

Evaluation and Management of Food Allergies in the Emergency Department



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KEYWORDS

- Food allergy • Food anaphylaxis • Emergency department
- Management of food allergies

KEY POINTS

- Food allergies are a common complaint among patients evaluated in the emergency department (ED), and ED visits for food allergies are increasing.
- In someone without a previously diagnosed food allergy, diagnosis is purely clinical in the ED.
- The mainstay of therapy for those suspected of having anaphylaxis owing to a food allergy is epinephrine.
- Antihistamines and steroids are not a substitute for epinephrine in the management of anaphylaxis.
- Discharge from the ED must include education on food avoidance, follow-up with an allergist, and making sure epinephrine is readily available to the patient.

Food allergies are an important group of disorders that all emergency department (ED) providers should be comfortable treating. Their incidence is on the increase as is the frequency with which these disorders are encountered in the ED. As many as 20% of people will avoid food at some point in their life out of concern for a food allergy.^{1–6} The complexity of appropriate recognition, diagnosis, and management requires a thorough understanding of the mechanisms that underlie the pathologic condition. This also means that diagnosis can be difficult. Symptoms can be broad and atypical ranging from mild to severe. It is crucial to recognize a food allergy reaction at presentation to appropriately treat and disposition patients.⁷

Food allergies are defined as “an adverse health effect arising from a specific immune response that occur reproducibly on exposure to a given food.”⁷ For the

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emergency provider, this definitive diagnosis is particularly troublesome, as the gold standard of testing is a placebo-controlled food challenge. This obviously falls outside of the realm of an acute care visit, making the diagnosis for the acute care provider solely clinical.^{8,9}

Although definitive diagnosis might not be possible at an acute care visit, the management of the most severe food allergy, anaphylaxis, is a staple of acute care medicine. The administration of epinephrine, antihistamines, and steroids is still the foundation of treatment, whereas more nuanced management and diagnosis usually fall outside of the emergency clinician's purview. Understanding these other treatments is relevant because of the disorder's widespread prevalence.

EPIDEMIOLOGY

The true incidence of ED visits for food allergy can be difficult to discern, as the diagnosis is presumptive in most cases; however, there are an estimated 203,000 emergency visits for such allergies, and of those, roughly 90,000 are anaphylactic reactions.^{9,10}

The incidence of food allergy nationally is estimated to be between 3% and 4% for adults and roughly 8% for children.^{11–13} Confirmatory skin testing, food challenge, and history would corroborate that 3% of adults have a true food allergy, but when patients are asked to self-report allergy, the number increases substantially. Self-reported food allergies range up to 20%, and a similar number report avoidance behavior for fear of being allergic to a specific food despite frequently lacking definitive diagnosis or true allergy.^{1–5}

Although unnecessary food avoidance may not seem like a major concern, there is a genuine impact on those who do so. A study in *Allergy* found that children with peanut allergy were restricted from attending school (10%) or school trips (59%), avoided parties (68%) and restaurants (11%), and many were prevented from playing at friends' houses (14%) and attending sleepovers (26%).

There is a decade over decade increase in food allergies over the last 3 decades.⁵ The increase based on confirmatory testing or serum markers is around 1.2% per decade since 1980. These seem to be most prominent in what would be described as "industrialized" countries, although there are some variances regionally and by age.¹⁴ Although there have been attempts in Australia, the United Kingdom, and United States to determine variances based on socioeconomic divisions, there is no clear difference or pattern to be inferred, and this is a continued area of research.

Motosue and colleagues¹⁴ analyzed pediatric anaphylaxis from food and found there to be a steadily increasing number of cases, as seen in [Fig. 1](#). Previous estimates from the late 1990s had substantially underestimated the burden of this disease for the emergency system.

As recognition and investigation have increased, there has been growing interest in identifying the most at-risk cohorts as well as trying to identify risk factors or protective behavior. There are some identified risk factors, including male sex, Asian or Black race/ethnicity, and a familial history of food allergy. There are innumerable other hypotheses about risks with varying levels of evidence that range from little to no evidence, such as vitamin D deficiency, antibiotic exposure, pet exposure as well as hygiene.¹⁵

The leading cause in the United States of pediatric anaphylaxis is food. However, data related to ED visits and hospitalizations due to food-related anaphylaxis are limited.¹⁴ From what is available, nut allergies are the most common, particularly peanut allergies.

