁰ Although nearly two-thirds of respondents had a food allergy EAP, the authors found that many were lacking in crucial information and they concluded that adherence to the FAAN action plan was preferred for students with food allergies.

METHODS

Location

Greenville County Schools is the largest public school system in South Carolina and 51st largest in the country with over 68,000 students in grades K–4–12th grade.²¹ In this school district, a school nurse is on-site at each of the 49 elementary and 18 middle schools.

Survey Instrument

For this study, an 11-item, investigator-developed electronic and paper survey was developed and administered to all public elementary and middle school nurses in Greenville County, South Carolina. The survey collected information on the number of students with known food allergies, the type of food allergies in these students, the quantity and location of food-allergic reactions in the past year, and details on rescue medication administration and storage procedures.

Also, the survey quantified the percentage of known food-allergic students with a food allergy EAP in each school. The survey took approximately 5 minutes to complete and was offered from February 3 to February 22, 2008. All school nurses employed at elementary or middle schools within Greenville County, South Carolina, Public School District were qualified to participate in the study. The survey was sent in electronic form to the Coordinator of Medical Health Services for the Greenville County School District who then forwarded the survey to all of the elementary and middle school nurses in the district. At the completion of the predetermined time period to complete the study, the Coordinator of Medical Health Services collected the completed surveys and then forwarded them to the principal investigator in a blinded manner. The study was approved by the Institutional Review Board at Greenville Hospital System University Medical Center as Exempt.

Statistical Analysis

For statistical analysis the survey results were entered into a spreadsheet software program, Microsoft Excel 2003 (Microsoft Corp., Redmond, WA) and data analysis software (SPSS, Chicago, IL). Descriptive analysis including mean, mode, and SD were performed.

RESULTS

Response

Forty-three of the eligible school nurses participated for an overall response rate of 64% (43/67). The response rate was 67% (33/49) for elementary school nurses and 56% (10/18) for middle school nurses.

All (100%) of the respondent elementary and middle schools (43/43) had at least one student with food allergies. The mean number of reported students with food allergies was nine students per school and a SD of seven students. Of the schools surveyed 35% reported up to 5 students with food allergies; 26% had 6–10 students with food allergies; 28% had 11–15 children with food allergies, and 12% reported ≥ 16 children with food allergies. Peanut was the most commonly reported food allergy in the survey with 95% of schools (41/43) having at least one peanut-allergic student in their school (Table 1).

School nurses reported that food allergy EAPs were used by all (100%) food-allergic students in 19/43 (44%) of schools. However, in 18/43 (42%) of schools one-half or less of identified food-allergic students had a food allergy EAP (Table 2).

The school nurses reported a total of 16 food allergy reactions occurred in this school district in the prior year. Thirty percent (13/43) of schools reported at least one reaction in the past school year. Also, three schools (7%) reported multiple food allergy reactions in the

Table 1 Results of South Carolina food allergy survey

	No. of Schools	Percentage of Schools
No. of food-allergic students per school		
1–5	15	35
6–10	11	26
11–15	12	28
≥16	5	12
Percentage of schools with at least one student with specific food allergy		
Peanuts	41	95
Other	27	63
Tree nuts	26	60
Milk	23	53
Shellfish	21	49
Egg	20	47
Wheat	12	28
Fish	11	26
Soy	9	21

Table 2 Results of South Carolina food allergy survey

	No. of Schools	Percentage of Schools
Percentage of food-allergic students with an emergency action plan		
0–25%	12	28
26–50%	6	14
51–75%	2	5
76–99%	3	7
100%	19	44
Do not know	1	2

past year. Of note, 50% of the reported reactions occurred in the school lunchroom and 43% occurred in the classroom (Table 3).

Individual schools within this school district used a number of different strategies to accommodate students with food allergies. Seventy percent (30/43) of schools reported at least one accommodation but 30% (13/43) of schools made no accommodations. Also, 23% (10/43) of schools made multiple accommodations for students with food allergies (Table 3).

Eighty-six percent (37/43) of schools reported at least three additional school personnel trained in administering rescue medications in addition to the school nurse. However, in 5% (2/43) of schools no other adult was trained to give rescue medications. Other groups trained to give rescue medications in the schools included classroom teachers in 86% (36/43), administrators in 65%

(28/43), “other personnel” (*i.e.*, office staff and first responders) in 60% (26/43), teaching assistants in 28% (12/43), and food service staff in 5% (2/43) of the schools.

