
School readiness for children with food allergies

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Background: Food allergy reactions and anaphylaxis may occur in children while at school. However, information regarding school readiness for children with food allergies is unknown.

Objective: To identify school education and prevention and treatment policies for food-allergic children in Michigan.

Methods: A questionnaire assessing food allergy awareness and avoidance and treatment strategies was mailed to a randomized sample ($n = 273$) of 2,082 public elementary school principals.

Results: One hundred four responses representing 109 schools were collected. From school estimates of 66,598 children, there was a 1.7% self-reported prevalence of food allergy. The most common allergens were milk and peanut, followed by tree nuts, shellfish, egg, and wheat. Affected children were identified primarily through office records, with few reporting individual emergency plans or designated classrooms, teachers, or lunch tables. Methods of food allergy education included parents of students and in-services. Avoidance strategies, food substitution, and "no-sharing" policies were common, whereas other measures such as food-label-teaching were uncommon. A minority of schools had epinephrine immediately accessible, either in the student's classroom, carried by the student, or passed by teachers. Principals, nurses, and teachers were most often trained to administer epinephrine.

Conclusions: There appears to be a need for schools to formally educate staff on food allergy, provide information on prevention measures such as reading of food labels, establish immediate accessibility to emergency epinephrine, and train staff for appropriate epinephrine use.

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INTRODUCTION

It is estimated that food allergy affects up to 8% of children < 3 years of age¹ and 1% to 2% of the adult population.² The exact prevalence of food allergy in school-age children is unclear, but food allergy reactions such as urticaria, wheezing, and anaphylaxis may occur in children when they are at school. Studies of fatal food-induced anaphylaxis have shown that these reactions frequently occurred outside the home and in the school setting.^{3,4} This demonstrates the need for schools to recognize food allergy as a potentially significant health risk and to establish

guidelines regarding anaphylaxis prevention measures and management. In the United States, recommendations for such guidelines have been published by the American College of Allergy, Asthma, and Immunology, the American Academy of Allergy, Asthma, and Immunology, and the American Academy of Pediatrics.^{5–9} However, limited information exists describing actual school policies, practice, and school readiness for children with food allergies. The aim of this survey study was to identify and characterize school education, and prevention and treatment policies for food-allergic children in the state of Michigan.

METHODS

A 21-item questionnaire was developed assessing three primary areas of concern: food allergy awareness, avoidance measures, and treatment strategies. Questions consisted of multiple-choice responses and were de-

rived from suggested school guidelines for anaphylaxis.^{5–9} Respondents were asked to check off all responses that applied for each question, so multiple responses per item were allowed. The 2,082 public elementary schools listed in the Michigan State Education Directory¹⁰ were stratified by size of the school district, and a proportionate sample of 273 schools were randomly selected for inclusion. Questionnaires were addressed and mailed to the school principal, with the request to forward to other appropriate school personnel for completion, if needed. Data analysis included multiple responses to each questionnaire item per school, resulting in totals that may exceed 100%. Missing responses for each item were excluded.

RESULTS

School and Student Characteristics

Of the 273 randomly selected public elementary schools, 104 responses representing 109 schools were collected (40% response rate). Surveys were completed by principals (72%), school nurses (21%), office staff (8%), and lunch staff (4%). Two respondents were school district nurses, accounting for 5 additional schools (total of 109 schools represented). Of the 109 schools, 39% characterized their school districts as urban, 37% as rural, and 28% as suburban; three schools checked more than 1 response. Based on school-reported estimates of 66,598 children (96 schools), there was a 1.7% prevalence of food allergies in this population. Table 1 shows the number of food-allergic students per school. At least one affected student was reported in 95 schools, with the majority (55%) reporting 10 or more affected students. Only three schools reported no children with food allergies.

Figure 1 shows the implicated foods. The most common allergens were milk (81%) and peanut (62%), followed by tree nuts (32%), shellfish (28%), egg

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Table 1. †Number of Food Allergic Students per School (*98 schools)

None	3% (3)
1–9 students	43% (42)
10–14 students	36% (35)
>15 students	19% (19)

* Data missing for 11 schools.

† Percentages are rounded to the nearest integer.

(23%), wheat (22%), and soy (7%). Thirty-one schools reported “other” food allergens: fruit (15%), chocolate (9%), red dye (8%), tomato (8%), fish (6%), orange juice (4%), spices (3%), and cheese (2%). The fruit category included strawberries, blueberries, grapes, mango, pineapple, and orange.