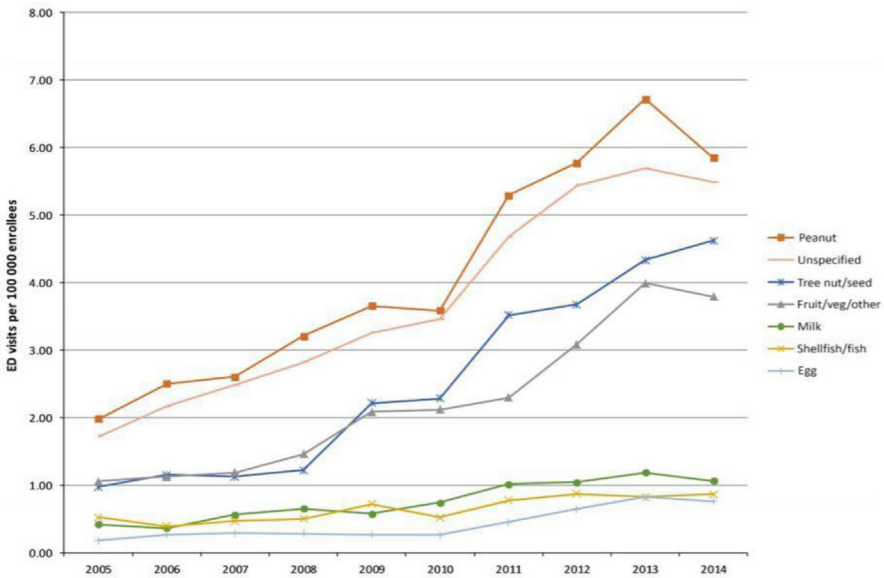


Fig. 1. Pediatric food-induced anaphylaxis ED visit rates based on trigger, 2005–2014. Veg., vegetables. (From Motosue et al. National trends in emergency department visits and hospitalizations for food-induced anaphylaxis in US children. *Pediatr Allergy Immunol.* 2018 Aug;29(5):538–544; with permission. (Figure 2 in original).)

COMMON FOOD CAUSES

The Food Allergen Labeling and Consumer Act (FALCPA) defines major food allergies as one of the 8 foods/food groups containing protein derived from milk, eggs, fish, crustacean shellfish, tree nuts, wheat, peanuts, and soybeans, as these are responsible for most food allergies.¹⁶

In adults, the most common of these is milk, followed by shellfish. Allergy to peanuts appears to resolve in approximately 20% of patients, but the same is not necessarily true for an allergy to tree nuts. Wheat allergies in children usually resolve by adolescence.^{13,17}

An allergy to 1 food group can be predictive of a sensitivity or allergy to another group based on the cross-reactivity of the underlying immune mechanisms, as seen in [Table 1](#) by Sicherer.¹⁸

For those patients who have yet to be tested definitively, these are important considerations to help avoid a repeated exposure that might precipitate another severe allergic response.

Children who have allergies to foods are likely to “outgrow them” by developing tolerance over time. Those allergic to milk or eggs have been shown likely to develop tolerance by adulthood; conversely, children allergic to fish, peanuts, or tree nuts are likely to continue to have some sensitivity or allergy into adulthood.^{19,20}

TYPES OF FOOD ALLERGIES

Food allergies are an abnormal response of the immune system to a food protein. This is distinct from food intolerance, which is a nonimmune reaction. Food allergies are usually grouped into 3 categories: immunoglobulin E (IgE)-mediated, mixed IgE and

Table 1 Eight major food allergies with cross-reactivity	
Primary Allergy	Cross-Reactivity
Cow's milk	Goat's milk, 90%, beef, 10%
Hen's eggs	Turkey, duck, and goose
Soy	Usually little cross-reactivity
Peanut	Little cross-reactivity
Fish	Very likely to be allergic to other fish
Tree nuts	Very likely to be allergic to other tree nuts
Shellfish	Likely allergic to other crustaceans and mollusks
Wheat	Little cross-reactivity

Adapted from Sicherer, Scott H. Clinical implications of cross-reactive food allergens. *Journal of Allergy and Clinical Immunology*, Volume 108, Issue 6, 881 - 890

non-IgE, or non-IgE-mediated. It is important for the emergency medicine physician to not only be aware of but also recognize the types of reactions that may fall under these subsets. They can also be divided into acute onset, which is IgE-mediated, and delayed onset, which includes IgE and/or cellular-mediated reactions.^{19,21}

Traditionally, IgE-mediated reactions are the rapid onset of symptoms that are typically associated with anaphylaxis within minutes to hours. These symptoms are typical of a type I hypersensitivity reaction and include flushing, urticaria, and angioedema. These occur in more than 60% of affected children; however, isolated respiratory and gastrointestinal symptoms are possible.²¹ IgE-mediated symptoms usually present within minutes to 1 to 2 hours after exposure, and the more severe the reaction, the earlier it seems to occur.^{13,22} IgE-mediated are generally acute urticaria/angioedema reactions, anaphylaxis, food pollen allergy syndrome, food-associated exercise-induced anaphylaxis, and alpha-Gal mammalian meat allergy.^{21,23,24}

