

The Pediatrician's Role in the Diagnosis and Management of Food Allergy

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Abstract

Food allergy is a rapidly increasing and potentially life-threatening health concern in the United States. Given the ubiquity of food in our society and the absence of a cure, it is crucial that families receive proper guidance and medication to keep children safe. The pediatrician plays a key role to this end as he or she is often the first, and sometimes the only physician, these children can access. Accordingly, pediatricians must be equipped to recognize, manage, and evaluate food allergies over time while preventing unnecessary avoidance. This review provides practical translation of guidelines into recommended practices that are most pertinent to pediatricians.

CME EDUCATIONAL OBJECTIVES

1. Recognize the signs and symptoms of food allergy versus food intolerance.
2. Review currently available diagnostic testing modalities for food allergy and their applicability in the pediatric outpatient setting.
3. Review appropriate management practices for pediatricians, including prescription of medications, counseling of families, and referrals to keep children safe.

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Food allergy is a rapidly increasing and potentially life-threatening health concern that impacts an estimated one in 13 children in the United States.¹ Given the absence of a cure and the ubiquity of food in our society, it is crucial that families receive proper guidance and medications to keep their children safe. The pediatrician plays a key role to this end as he or she is often the first and sometimes the only physician that these children can access.

Even if these children are referred to an allergist, the average wait time for a first allergist consultation is 4 months.² Therefore, it is critical that the pediatrician provides families with the means and guidance to appropriately manage reactions in the interim. Accordingly, pediatricians must be equipped to recognize, manage, and evaluate the allergy over time while preventing unnecessary avoidance.

Unfortunately, knowledge gaps and misconceptions regarding food allergy exist among pediatricians.³⁻⁵ Physicians themselves often report inadequate residency training to care for affected children, and have consistently expressed concern regarding their ability to manage food allergy effectively.³ This has led to variations in diagnosis and management approaches across primary care clinics.^{2,6-9}

In an attempt to standardize clinical best practices, evidence-based guidelines for the diagnosis and management of food allergy were released in 2010 by the National Institute of Allergy and Infectious Diseases (NIAID).¹⁰ Familiarity with current guidelines is a first step toward improving physicians' confidence and clinical ability in caring for children with food allergy. Here, we use the recommended practices from a 2013 review article focused on managing the food allergies that are most pertinent to pediatricians: 1) documentation of a diagnosis based on reaction history, 2) appropriate diagnostic testing and test interpretation,

3) prescription of potentially life-saving medications, 4) counseling and educating patients' families on prevention and treatment, and 5) referral to an allergist.¹¹

FOOD ALLERGY DEFINED

Food allergy is an immune-mediated, reproducible adverse response to a specific food.¹⁰ An example of a nonimmunologic reaction is a food intolerance.¹⁰ A common example of this is lactose intolerance. Lactose intolerance is the reduced ability to digest lactose due to a deficiency of lactase, an enzyme required to digest lactose. This typically results in gastrointestinal symptoms such as bloating and diarrhea.

DIAGNOSIS OF FOOD ALLERGY

A thorough clinical reaction history must be used to focus the diagnostic workup and identify the causative food involved. This history is then combined with tests for the presence of immunoglobulin E (IgE) to rule out non-immunologic reactions such as food intolerance (see Figure 1).¹⁰

Reaction History

All diagnostic workups should begin with a detailed medical history, including all foods eaten prior to the reaction, symptoms, time taken to react, and response to medications. Symptoms typically occur within minutes to a few hours, but in some cases, onset may be delayed or a child may have a biphasic reaction.¹⁰

Cutaneous symptoms such as erythema, pruritis, urticaria, morbilliform eruption, angioedema, eczematous rash, and flushing are commonly recognized as symptoms of food allergy. It is important to recognize, however, that many present without cutaneous symptoms. Other signs and symptoms of food allergy may include ocular symptoms (eg, pruritis, periorbital edema, tearing, conjunctival erythema); respiratory symptoms (eg, nasal congestion, pru-

ritis, rhinorrhea, sneezing, hoarseness, dry staccato cough, chest tightness, dyspnea, wheezing, intercostal retractions, accessory muscle use); gastrointestinal symptoms (eg, angioedema of the lips, tongue or palate, oral pruritis, tongue swelling, nausea, colicky abdominal pain, reflux, vomiting, diarrhea); and cardiovascular symptoms (eg, tachycardia, hypotension, dizziness, fainting, loss of consciousness).¹⁰ The symptoms may vary depending on the type of allergen, the child's sensitivity to the allergen, and the amount of allergen the child has ingested.