Rescue medications were stored primarily in the school nurse office with 95% (41/43) of schools storing them in that location. Sixty percent (26/43) of schools exclusively stored rescue medications in the school nurse office. However, 35% (15/43) of schools stored the rescue medications in multiple locations within the same school (Table 3). Finally, forty percent of schools (17/43) desired further physician education regarding students with food allergies.

DISCUSSION

This brief survey was the first of its kind known to the authors undertaken in South Carolina to assess the school nurse’s perception of food allergies. Of note was the high return rate (~67%), which may indicate a high level of interest in students with food allergies by the respondent school nurses. In addition, 40% of respondent schools requested further education regarding students with food allergies, indicating the school nurses in this school district showed a strong interest in further training on this condition. This is not unexpected, because prior publications have documented the desire of school nurses for more guidance on the recognition, treatment, and support of their food-allergic students.^{22,23}

This study documented at least a single food-allergic student in each of the respondent surveys (43/43) with a mean number of nine students per school and a SD of seven students. Larger, prior studies in children <5 years of age in the United States have shown cow’s milk allergy to be the most prevalent food allergy.²⁴ However, in our small survey of older children and adolescents, in this district, peanut was the most common food allergy found in 95% of the respondent schools. Peanut allergies have increased in the United States with a recent study showing the rate of peanut allergy increasing from 0.4 to 0.8% from 1997 to 2002.¹ Additionally, peanut allergy is often a persistent allergen with only around 20% of children likely to outgrow this allergy.²⁵ This is concerning because 90% of fatal food anaphylaxis is caused by peanut and tree nut sensitivity.²⁶

In this school district, over 70% of the respondent schools used at least one accommodation for students with food allergies. Peanut-specific restrictions were made in over 50% of the schools. However, at least 25% of schools with identified peanut-allergic students failed to make any accommodations at all. This survey highlights the extensive variety and individual autonomy schools possess in developing accommodations for food-allergic students even within the same school district.

Another portion of this study was to investigate the frequency and location of food-allergic reactions in the

Table 3 Results of South Carolina food allergy survey

	No. of Schools	Percentage of Schools
Schools with a food allergy reaction		
Schools with a reaction	13	30
Schools without a reaction	30	70
Schools with multiple reactions	3	7
Locations of food-allergic reactions in past year		
Classroom	7	16
Lunchroom	8	19
Other location	1	2
Accommodations made for students with food allergies		
Peanut or tree nut free schools	5	12
Peanut free tables	6	14
Peanuts restricted from classroom	11	26
Separate eating areas	6	14
Alternative meals	16	37
No. of additional school personnel trained in administering rescue medications		
0	2	5
1	0	0
2	4	9
≥ 3	37	86
Additional school personnel trained in administering rescue medications		
Classroom teachers	36	84
Administrators	28	65
Food service staff	2	5
Teaching assistants	12	28
Other	26	60
Rescue medications storage locations		
School nurse/health office	41	95
Main office	1	2
Carried by student with allergy	6	14
Other	1	2
Carried by teacher(s) of student with allergy	10	23
Multiple storage locations in single school	15	35
Exclusively carried by teacher(s)	1	2
Exclusively stored in school nurse/health office	26	60

school setting. A food-allergic reaction occurred in 30% of the respondent schools in the prior year with slightly more occurring in the lunchroom as opposed to the classroom. However, the near identical frequency of reactions occurring in the classroom as to the lunchroom underscores the fact that food allergens are present well beyond the four walls of the school cafeteria. Food is often used in schools as awards, class projects, or in birthday parties and these "food-based" events could precipitate a reaction at anytime in any location. FAAN, a food allergy support organization, recommends eliminating the use of food allergens in educational tools, arts and crafts projects, or as incentives in the school setting.²⁷

In this school district, the majority (86%) of schools had at least three additional individuals trained to give rescue medications. However, in a concerning minority of schools (5%), only the school nurse was capable of providing rescue medications. Although various state and federal laws impact the ability of school nurses to designate their health care roles to other school personnel, specific plans should be in place to administer life-sustaining epinephrine for students with food-induced anaphylaxis. Previous studies have shown some schools fail to designate authorized personnel to make emergency medical decisions when the school nurse is unavailable.²⁸ A coordinated EAP, ideally, that would designate whom to administer the rescue medications

if the school nurse was unavailable, is advisable for all students who have the possibility of life-threatening anaphylaxis.