Both IgE and non-IgE-mediated reactions are responsible for atopic dermatitis, eosinophilic esophagitis, and eosinophilic gastroenteritis.²³ Non-IgE-mediated reactions are usually delayed in onset. These include food protein-induced enterocolitis syndrome (FPIES), celiac disease, food intolerance, and contact dermatitis.^{21,23-25}

Pollen-food allergy syndrome (PFAS), alternatively known as oral allergy syndrome, is a common IgE-mediated allergic disease caused by a cross-reaction among pollens and vegetables. The most common symptom is pruritus in the mouth and throat after eating raw fruit or vegetables. It is important to note these same foods are often tolerated when cooked. Systemic symptoms, such as urticaria, nausea, vomiting, and anaphylaxis, are rare but have been found in up to 1.7% of reactions. Initially, PFAS was thought to be mostly a disease of adulthood but is more prevalent in childhood than previously thought.^{21,26,27}

“Alpha Gal” syndrome is secondary to a bite from the lone star tick. Diagnosis of alpha-Gal syndrome is made by a detailed history of delayed hives or anaphylaxis usually 3 to 6 hours after eating mammalian meat. Confirmatory testing for the IgE to alpha-Gal is usually not available through the ED. However, it can be done at some academic centers.^{21,24,28}

Food-dependent exercise-induced anaphylaxis is the ingestion of a culprit food along with exercise. IgE to the food is crucial to the disease process. Although this is most commonly called exercise-induced anaphylaxis, other factors can precipitate a reaction when done concomitantly with ingestion of the offending food. These

factors include alcohol intake or acetylsalicylic acid intake. Thus, this disease is better characterized as a type of food allergy whereby symptoms develop only in the presence of an augmenting factor.²⁴

Eosinophilic gastrointestinal disorders (EGID) are mixed IgE and non-IgE-mediated with symptoms isolated to the gastrointestinal system. In patients with eosinophilic esophagitis, symptoms include long-standing dysphagia. These patients are likely to present with food impactions. Abdominal discomfort with diarrhea or constipation along with vomiting are seen in other cases of EGID. The foods most associated as triggers are milk and wheat. In most cases, patients are also treated with oral steroids, such as budesonide or fluticasone.²⁴

FPIES is food protein-induced enterocolitis syndrome. It is a non-IgE-mediated food allergy seen almost exclusively in pediatric patients usually during infancy when milk and soy are introduced. Although milk and soy are the most common causes, rice, oats, and grains have also been implicated in causing reactions. True prevalence is unknown, but it is relatively rare and often seen in patients with atopic disease. The most common symptoms are emesis and nonbloody or bloody diarrhea, which can lead acutely to severe dehydration, laboratory abnormalities, and hemodynamic instability or chronic failure to thrive. There is a lack of awareness of this condition and no available confirmatory test, contributing to the diagnosis being easily missed in the ED. Treatment includes supportive care for mild reactions and intravenous (IV) corticosteroids for severe reactions. Education and avoidance of problematic foods are the definitive care.²⁹

There are several mimics of food allergies that are nonimmunologic. These should be in the differential diagnosis on presentation to the ED.³⁰ These include scombroid poisoning caused by histamine ingestion, chemical effects caused by hot or spicy foods, Frey syndrome, and lactose intolerance, among others seen in **Box 1**.^{23,30,31}

DIAGNOSIS OF FOOD ALLERGIES

The gold standard of diagnosis of food allergy is a double-blind placebo-controlled oral food challenge, but this cannot be accomplished in the ED. It is also not practical in the clinic setting, so current standard testing includes skin prick test and sIgE (serum food allergen-specific immunoglobulin E). Some of the new diagnostic modalities under active investigation are basophil activation test, epitope analysis, and molecular allergy analysis. As exciting as this may be, none of these have application in the ED.

Box 1

Differential diagnosis for food allergy

A differential diagnosis for food allergy

- Allergic reactions to nonfood causes (eg, bee stings, medication)
- Food intolerance or sensitivity (eg, lactose intolerance, celiac disease)
- Food poisoning (eg, salmonella, staph, *Escherichia coli*)
- Food toxicity (eg, scombroid, ciguatera)
- Auriculotemporal syndrome (eg, Frey syndrome)
- Food avoidance (eg, anorexia nervosa)
- Side effects of caffeine, alcohol
- Spicy foods reaction

Adapted from Mahdavinia M. Food Allergy in Adults: Presentations, Evaluation, and Treatment. *Med Clin North Am.* 2020 Jan;104(1):145-155.

Therefore, the management must be guided by a history and presentation that point to a food allergy reaction.³⁰

PRESENTATION

Patients with food allergies may present with a constellation of symptoms. Reactions only involving hives or angioedema not involving the posterior oropharynx or larynx are considered mild. Isolated gastrointestinal symptoms are also considered mild. Mild symptoms can be treated with antihistamines.