Food-induced anaphylaxis is a severe allergic reaction that is rapid in onset and may lead to death.¹² Although cutaneous symptoms occur in many food-allergic reactions, they are less common in food-induced anaphylaxis. Anaphylaxis typically presents with hypotension or involvement of any two organ systems: involvement of skin-mucosal tissues (eg, hives, itching, flushing, swollen lips, tongue, or ulva), respiratory compromise (eg, dyspnea, wheeze, bronchospasm, stridor, hypoxemia), hypotension or associated symptoms of end-organ dysfunction (eg, hypotonia, syncope, incontinence), or persistent gastrointestinal symptoms (eg, crampy abdominal pain, vomiting).¹² Anaphylaxis typically occurs within seconds to minutes, although death may occur up to 2 hours after the exposure.^{10,12}

Severity of the next food-allergic reaction cannot be predicted by the severity of past reactions nor by the magnitude of one's skin or blood test (eg, higher scores do not necessarily indicate a more severe allergy).¹⁰ Even a seemingly mild reaction has the potential to quickly progress to anaphylaxis. Progression to a severe reaction can be avoided by recognition and prompt treatment. It is thus imperative that physicians prescribe medications for both mild and severe reactions even if the child has never had a severe reaction in the past.

Diagnostic Testing

Pediatricians may use allergen-specific serum immunoglobulin E (IgE) tests to confirm suspected cases of food allergy when indicated by reaction history.¹⁰ Other recommended diagnostic tests that an allergist will use include the skin prick test and the oral food challenge.¹⁰ Atopy patch testing, intradermal food testing, IgG4 food testing, and total IgE levels are not recommended for diagnosing food allergy.¹⁰

Allergen-Specific Serum IgE Tests

The only diagnostic tests for food allergy currently available to pediatricians are allergen-specific serum IgE tests. These tests detect the presence of IgE antibodies in response to a particular allergen in a sample of the patient's blood.¹⁰ The patient's allergen-specific IgE level should be compared to diagnostic "cutoff" levels, which refer to the concentration of allergen-specific IgE that is predictive of a true allergy. Such cutoff levels vary by allergen, brand, assay system, and are lower for younger children.^{13,14} Ninety percent cutoff levels have been determined in the research literature.¹⁴

For example, if the patient has a peanut-specific IgE level that is higher than the 90% cutoff level for peanut, we can be more than 90% certain that the patient has a true peanut allergy. Conversely, using cutoff levels with such a high predictive value also means that children with true allergies but low allergen-specific IgE levels will be missed or not diagnosed. For this reason, a much lower IgE concentration of 0.35 kU/L (the lowest detection limit of the test) has been used in clinical practice as a general cutoff level.

This general cutoff level predicts a true milk allergy 68% of the time, egg allergy 67% of the time, peanut allergy 76% of the time, soy allergy 78% of the time, and wheat allergy 100% of the time.¹⁵ Recently, improved IgE tests can