Unfortunately, prior studies have shown that either not using rescue epinephrine or a delay in the administration of epinephrine have been associated with anaphylaxis fatalities.^{5,10} A 2008 survey of students with peanut allergies in Quebec, Canada, showed that that nearly 50% of students with peanut anaphylaxis may have a delay in administration of rescue epinephrine because of limited access to this device at school.²⁹ Another study of food allergy-induced anaphylactic reactions in school-aged children showed that only two of the children who died received epinephrine within 1 hour of ingesting the allergen.³⁰ Similarly, this survey found that rescue medications are often stored in the school nurse/health office. Although prudent to keep the medications secure, some studies question the effectiveness of not keeping medicine where they are needed most (with the student).⁹

Finally, food allergy EAPs have been developed by many groups (federal agencies, state governments, and local school districts).³¹ Also, a variety of national organizations recommend the implementation of EAPs in schools with food-allergic students.^{13,14,16,17} However, although EAPs are highly encouraged, in this school district only 44% of schools had one in place for all their food-allergic students. Equally concerning was that in 42% of the rest of the schools, one-half or less of all known food-allergic students had an EAP.

The large disparity between the presence and absence of food allergy action plans in this single school district remains the most striking finding of this study. Further studies investigating why some school nurses adhere to these recommended guidelines and others do not are warranted. Particularly useful would be uncovering the barriers to implementing food allergy EAPs in the schools with reported low current use. A follow-up study of the school nurses in this district with high use of food allergy EAPs may offer insight into what is necessary to foster an environment whereby food allergy EAPs are used on a more frequent basis. Finally, a 2005 South Carolina law highlighted the joint responsibility of the school nurse and the student's health care provider in the development of individual health care plans, and EAPs.³² A future study surveying the community physicians (particularly allergists/immunologists) and how often they provide parents of school-age children with EAPs is necessary to examine their role in this school district's EAP utilization rate.

Finally, we must note the following potential limitations with this study. First, we recognize ascertainment bias that we believe was limited because of the blinded, anonymous nature of the survey and the use of only aggregate data in the results. Second, the study had a

response rate of 64%. We contend the response rate for this survey is equivocal to response rates in comparable published school nurse surveys on food allergy prevalence in schools, which have been in the range of 38–64%.^{18–20} Although we acknowledge a 100% response rate would have been ideal, the blinded, anonymous nature of this study precluded further investigation of the nonresponding school nurses. We did note a slightly lower response rate from middle school nurses as opposed to elementary school nurses but contend this difference is unlikely to affect the primary conclusions of the study. Third, we disclose the possibility of recall bias in our study. Because our survey was restricted to the current school year we propose that recall bias was minimal. Finally, we fully acknowledge this survey relied on the school nurse's perception of food allergies in their school—and no validated allergy food testing was performed to corroborate the school nurse's identification of food-allergic students.

In summary, although the absence of a food allergy EAP for many students in this school district is a serious omission, the overall prevalence rate of food allergy EAPs in this school district is at the previously published levels.^{10,18–20} Because allergists/immunologists are responsible for our patients' well-being, our specialty should strive to educate school nurses on the importance of food allergy EAPs and advocate for increased use in schools nationwide.

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REFERENCES

1. Sicherer S, Munoz-Furlong A, and Sampson H. Prevalence of peanut and tree nut allergy in the United States determined by means of a random digit dial telephone survey: A 5-year follow-up study. *J Allergy Clin Immunol* 112:1203–1207, 2003.
2. van Odijk J, Ahlstedt S, Bengtsson U, et al. Specific IgE antibodies to peanut in western Sweden—Has the occurrence of peanut allergy increased without an increase in consumption? *Allergy* 56:573–577, 2001.
3. Grundy J, Matthews S, Bateman B, et al. Rising prevalence of allergy to peanut in children: Data from 2 sequential cohorts. *J Allergy Clin Immunol* 110:784–789, 2002.
4. Weiss C, Munoz-Furlong B, Furlong T, and Arbit J. Impact of food allergies on school nursing practice. *J Sch Nurs* 20:268–278, 2004.
5. Sampson HA. Update on food allergy. *J Allergy Clin Immunol* 113:805–819, 2004.
6. Burks W. Skin manifestations of food allergies. *Pediatrics* 111:1617–1624, 2003.
7. Dibs S, and Baker M. Anaphylaxis in children: A 5-year experience. *Pediatrics* 99:e7, 1997. Available online at www.pediatrics.org/cgi/content/full/99/1/e7; last accessed June 3, 2009.

