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Clinical Report Management of Food Allergy in the School Setting
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IMMUNOLOGY

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Clinical Report—Management of Food Allergy in the School Setting

abstract

FREE

Food allergy is estimated to affect approximately 1 in 25 school-aged children and is the most common trigger of anaphylaxis in this age group. School food-allergy management requires strategies to reduce the risk of ingestion of the allergen as well as procedures to recognize and treat allergic reactions and anaphylaxis. The role of the pediatrician or pediatric health care provider may include diagnosing and documenting a potentially life-threatening food allergy, prescribing self-injectable epinephrine, helping the child learn how to store and use the medication in a responsible manner, educating the parents of their responsibility to implement prevention strategies within and outside the home environment, and working with families, schools, and students in developing written plans to reduce the risk of anaphylaxis and to implement emergency treatment in the event of a reaction. This clinical report highlights the role of the pediatrician and pediatric health care provider in managing students with food allergies. *Pediatrics* 2010;126:1232–1239

INTRODUCTION

Anaphylaxis is a severe, potentially fatal, systemic allergic reaction that occurs suddenly after contact with an allergy-causing substance.¹ Food allergy is a common cause of anaphylaxis.² The Centers for Disease Control and Prevention recently reported an 18% increase in food allergy among school-aged children from 1997 to 2007; 1 in 25 children are now affected.³ Results of studies of children with food allergy indicate that 16% to 18% have experienced a reaction in school.^{4,5} Allergic reactions or treatment for anaphylaxis also occur in children whose allergy was previously undiagnosed (~25% of cases of anaphylaxis).^{5,6} Fatalities were noted to be overrepresented by children with peanut, tree nut, or milk allergy and among teenagers and those with underlying asthma. Preschool-aged children may experience food-induced anaphylaxis more often than older children, but the majority of food-allergic reactions in preschool- and school-aged children are not anaphylaxis,^{7,8} and deaths are rare.⁹

In case series of fatalities from food allergy among preschool- and school-aged children in the United States, 9 of 32 fatalities occurred in school and were associated primarily with significant delays in administering epinephrine.^{10–12}

The purpose of this clinical report is to highlight the pediatrician's role in management of food allergy in the school setting and emphasize prevention and treatment of food-induced anaphylaxis.¹³ Management of infants, toddlers, and preschool-aged children who are cared for in myriad settings poses additional challenges (eg, infants may suck on

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KEY WORDS

food allergy, school, anaphylaxis

ABBREVIATION

IHCP—individualized health care plan

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The guidance in this report does not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate.

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shared toys, grab another infant's bottle, etc) that are beyond the scope of this document.

DOCUMENTING FOOD ALLERGY (DIAGNOSIS) AND ASSESSING RISKS

Before developing a management plan, it is important to ascertain, as best as possible, whether a child has a potentially life-threatening food allergy. It is beyond the scope of this report to present all of the factors that might be considered in rendering a diagnosis, although comprehensive reviews are available,¹⁴ as are national guidelines (www.niaid.nih.gov/topics/foodAllergy/clinical/Pages/default.aspx). The pediatrician may wish to work with a pediatric allergist but should be aware of several key observations:

- Any food may elicit a reaction; however, most significant reactions in children are attributable to peanut, tree nuts (eg, walnut, cashew, etc), milk, fish, shellfish, egg, soy, and wheat. Sesame and other seeds have been reported as potent allergens as well.¹⁵ Fatalities in school-aged children in the United States have primarily been attributed to peanuts, tree nuts, milk, and seafood,^{10–12} but as stated previously, anaphylaxis and death are rare in school-aged children.
- Confirmation of a clinical history (eg, urticaria, wheezing shortly after ingestion) by laboratory tests (eg, allergy skin-prick tests or food-specific serum immunoglobulin E [IgE] testing) is a typical modality for securing a diagnosis. However, although increasingly large skin tests and increasing levels of food-specific IgE antibodies correlate with increasing risk of a true allergy, these tests do not, in isolation, diagnose an allergy, nor do they accurately reflect severity of an allergy or the dose of food that might

trigger a reaction. A child also may test strongly positive to a food without a previous known ingestion; in this situation, the child may still be at risk of anaphylaxis. Physician-supervised oral food-challenge testing, typically undertaken by an allergist, may be required to confirm or refute a diagnosis when the history and testing is not sufficient to diagnose the food allergy. Caution must be exercised in making a diagnosis of a life-threatening food allergy, because treatment and food-allergen avoidance require significant efforts for everyone involved.