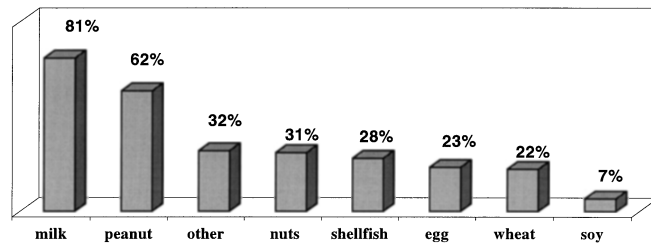
School Awareness

Most schools (97%) were notified of a food allergy by the child’s parents. Table 2 shows how schools identified food-allergic students. The most common method by far was documentation through school office records. Only 16% specified that they had written individual emergency plans, and just 9% posted food service notices. Students were identified by designated classrooms, teachers, or lunch tables in 7% of the schools, and 7% by a student’s MedicAlert (Turlock, CA) bracelet. To educate staff members on food allergy, schools relied on parents (52%) and in-services (47%). In-services were commonly conducted by school nurses or principals, and some by secretaries or paramedics. Other methods included written or audiovisual resources (8%), and physician-provided information (4%). No methods of food allergy education for staff were reported for 11%, and data were missing for 12 schools.

Avoidance Measures

Table 3 shows that many respondents had some avoidance measures in place to aid in preventing accidental ingestions and reactions. The majority of schools allow food substitution and special meals by request, implement “no-sharing” policies, and instruct food handlers on cross-contamination techniques. However, only 21% reported instruction on reading food labels for hidden aller-

†School Reported Food Allergies (*104 schools)



* data missing for 5 schools

†percentages exceed 100% due to multiple responses per schools

Figure 1

gens.²² Eight schools stated these issues were not applicable for the following reasons: meals/food brought only from home, children sent home for meals, school menus sent home for selection by parents, or a “large” variety of food items offered in school.

Treatment Strategies

In the event of a serious allergic reaction or epinephrine administration, 94% (88 of 94) reported that they would transport students to medical facilities. Two schools reported they would initially contact the child’s parents and seek further instructions. Figure 2 shows storage locations of emergency injectable epinephrine. The most common sites were the main office or nurse’s office. A minority of schools had epinephrine immediately accessible, either in the student’s classroom (24%), carried by the student (17%), or passed from teacher to teacher (4%). Principals, nurses, and teachers were most often trained to administer epinephrine, followed by

office staff and paraprofessionals. (Fig 3). Playground, lunchroom or custodial staff were also trained by 6%. No training of staff was reported by 10%.

Because peanut/tree nut allergies are important causes of severe, life-threatening reactions with accidental ingestions frequently occurring at school,¹¹ responses of schools with peanut- or tree nut-allergic children were further analyzed. These 73 schools accounted for 100% (7 of 7) of those with designated classrooms, teachers, or lunch tables, 86% (6 of 7) of schools identifying children by MedicAlert bracelets, 95% (21 of 22) of schools instructed on food-label-teaching, and 88% (14 of 16) with individual emergency action plans.

DISCUSSION

Avoidance of an incriminating food poses a significant challenge for food-allergic individuals. In the school setting, this represents a particularly important challenge to both the student as

Table 2. †Methods of Identifying Food—Allergic Children (*99 schools)

Office records	86% (85)
Memo/doctor letters to staff	19% (19)
ER cards or plans	16% (16)
Food service notices	9% (9)
Designated classes, teacher, or lunch table	7% (7)
MedicAlert bracelets	7% (7)
Verbal or personal contact	5% (5)
No policy	1% (1)

* Data missing for 10 schools.

† Percentages exceed 100% because of multiple responses per school.

Table 3. †Avoidance Measures

	Yes	Number of schools per respondents
Food substitution allowed?	98%	104/106
Food handlers instructed on Cross-contamination issues?	88%	86/98
"No sharing" policy for food?	70%	74/106
Special meals prepared on request?	60%	63/105
Staff instructed to read food labels?	21%	22/104

† Percentages exceed 100% because of multiple responses per school.

well as school personnel, who may need to manage life-threatening reactions. In this report, we have described and characterized food allergy policies for 109 of 2,082 Michigan public elementary schools. The extent to which these schools are affected is evident by the fact that most schools (97%) reported at least one food-allergic student, with more than half reporting at least 10 affected students. Interestingly, there was a 1.7% prevalence rate, which parallels that of food allergy in the general population,² and may reflect the natural history of outgrowing food allergies as children reach school-age. Whether one or many students are affected, it is essential that schools establish food allergy education, preventive measures, and

treatment guidelines. The results of our survey highlight several important deficiencies of existing policies. These include: 1) lack of structured, school-wide staff education regarding food allergy; 2) gaps in avoidance measures such as reading of food labels; 3) lack of written emergency treatment plans; and 4) lack of immediate accessibility to emergency epinephrine.