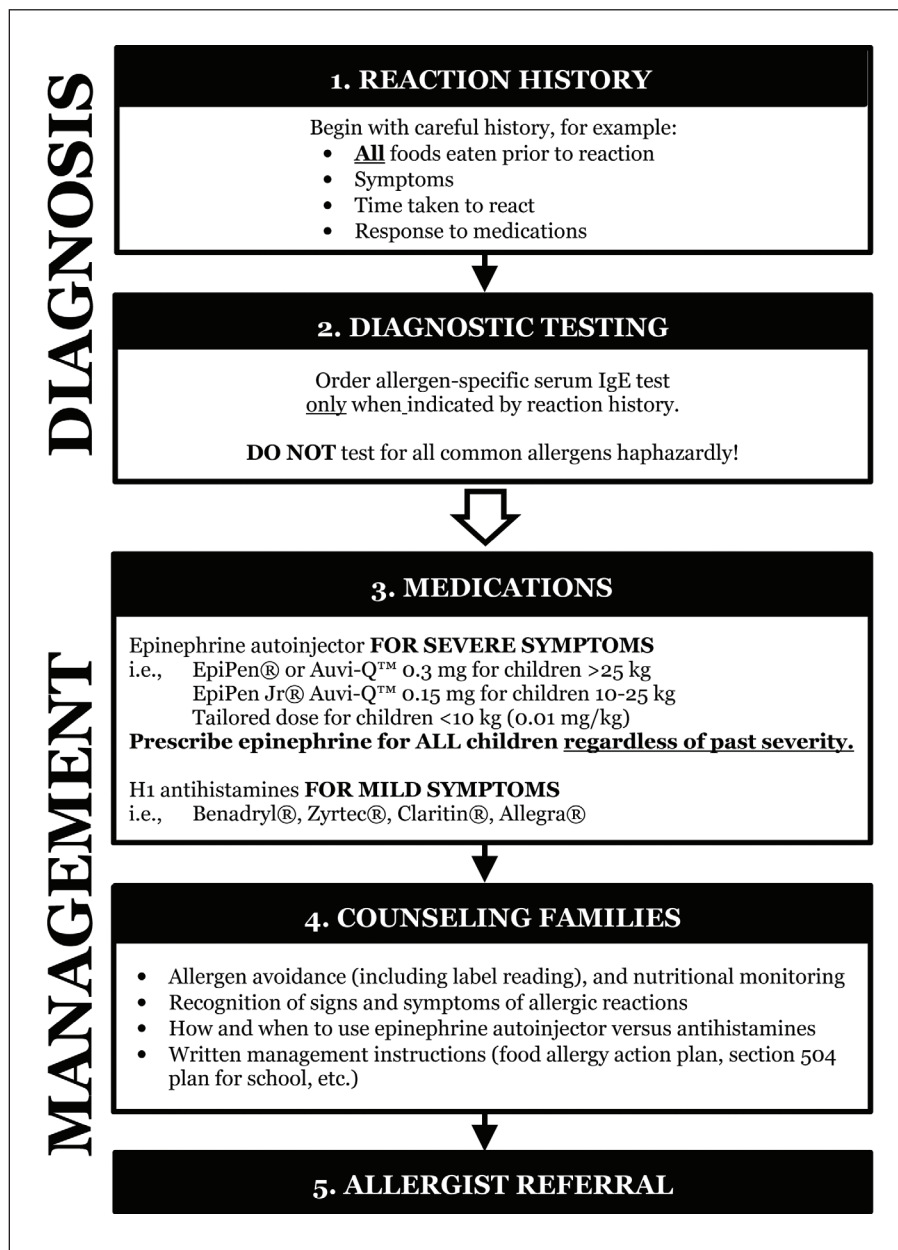


Figure 1. Recommended practices for food allergy that are most pertinent to pediatricians, distilled down to five areas: 1) reaction history, 2) diagnostic testing, 3) medications, 4) counseling families, and 5) allergist referral.

detect levels as low as 0.1 kU/L, which is starting to become the new general cutoff level.¹⁶

Diagnostic testing must be guided by reaction history, as opposed to testing for all common food allergens with a food allergy panel. In particular, use of laboratory-offered standard panels (ie, panels evaluating multiple common allergens) is discouraged due to the high

rate of false-positive results.¹⁷⁻²⁰ In short, if a child is currently consuming a food without symptoms, diagnostic testing for that food is not warranted. A positive test result in the absence of symptoms does not indicate a true allergy; a child can have high allergen-specific serum IgE levels without being truly food-allergic.¹⁷⁻²⁰ Misinterpretation of diagnostic testing results without a corroborating

Figure courtesy of Fuchi S. Gupta, MD, MPH.

reaction history may lead to unnecessary dietary restrictions, which has the potential to adversely affect nutrition²¹ as well as the family's quality of life.²² Therefore, it is critical that physicians selectively use diagnostic testing only when indicated by reaction history.¹⁷⁻²⁰

Conversely, children with true food allergy may have undetectable IgE levels. In cases where the reaction history is highly suggestive, evaluation by an allergist is necessary before notifying both the parent and the child that he or she may ingest the suspected food.

Skin Prick Tests

Skin prick tests (SPT) are currently only performed by allergy or immunology specialists. This test detects the presence of IgE bound to cutaneous cells rather than free IgE in the blood.¹⁰ Hence, skin and blood testing may not always show the same results. A positive result is defined as a wheal with a mean diameter of at least 3 mm or a diameter that is greater than the negative (diluent) control.²³ Similar to interpretation of blood test results, positive skin test results should be interpreted cautiously due to its high rate of false-positive results.

Oral Food Challenges

Oral food challenges (OFC) are also only performed by specialists in allergy or immunology. The procedure involves incremental feeding of the suspected food allergen.¹⁰ Any reaction during an OFC is considered a positive test result. A positive oral food challenge result is diagnostic of food allergy, regardless of skin or blood test results.