- Although subsequent reactions are not necessarily more severe than initial reactions, they may be. For example, initial mild reactions to peanut may be followed by more severe reactions on subsequent exposures.^{16,17}
- Clinical factors such as a history of asthma, previous reactions to trace exposures, and allergies to foods mentioned previously are potential risk factors for fatal anaphylaxis.^{10–12,18}

NOTIFICATION OF THE SCHOOL, PRESCRIPTION OF EPINEPHRINE, AND DEVELOPMENT OF A PERSONALIZED EMERGENCY ACTION PLAN

The family must notify the school about the child's potentially life-threatening food allergy. The family may notify the school by providing a written "emergency action plan" or "food-allergy action plan" (see Appendix for a list of resources). It is recognized that multiple forms of plans are in use and that development of a more universal plan would streamline care. The physician/family may also need to provide the school with a list of foods to be avoided and possible substitutions. Physician-recommended substitutions may be required for school food programs.

The following considerations may be helpful in developing emergency plans:

- The written treatment plan could include the child's name, identifying information (child's picture, if provided), specifics about the food allergies, symptoms and treatments, instructions to activate emergency services, and contact information (see Appendix).
- The parent should be given a prescription for self-injectable epinephrine devices to be used at school in addition to ones for use at home. It may be useful to prescribe additional autoinjectors for school: (1) one to be carried by the child in a dedicated pack that is either on his or her person (if it is judged reasonable for the specific child and is in accord with local regulations) or in possession of the supervising adult and (2) other(s) to be kept in the health office, should the self-carried pack be misplaced or an additional dose be needed. The second-dose feature of some types of self-injectors requires handling of a used needle; although access to the second dose is appropriate in some settings by licensed personnel, these types of injectors should be disposed of after the first dose to reduce the risk of needle-stick injury in the school setting (if a second dose is needed, another unit should be used).
- Before creating an action plan, the pediatrician may determine if there is a licensed health care professional who will be assisting the child. When there is not, and only a nonlicensed assistive person is available, the action plan should be as simple as possible. For example, whereas a licensed health professional may be able to administer an antihistamine and observe for progression of symptoms before administering epinephrine, a nonli-

censed professional should not be expected to make a medical or nursing assessment. Instead, the advice may be to give the epinephrine via autoinjector and call for activation of emergency medical services immediately.

- There is no diagnostic test for anaphylaxis, and specific symptoms may vary. A recent report suggested that anaphylaxis is likely to be occurring if any of the following 3 situations are observed¹:
 1. acute onset (minutes to several hours from exposure) of symptoms with involvement of the skin and/or mucosal tissue (eg, generalized hives, pruritus or flushing, swollen lips/tongue/uvula) and signs or symptoms of either respiratory compromise (eg, dyspnea, wheeze/bronchospasm, stridor, reduced peak expiratory flow, hypoxemia) and/or reduced blood pressure or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence); or
 2. 2 or more of the following that occur rapidly after exposure to a likely allergen for that patient: involvement of the skin/mucosal tissue; respiratory compromise; reduced blood pressure or associated symptoms; or persistent gastrointestinal tract symptoms (eg, crampy abdominal pain, vomiting); or
 3. reduced blood pressure after exposure to a known allergen for that patient (minutes to several hours).
- In the context of a possible allergen ingestion, a simple means to impart instructions regarding when epinephrine should be administered is to suggest that it be injected for significant respiratory (eg, tightness of the throat, hacking cough, hoarseness, shortness of breath, wheezing, etc) or cardiovascular symp-

toms (eg, paleness, blue skin tone, decreased consciousness/confusion, poor pulses, etc) or if there is progression of symptoms or involvement of more than 1 organ system (eg, more than a few hives). The treatment plans (see Appendix) list key additional symptoms not stated in this report.

- Anaphylaxis may occur without urticaria.¹⁰
- Dosing of self-injectable epinephrine (either 0.15 or 0.3 mg) has been reviewed in a previous clinical report.¹⁹ Briefly, the manufacturer recommends switching to the 0.3-mg dose at 66 lb, but because that results in underdosing as children approach this weight, consideration should be given to prescribing the 0.3-mg dose at approximately 55 lb.
- Symptoms of anaphylaxis may initially respond to treatment but recur (biphasic response) with possibly more severe manifestations.¹⁰ Therefore, emergency plans should include activation of emergency medical services and transport to a facility at which additional observation and care can be administered in the ensuing hours whenever a significant allergic reaction is believed to have occurred. A second dose of epinephrine is recommended^{20–22} in 5 to 20 minutes if significant symptoms progress or are not responding to the first dose.
- Because 25% of anaphylaxis in schools occurs without a previous diagnosis,⁶ a prescription for unassigned epinephrine for general use, consistent with district regulations and state laws, should be considered, especially in schools with nurses. A standard anaphylaxis-management protocol should be developed by the school health services staff and the consulting school physician. In districts without

a school physician, a standard anaphylaxis-management protocol could be developed in consultation with local public health professionals, community health center staff, or school-of-medicine faculty.