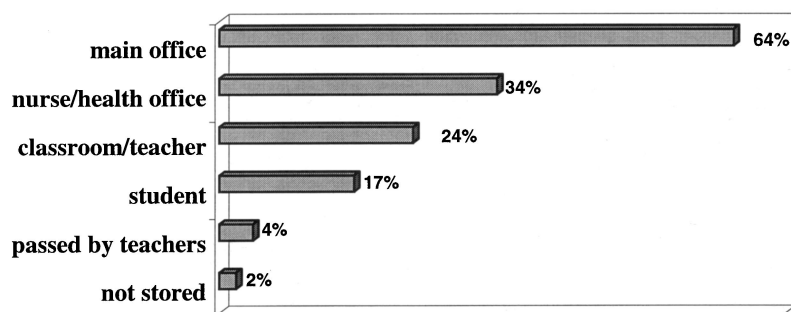
Several issues concerning lack of awareness of food-allergic children are apparent. Because exposure to foods may occur in the cafeteria and classroom, teachers and lunchroom staff must be cognizant of their food-allergic students. In our survey, very few schools posted food service notices for lunchroom staff, or designated specific classrooms, teachers, or lunch tables

for food-allergic students. The need to establish peanut-free or allergen-free classrooms and areas is controversial, but emphasizes the need for schools to clearly identify their affected students. Office record documentation is appropriate, but relies on staff members to actively review these records before student interaction. A more pro-active approach, such as classroom postings, food service notices, or in-services for uninformed or substitute staff, may be necessary for children with severe or life-threatening allergies.

For approximately half of the responding schools, parents were the primary source of food allergy education. Although parents can provide invaluable information, this may be available only to staff members directly involved in their child's care. Lack of knowledge and recognition of anaphylaxis is a major concern of school staff, and information should be provided on a school-wide basis, ie, through in-services. Treatment information should point out that severe reactions may occur despite mild reactions in the past. Unfortunately, few respondents specified having written emergency action plans. This is especially concerning, because written treatment plans would provide important instructions for staff who are unfamiliar with either a student or the proper management. Several reports of school nursing education programs¹²⁻¹⁴ have demonstrated that structured methods of instruction, such as in-services, written care plans, and other educational resources, can alleviate anxiety and lead to policies that promote a safer environment.

Many responding schools had some avoidance measures in place. Food allergen avoidance is fundamental to preventing severe and life-threatening reactions, and measures such as allowing food substitution, instructing food service workers on cross-contamination techniques, and "no-sharing" food policies were common. However, a striking finding was that only 21% of the schools educated staff on reading labels for possible hidden ingredients. Food allergens may be hidden on processed food labels listing uncommon

† Epinephrine Storage Locations (*96 schools)

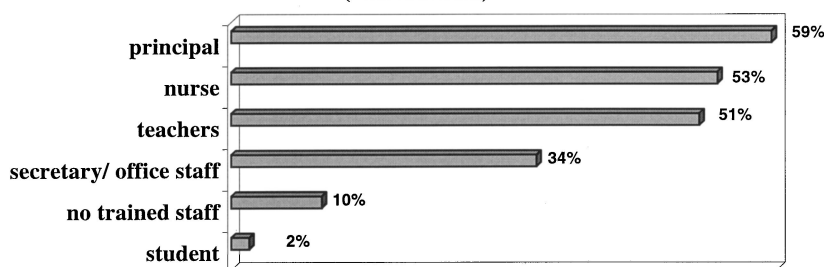


† percentages exceed 100% due to multiple responses per school

* data missing for 13 schools

Figure 2

†Staff Members Trained to Administer Epinephrine
(*101 schools)



[†]percentages exceed 100% due to multiple responses per school

* data missing for 8 schools

Figure 3

or scientific terms,¹⁵ leading to accidental ingestions. Sicherer et al¹¹ found that 55% of peanut-allergic children experienced accidental ingestions over a 5-year period, frequently at school and through exposures including “hidden” ingredients, food-sharing, or food contact in school projects. Thus, school personnel involved in food-related activities need to have knowledge of technical terms on labels for common foods as another important prevention measure. This information could be addressed through in-services, written educational materials, bulletins or memos for teachers and food service personnel, and resources such as the Food Allergy Network.