Tolerance Development Testing

Milk, egg, and peanut account for the vast majority of food allergy in young children.¹ Many children with milk, egg, soy, or wheat allergy eventually outgrow their allergy.¹⁰ More than half of children outgrow their milk allergy by 12 years

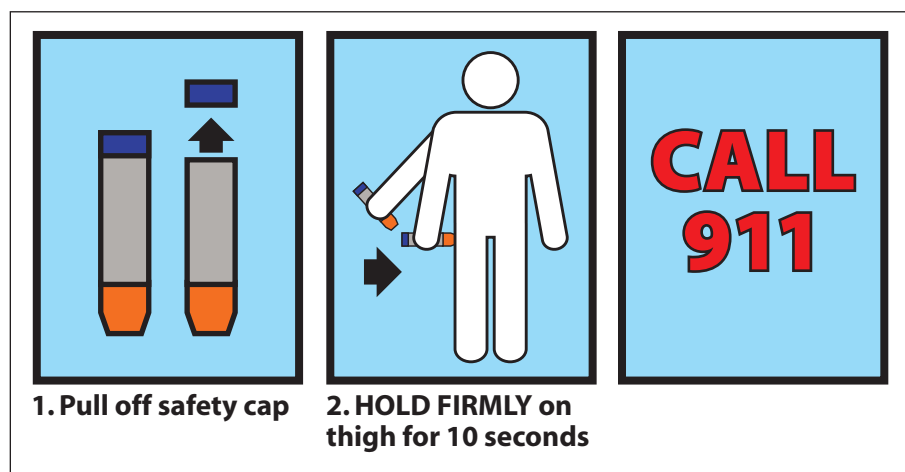


Figure 2. How to use an epinephrine auto-injector.

of age, and egg allergy by 14 years of age, soy allergy by 10 years of age, and wheat allergy by 8 years of age.²⁴⁻²⁷ To this end, follow-up testing for tolerance is reasonable annually for milk, egg, soy, or wheat allergy.

Teenagers and adults, on the other hand, are most commonly allergic to peanut, tree nut, and shellfish.¹⁰ Peanut, tree nut, and shellfish allergies will typically persist into adulthood.¹⁰ Only 22% of children will outgrow peanut allergy,²⁸ and less than 10% of patients will outgrow tree nut allergy.²⁹ Thus, testing for these allergens can be repeated less frequently (eg, every 2 to 3 years) depending on the reaction history.

A decrease in allergen-specific IgE levels is often a marker for the onset of tolerance.^{25-28,30-32} However, a child may have decreased IgE levels without truly outgrowing the allergy. Hence, tolerance must be confirmed with an oral food challenge (by allergists) prior to telling the parents that the child is no longer allergic and may ingest the food. After confirming development of tolerance, the child should consume the outgrown allergen on a regular basis to avoid recurrence of the allergy.³³

MANAGEMENT

Currently, there is no recommended cure nor preventive medicine for food al-

lergy.¹⁰ The only means to defend against anaphylaxis are avoidance of allergens and prompt treatment upon exposure. Recommended management practices for pediatricians include prescribing both an epinephrine auto-injector for all patients and antihistamines to be used in conjunction with very mild symptoms, counseling families on appropriate food allergy management, and referring patients to an allergist (see Figure 1).¹⁰

Food Allergy Medications

Pediatricians should prescribe both antihistamines and an epinephrine auto-injector for all children with a suspected food allergy, regardless of severity of past reactions. Parents, relatives, teachers, and others involved in caring for the child should be directed to use H1 antihistamines (eg, Benadryl, Claritin, Zyrtec, Allegra) for mild symptoms and the epinephrine auto-injector for anaphylaxis.¹⁰ Please see "Reaction History" section (Figure 1) for classification of symptoms.

It is important to stress to caregivers that antihistamines should never be used in place of epinephrine for the treatment of anaphylaxis. Antihistamines are used only for very mild skin symptoms. After administering antihistamines, the child should be observed until the symptoms are completely resolved to ensure that

the child does not develop severe symptoms.¹⁰ If an increase in severity is noted, the epinephrine auto-injector should be administered immediately.

If any two systems are involved like the skin (eg, hives) and the respiratory (eg, trouble breathing), epinephrine should be administered immediately.