Additional information about administration of medications in schools is addressed in a policy statement from the American Academy of Pediatrics titled “Guidance for the Administration of Medication in School.”²³ The diagnosis, treatment plan, and prescriptions should be reviewed periodically and updated at least yearly. Pediatricians should remind parents to be cognizant of expiration dates on epinephrine autoinjectors and to be alerted to proper temperature storage requirements.

- It may be advisable to inject epinephrine at the time of first symptoms if an allergen was ingested that previously caused anaphylaxis.²⁴
- It may be advisable to inject epinephrine before symptoms if an allergen was ingested that previously caused anaphylaxis with cardiovascular collapse.²⁴
- Emergency action plans can be individualized according to the child’s history as well as the abilities of the responsible adult.
- Physicians are encouraged to educate parents/school caregivers that:
 - antihistamines are adjunctive therapies to treat an allergic reaction but cannot be depended on to treat anaphylaxis;
 - inhaled bronchodilators may be given for respiratory reactions but must not be depended on to treat anaphylaxis;
 - medication should not be exposed to extremes in temperature, and expired units should be replaced; and

- epinephrine is generally safe (ie, when in doubt, inject), and parents/school caregivers should be advised about common adverse effects of epinephrine (eg, tremor, tachycardia, flushing/paleness).
- In some adults experiencing anaphylaxis who were raised from the supine to the upright position during transport to a hospital, death occurred suddenly, presumably from “empty-ventricle syndrome” caused by blood pooling in the legs during anaphylactic shock.²⁵ The implications of this observation for children, who more typically succumb to respiratory insufficiency during anaphylaxis and who may vomit during anaphylaxis, are not known. Nevertheless, caregivers should be advised that individuals with severe anaphylaxis who may benefit from being in a supine position with legs raised should remain in that position and be transported that way by emergency personnel until advanced care can be accessed (eg, additional medications and intravenous fluids).
- Physicians are encouraged to educate families and the student, as appropriate for age (or arrange for education):
 - about how to administer self-injectable epinephrine and educate others, because mistakes are common²⁶;
 - to consider obtaining medical identification jewelry;
 - about the importance of avoidance strategies (eg, no food-sharing), to notify an adult of any symptoms or if they may have eaten an unsafe food, and when to use self-injectable epinephrine; and
 - to determine if carrying/self-administration of self-injectable epinephrine is appropriate (assuming local and state agencies allow it) (to make these decisions, student, parent/guardian, and school and community factors may be assessed [see: www.nhlbi.nih.gov/health/prof/lung/asthma/emer_med.htm]; however, designated adults [eg, licensed provider or a lay designee] should be additionally responsible for treatment because the student may not be depended on for or be capable of self-administration).
- Pediatricians can encourage parents to request to meet with key school staff members who have responsibility for the care of their child and to work cooperatively with schools to ensure their child’s safety. Key staff members may include the directors of transportation and food service, the building administrator, school nurse, classroom teacher, and director of health services. Pediatricians can provide resources for parents to give to school officials to help them develop food-allergy management protocols at the school board of directors’ level. Pediatricians can also serve as a resource to school wellness committees or councils and to boards of education to help them in developing safe policies, regulations, and procedures for children with food allergies.
- Pediatricians (and allergists) are encouraged to counsel parents about the level of exposure that might be dangerous for a specific child, such as ingestion versus inhalation versus touching food residues, so that parents are appropriately vigilant without becoming needlessly hypervigilant about avoidance strategies, particularly because they might affect schools or neighbors.

AVOIDANCE STRATEGIES

Avoidance strategies must be practical and focus on policies to avoid ingestion of the allergen, the primary route that can result in anaphylaxis. There have been no controlled studies to evaluate the effectiveness of potential avoidance strategies. Knowledge about risks primarily come from observational studies and self-report. Avoidance strategies appropriate for a specific child may vary on the basis of the nature of the allergy, circumstances unique to the particular institution, age of the child, and the child’s developmental stage and disposition.

BEST-PRACTICE STRATEGIES

The following points may be helpful in instructing families and schools about avoidance strategies.