8. Novembre E, Cianferoni A, Bernardini R, et al. Anaphylaxis in children: Clinical and allergic features. *Pediatrics* 101:E8, 1998.
9. Nowak-Wegrzyn A, Conover-Walker MK, and Wood R. Food-allergic reactions in schools and preschools. *Arch Pediatr Adolesc Med* 155:790–795, 2001.
10. Sicherer SH, Furlong TJ, DeSimone J, and Sampson HA. The U.S. peanut and tree nut allergy registry: Characteristics of reactions in schools and child care. *J Pediatr* 138:560–565, 2001.
11. U.S. Department of Education. Available online at [//idea.ed.gov/](http://idea.ed.gov/); last accessed June 3, 2009.
12. U.S. Department of Education. Available at online www.ed.gov/about/offices/list/ocr/docs/edlite-FAPE504.html; last accessed June 3, 2009.
13. American College of Allergy, Asthma, and Immunology (ACAAI). Food allergy: A practice parameter. *Ann Allergy Asthma Immunol* 96(suppl 2):S1–S68, 2006.
14. AAAAI Board of Directors. Anaphylaxis in schools and other childcare settings. *J Allergy Clin Immunol* 102:173–176, 1998.
15. Munoz-Furlong A, Sicherer S, and TePas E. Food allergy in schools and Camps. 2009. Available online at www.uptodateonline.com/online/content/topic.do?topicKey=ped_allg/2131; last accessed August 12, 2009.
16. American Academy of Pediatrics. Committee on School Health (AAP) Guidelines for emergency medical care in school. *Pediatrics* 107:2:435–436, 2001.
17. National Association of School Nurses. Position Statement on Emergency Care Plans for Students with Special Health Care Needs, 2001. Available online at www.nasn.org/Default.aspx?tabid=220; last accessed July 15, 2008.
18. Rhim G, and McMorris M. School readiness for children with food allergies. *Ann Allergy Asthma Immunol* 86:172–176, 2001.
19. Wu F, and Hill J. An allergy and asthma educational outreach program for school nurses and staff. *Allergy Asthma Proc* 19: 307–310, 1998.
20. Powers J, Bergeren MD, and Finnegan L. Comparison of school food allergy emergency plans to the food allergy and anaphylaxis network's standard plan. *J Sch Nurs* 23:252–258, 2007.
21. Roper JD. Clinical challenges in recognizing, diagnosing, and treating anaphylaxis. *Sch Nurs News* 24:28–30, 32, 2007.
22. O'Brien R. Identifying food allergic children in schools: Practical advice for school nurses. *Sch Nurs News* 24:25, 2007.
23. South Carolina Department of Education—Fast Facts. Available online at www.greenville.k12.sc.us/gcsd/depts/admin/stats/index.asp; last accessed June 3, 2009.
24. Sampson HA. Food allergy. *Allergy* 60:19–24, 2005.
25. Skolnick H, Conover-Walker M, Koerner C, et al. The natural history of peanut allergy. *J Allergy Clin Immunol* 107:367–674, 2001.
26. Bock S, Munoz-Furlong A, and Sampson H. Fatalities due to anaphylactic reactions to food. *J Allergy Clin Immunol* 107:191–193, 2001.
27. School guidelines for managing students with food allergies. The Food Allergy and Anaphylaxis Network. Available online at www.foodallergy.org/school/guidelines/SchoolGuidelines.pdf; last accessed June 3, 2009.
28. Olympia R, Wan E, and Avner J. The preparedness of schools to respond to emergencies in children: A national survey of school nurses. *Pediatrics* 116:e738–e745, 2005.
29. Ben-Shoshan M, Kagan R, Primeau MN, et al. Availability of the epinephrine autoinjector at school in children with peanut allergy. *Ann Allergy Asthma Immunol* 100:570–575, 2008.
30. Sampson H, Mendelson L, and Rosen JP. Fatal and near-fatal anaphylactic reactions to food in children and adolescents. *N Engl J Med* 32:380–384, 1992.
31. Leo HL, and Clark NM. Managing children with food allergies in childcare and school. *Curr Allergy Asthma Rep* 7:187–191, 2007.
32. South Carolina Department of Health and Environmental Control. Meeting the special health care needs of students: New South Carolina law guidelines for implementing S.C. Code Ann. 59-63-80 and 59-63-90. Available online at www.scdhec.gov/health/mch/wcs/school/guidelines.htm; last accessed November 17, 2009. □

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