Epinephrine is the primary treatment for anaphylaxis.^{10,12} The epinephrine auto-injector should be injected into the anterior-lateral thigh at the first sign of anaphylaxis and held for 10 seconds before calling 911 (see Figure 2). Epinephrine will relieve symptoms for 5 to 15 minutes. Delayed administration of epinephrine beyond 15 minutes has been associated with increased risk of death.^{12,34,35} After the first dose of epinephrine is administered, the child must be taken to the closest hospital for ongoing observation as symptoms may recur.^{10,12} A second dose of epinephrine may be required before reaching the hospital.^{10,12} Thus, pediatricians should prescribe two epinephrine auto-injectors for each location in which the child spends an extensive amount of time (eg, home, school, grandmother's house, etc).

Access to epinephrine auto-injectors is crucial for all children with food allergy, as the child may have a severe reaction regardless of the severity of past reactions. Children weighing 10 kg to 25 kg should be prescribed the 0.15-mg dose of epinephrine auto-injectors (EpiPen Jr [Mylan Specialty] or Auvi-Q [Sanofi US] 0.15 mg), and children weighing more than 25 kg should be prescribed the 0.3-mg dose (EpiPen or Auvi-Q 0.3 mg).^{10,12} Children weighing less than 10 kg should be prescribed tailored doses of epinephrine solution of 0.01 mg/kg per dose (see Figure 1).^{10,12}

Counseling Families

Comprehensive counseling is integral to keeping children with food allergies safe. Pediatricians are recommended to educate families on: 1) allergen avoid-

ance; 2) recognition of the signs and symptoms of allergic reactions; and 3) how and when to use the epinephrine auto-injector (Figure 2) versus antihistamines.¹⁰ Pediatricians should also provide written instructions for the management of food-induced reactions (eg, food allergy action plan, section 504 plan for school).¹⁰

Guidance on Allergen Avoidance

When food allergy is suspected, the food should be eliminated from the child's diet.¹⁰ Pediatricians can help families prevent accidental exposure by pointing out specific foods that must be avoided. For example, children with milk allergies must avoid butter, cheese, yogurt, and any other product that has milk as an ingredient. To prevent cross-contamination at home, separate utensils, dishes, cutting boards, pots and pans should be used if other family members continue to eat foods to which the child is allergic.

Pediatricians must stress the importance of carefully checking ingredient lists of all packaged foods, since allergens may not always be visible in them.¹⁰ Even trace amounts of the food allergen during handling can induce anaphylaxis. Thus, products with precautionary labeling such as "may contain trace amounts" should be avoided because of the small but significant risk of actual food contamination.¹⁰ Pediatricians should also advise families to check ingredient lists of nonedible products such as Play-Doh, toothpaste, or lotions that may contain the food allergen.

Accidental exposures occur all too often.³⁶ Hence, children's food allergies must be managed at home, at school, and in the community. Children should be instructed not to share or trade food with others and to notify adults if they eat something that may contain the allergen.³⁷ Since it can be difficult to determine whether foods prepared by someone else are safe, it is best to bring

"safe" foods to social gatherings.³⁷ Particularly, families must be cautious with restaurant food since dishes without the allergen as an ingredient may have been cross-contaminated in the kitchen.^{38,39} Medical identification jewelry should be worn when outside of home in the case of an emergency.¹⁰ Furthermore, all those who are involved in supervising the child (eg, relatives, other babysitters, teachers, coaches) should also receive education on managing the child's food allergy and training on how to respond to a food allergy reaction.³⁷

Depending on the specific food or number of foods removed from the diet, nutritional counseling and growth monitoring are often not only helpful to preserve the family's quality of life, but also may be medically necessary to prevent malnutrition.^{10,21,22}

Additional practical information and resources to support families of children with food allergies can be found on the Food Allergy Education and Research website (www.foodallergy.org).

Allergist Referral

All children presenting with a suspected food allergy should be referred to an allergist for further evaluation and management (see Figure 1).¹⁰ Pediatricians are encouraged to co-manage the food allergy with the allergist.

CONCLUSION

Childhood food allergy is a rapidly increasing and potentially life-threatening health concern in the US. The pediatrician plays a key role to this end as he or she is often the first and sometimes the only physician these children can access. Thus, recognition and proper management of food allergy in the primary care setting according to current NIAID guidelines for the diagnosis and management of food allergy is essential. As there is no current cure for food allergy, pediatricians must be trained to prescribe potentially life-saving medi-

cations, counsel the family on how to prevent accidental exposures and how to promptly respond to symptoms, and refer children to an allergist. ■

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