- Studies of skin contact and inhalation of peanut-butter vapors by children with peanut allergy failed to induce any systemic reactions.^{27,28} Lack of a reaction from these casual exposures is not unexpected, because penetration to the systemic circulation by skin contact is unlikely, and peanut-butter vapors do not contain protein. Although these findings suggest that such exposures are of low risk, concern remains for young children transferring skin contact to their mouths.
- Case reports and controlled studies in which foods are vaporized through heating have shown that reactions, primarily respiratory, can be elicited.²⁹ These observations support limiting exposure to allergens being cooked (eg, in science/craft projects).
- Reports that focused on reactions to peanut in schools from noningestion exposures primarily identified craft projects with peanut butter as a cause of mostly mild reactions.⁵ This observation supports not using

food allergens in craft or cooking projects.

- A study showed that peanut can be cleaned from the hands of adults by using running water and soap or commercial wipes but not antibacterial gels alone.³⁰ In addition, peanut was cleaned easily from surfaces by using soap, wet wipes, and commercial wipes but not dishwashing liquid alone. Results of threshold studies indicated a wide range of doses of peanut that elicit objective symptoms, but the lower range seems to be 10 to 100 mg, on average. More typical eliciting doses are one-half to one whole peanut kernel.³¹ These observations indicate that standard cleaning and lack of visible contamination should suffice for most children with peanut allergies.
- On the basis of the aforementioned studies, allergen avoidance might vary depending on the age of the children, and more supervision, cleaning, and containment of the allergen are needed for younger children. Care must be taken not to ostracize or physically separate the child with food allergies. For example, an “allergen-aware” table should include the child’s friends who are eating safe meals. Experts have not espoused blanket “bans” on foods,³² particularly because peanut butter, milk, egg, and other common allergens may be a protein staple of another child’s diet. In rare instances, individual schools or classrooms might pursue these options. For example, removal of highly allergenic foods from the vicinity of kindergarten-aged children or children with significant developmental disabilities might be warranted when transfer of the allergen among the children is likely. Schools may wish to ban children from bringing food from home to

share with classmates for celebratory functions and offer acceptable alternative options for purchase through school food services.

- Several professional organizations (see Appendix) have advocated procedures to reduce the risk of accidental allergen ingestion that are responsive to previously published observations regarding circumstances leading to allergic reactions.^{4,5} These procedures include strict “no food-sharing” policies; use of commercially prepared and labeled, individually wrapped food items; education of those providing foods regarding safe and unsafe foods and label-reading; education of cafeteria/food service staff; a ready supply of safe alternative snacks; and policies of no eating on the school bus and having a means of communication on the bus. Avoidance strategies and emergency management must also be communicated to personnel who may not have primary responsibilities for the student, such as coaches, specialty teachers (art, music, etc), substitute teachers, field trip personnel, etc. These individuals also require training in the use of epinephrine autoinjectors, familiarity with the food-allergy action plan, and indicators for activating the emergency medical response system.
- School food services leadership should be involved in district policy development and assist in the education of cafeteria/food service staff at the individual school level.

SCHOOL TREATMENT GUIDANCE/ DEVELOPMENT OF THE INDIVIDUALIZED HEALTH CARE PLAN

The pediatrician may submit a written emergency action plan, emergency care plan, or food-allergy action plan

or emergency medical order so that the school nurse can develop an individualized health care plan (IHCP). The emergency action or care plan is a document created by the pediatrician or school nurse on the basis of medical orders from the pediatrician that is written in simple lay terms for the nonlicensed staff members who may have a supervisory role for a child at any time before, during, or after the school day. The IHCP is a nursing document created by a school nurse with input from the pediatrician’s orders that contains a complete school management plan with preventive procedures for day-to-day management in the school. The following information should be considered:

- The student’s IHCP is typically developed by the school nurse in collaboration with the family, physician, and other school personnel. General recommendations for materials to be included in the IHCP are included in various state guidelines (see Appendix). The IHCP should be revised according to the child’s needs on the basis of age and developmental stages.
- Schools may establish a core team responsible for food-allergy management and actions, to ensure that reasonable and nondiscriminatory avoidance plans are in place, that a food-allergy treatment plan is reviewed and practiced periodically, that people are designated and trained to recognize and treat anaphylaxis, etc (also see Appendix). The pediatrician should be familiar with these responsibilities and may wish to provide education on these procedures, particularly when the plans are part of the student’s IHCP. The pediatrician/family may also determine if a full-time registered nurse is present in the student’s school during all school hours and advocate for delegation of nursing

services in that school when the school nurse is not present. If there is a before- and/or after-school program, the parent should be aware of the process for ensuring access to epinephrine and allergen reduction during this out-of-school time.