For treatment guidelines, the majority of schools had injectable epinephrine stored onsite. However, less than 25% had epinephrine immediately accessible, ie, in the classroom, passed by teachers, or carried by the student. Improved access to epinephrine through these methods could be implemented to better prepare for severe allergic reactions. Epinephrine is the treatment of choice for anaphylaxis¹⁶ and must be immediately available as delay in its administration may lead to fatal outcomes.^{3,4} Because most states allow only paramedics, and not emergency medical technicians, to carry and administer epinephrine, this underscores the need for immediate accessibility to epinephrine in schools. Although it is not routinely pre-

scribed in all cases, its availability in emergency medical kits has been endorsed by organizations such as the American Academy of Pediatrics.⁸ Because many schools and/or districts do not have nurses, appropriate nonmedical personnel should assume the responsibility of administering epinephrine. Surprisingly, the majority of our respondents trained multiple staff members to administer epinephrine in emergencies, usually principals, nurses, and teachers. This may be related to the presence of a school nurse in these responding schools, who may promote more confidence in training nonmedical personnel. In addition, registered professional or licensed practical nurses who render emergency care are generally immune from civil liability under Good Samaritan legislation in this state.¹⁷ Whether these trained individuals would recognize the actual need to administer epinephrine is an unclear, larger issue, and should be addressed in training procedures.

In addition to identifying school policies, it is important to examine factors influencing policy decision-making. Our survey was not designed to evaluate this, although issues such as liability and lack of knowledge of food allergy and anaphylaxis are probable contributing factors. Another factor that may play a role is the type of food allergy in the student population. Peanut and tree nut-allergy can be life-

threatening,^{3,4,18} and may provoke symptoms by contact,^{18,19} as well as ingestion of microgram amounts of allergen.¹⁹ We speculated that the presence of peanut or tree nut-allergic individuals may have influenced specific policies, and found that these schools accounted for 100% of those with designated classrooms, teachers, or lunch tables; 95% of those instructed on food label teaching; 88% of those with individual emergency action plans; and 86% of schools with students wearing MedicAlert bracelets. These findings are limited by other confounding food allergens in this subgroup, but may provide some insight into the process of establishing school policies.

Our study has several limitations. Data were based on school-reported food allergies, and uncommon allergens such as chocolate and red dye were reported more frequently than soy, a common food allergen in children.¹ Our intent was to identify and describe policies regarding food allergy, regardless of their basis on true IgE-mediated reactions. Our results may also not be generalizable to private or secondary schools, who may have more or less stringent guidelines. Perhaps, most importantly, schools responding to our questionnaire may represent a selected group who are conscientious of the need to address food allergy issues. It appears that many respondents had some identification and prevention and treatment guidelines in place. However, the majority of sample schools did not respond, and their policies regarding food allergies is unknown. Despite this possible self-selection bias, our findings emphasize several key issues needed to improve school readiness for just such an emergency.

CONCLUSION

There appears to be a need for schools to formally educate staff on food allergy on a school-wide basis, provide information on important prevention measures such as reading of food labels, establish individualized written treatment plans and immediate accessibility to emergency epinephrine, and

train staff for appropriate epinephrine administration. It is not possible to recommend guidelines that could be practically implemented in all schools, but strategies to achieve these goals are outlined by the American Academy of Allergy, Asthma, and Immunology⁷ and American College of Allergy, Asthma, and Immunology.⁵ These may include: in-services or informational sessions on food allergy and anaphylaxis, requiring written treatment plans, posting bulletins or memos in classrooms and lunchrooms for recognition, prevention and treatment of food-allergic reactions, providing epinephrine in the classroom for severely allergic students or allowing capable students to carry their own, and using resources such as the Food Allergy Network. Future studies exploring specific interventions to address these issues are needed.

APPENDIX

Sample Questions

1. In your best estimation, how many children in your school have food allergies?
2. What foods are these children allergic to?
3. How are students with food allergies identified to staff members? (check all that apply) school/nurse recordsspecific identification badges MedicAlert bracelets placement in specific classrooms other, please specify
4. How are staff members educated on the signs and symptoms of an allergic reaction? (check all that apply) in-services led by the school nurse local physicians parents other, please specify
5. Are staff members taught how to read labels for hidden ingredients that students may be allergic to?
6. Do you have "no-sharing" policies for food and utensils used in the classroom or cafeteria?
7. Are food handlers instructed on how to avoid cross contamination of foods? (Ie, using separate utensils and equipment while preparing or serving various foods).
8. Are special meals prepared for children with food allergies upon request?
9. Are allergic students allowed to substitute foods for classroom projects or special occasions?
10. If prescribed, where are EpiPens (injectable epinephrine; Dey, Napa CA) stored? (check all that apply) school nurse's office student's classroom passed along from teacher to teacher carried by the student
11. Which staff members, if any, are trained to administer EpiPens in life-threatening situations? (check all that apply) school nurse, school administrator, teachers
12. Are children transported to outside facilities in the event of a serious reaction or use of an EpiPen? If so, how and where?

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