- Results of several studies support the notion that epinephrine may be needed in locations outside of the school cafeteria, that significant delays in administration are associated with fatalities (eg, >20 minutes after symptoms), and prompt administration is advantageous.^{6,8,10–12} To ensure access to epinephrine within several minutes, school plans should consider allowing the student to self-carry, if allowed and age appropriate, and/or storing epinephrine in secure and readily accessible locations. Prompt access to a reliable source of autoinjectable epinephrine is critical. To ensure medication security and safety and provide for timely treatment, procedures should be established that specify where the medication will be stored, who is responsible for the medication, who regularly monitors and replaces outdated medication, and who will carry the medication for field trips.
- The adolescent age group seems to be at the highest risk of fatal food-induced anaphylaxis.^{10–12} Special attention for this group should include education of the adolescent and his or her peers to reduce risk-taking and to encourage carrying and using medications when needed.³³ Education should be provided to staff, including coaches, trainers, and after-school advisors. Affected students should be permitted to wear/carry clothing/bags/purses

that facilitate carrying medications (eg, large pockets, larger purses, book bags, etc).

- Harassment or bullying of students because of their food allergy must be taken seriously. Students should be encouraged to report such behaviors, and the school should address the situation with quick and decisive antibullying policies.
- The legal rights of children with life-threatening food allergies are protected under several laws. If a student qualifies for special education services under the Individuals With Disabilities Education Act and also has food allergies, the food allergy should be addressed in the student's individualized education plan. Section 504 of the Rehabilitation Act of 1973 may also be used to document specific management plans and provides legal recourse for students and their families if they and the school are unable to come to terms on health care plans through normal channels. In some schools, Section 504 plans may not be necessary if the written emergency action plan and/or IHCP provide the necessary procedures for safety. The Americans With Disabilities Act also protects children with life-threatening food allergies who attend schools that do not receive federal funding.
- After a reaction has occurred, it is important to review policies and procedures among the school staff, the child's health care provider, parents, and the child.

SUMMARY

The pediatrician plays an important role in contributing to the management of school-aged children with food allergies. Consultation with a board-

certified allergist-immunologist to secure a diagnosis and provide directed treatments and advice is recommended.³⁴ It is important that there be close communication between the pediatrician and allergist for diagnosis and management. Partnerships with students, families, school nurses, school physicians, and school staff are important for individualizing effective and practical care plans.

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Comments on this clinical report were solicited from committees, sections, and councils of the AAP; 5 responded. Additional comments were sought from the Centers for Disease Control and Prevention, National Association of State School Nurse Consultants, National Association of School Nurses, and Food Allergy & Anaphylaxis Network. For recommendations for which high levels of evidence are absent, the expert opinions and suggestions of the members of the Section on Allergy and Immunology and other groups and authorities consulted were taken into consideration in developing this clinical report.

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APPENDIX RESOURCES

Example of an emergency treatment plan

www.foodallergy.org/downloads/FAAP.pdf

Overview of school guidelines endorsed by professional organizations

www.foodallergy.org/school/schoolguidelines.pdf

Examples of state school programs

Arizona

www.azdhs.gov/phs/oeh/fses/pdf/allergies1007.pdf

Connecticut

www.sde.ct.gov/sde/lib/sde/PDF/deps/student/health/Food_Allergies.pdf

Maryland

www.marylandpublicschools.org/nr/rdonlyres/6561b955-9b4a-4924-90ae-f95662804d90/21182/anaphylaxisstateguidelines_final082809.pdf

Massachusetts

www.doe.mass.edu/cnp/allergy.pdf

Mississippi

www.healthyschoolsms.org/health_services/documents/GuidelinesforManagingFoodAllergies.pdf

New Jersey

www.nj.gov/education/students/safety/health/services/allergies.pdf

New York

www.schoolhealthservices.org/uploads/Anaphylaxis%20Final%206-25-08.pdf

Tennessee

<http://health.state.tn.us/Downloads/HealthySchoolsGuidelines.pdf>

Vermont

http://education.vermont.gov/new/pdfdoc/pgm_health_services/food_allergies_manual_0608.pdf

Washington

www.k12.wa.us/HealthServices/publications/09-0009.aspx

West Virginia

<http://wvde.state.wv.us/osshp/main/documents/GuidelinesforAllergiesintheSchoolSetting-Final2.doc>

Centers for Disease Control and Prevention information for school food allergy

www.cdc.gov/Healthyyouth/foodallergies/index.htm

Clinical Report Management of Food Allergy in the School Setting
Scott H. Sicherer, Todd Mahr and THE SECTION ON ALLERGY AND
IMMUNOLOGY

Pediatrics published online Nov 29, 2010;
DOI: 10.1542/peds.2010-2575

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