However, the progression to anaphylaxis with 2 body systems or respiratory or cardiovascular compromise requires escalation of treatment.²¹

Recognizing those signs and symptoms that indicate anaphylaxis is most important for guiding management in the ED and can be reviewed as in **Table 2**. Those with a history of eczema, asthma, allergic rhinitis, food allergies, and a family history of atopic disease should make suspicion for food allergy reaction even greater, as they are at higher risk of a food allergy.³⁰

The National Institute of Allergy and Infectious Diseases (NIAID) and the Food Allergy and Anaphylaxis Network (FAAN) definition of anaphylaxis has been translated into clinical diagnostic criteria by Phillip Lieberman, MD in Clinical Diagnostic Criteria for Anaphylaxis, which can be seen in **Fig. 2**. Criteria include a quick onset of signs and symptoms usually within minutes but up to 2 hours and involvement of dermatologic, respiratory, cardiovascular, or gastrointestinal systems. It is important to note whether the patient has a known allergen, likely exposure, or no known allergies, as the number of criteria required to be met depends on this history. The NIAID/FAAN criteria were validated specifically in the ED, with a sensitivity of 96.7% and a specificity of 82.4%.³² These criteria can be applied to patients in the ED and, when met, treatment with epinephrine is crucial.³³

Some exceptions include a child with a known allergen and only cutaneous manifestations, which does not meet the diagnosis above for anaphylaxis but should be treated as such regardless.³⁴

There are 3 types of anaphylactic reactions: uniphasic, biphasic, and protracted reactions. This is important to note, as some patients may need prolonged observation or extensive education at discharge even after marked improvement in ED. A uniphasic reaction is a typical anaphylactic reaction occurring within 30 minutes of exposure of the offending food allergen and resolving over the next 1 to 2 hours. A biphasic reaction has a second wave of symptoms after the initial reaction has resolved. Up to 20% of patients will experience this. The recommended observation period is 4 to 6 hours, but it is particularly important to know that reactions may occur within the next 6 to 8 hours but can occur up to 24 hours after a reaction. Protracted anaphylaxis is the most severe reaction that can last greater than 24 hours and can include shock and respiratory distress that does not improve despite aggressive therapy.³³ The treatment remains the same on recurrence in a biphasic reaction or protracted anaphylactic reactions with epinephrine, steroids, and antihistamines being the treatments of choice.

MANAGEMENT OF FOOD ALLERGIES IN THE EMERGENCY DEPARTMENT

The most important treatment for anaphylaxis is epinephrine, and it should be administered very early in the course of the allergic reaction. Patients should give themselves epinephrine at the first sign of a potential anaphylactic reaction to a food if it is available to them, and ED providers should also use epinephrine as first-line therapy. If anaphylaxis is identified and/or epinephrine administered by the patient in the out-

Table 2
System-based symptoms encountered in acute immunoglobulin E-mediated food reactions

System	Involved symptoms (usual onset within minutes to 1–2 h following food ingestion)
Cutaneous	Pruritus Flushing Urticaria Angioedema Flare of chronic eczematous rash
Ocular	Pruritus Conjunctival erythema Tearing Periorbital edema
Respiratory tract	Nasal congestion Pruritus Sneezing Laryngeal edema and hoarseness Cough Wheeze Chest tightness Dyspnea Cyanosis
Gastrointestinal	Nausea Emesis Crampy abdominal pain Oral pruritus Tongue, lip, palate, or pharyngeal angioedema
Cardiovascular	Tachycardia Bradycardia Hypotension Cardiac arrest Dizziness
Neurologic	Sense of impending doom Syncope Dizziness

From Mahdavinia M. Food Allergy in Adults: Presentations, Evaluation, and Treatment. *Med Clin North Am.* 2020 Jan;104(1):145-155

of-hospital setting, emergency medical services should be used to transport the patient to an ED.³⁵ These patients are usually monitored for 4 to 6 hours after receiving epinephrine to monitor for biphasic reactions, which occurs in 20% of cases.²¹ This is not a requirement for a non-IgE-mediated reaction.²¹

Epinephrine is the most effective treatment to prevent death from anaphylaxis, and multiple doses may need to be given in the course of treatment because of its short half-life.^{21,24} Despite the generally widespread knowledge of its benefit in preventing fatal anaphylaxis, epinephrine continues to be underutilized by health care providers and patients, and antihistamines are commonly overused in treating these reactions.³⁵

Adjunctive treatments may also be given, but these are all second line. These include antihistamines, glucocorticoids, and inhaled beta-agonists. Histamine is produced by mast cells and basophils, which help to arrange the allergic response. Oral H1 antihistamines affect conjunctival, nasal, and cutaneous response to the allergen by decreasing the symptoms that are triggered. Onset of action of such treatment

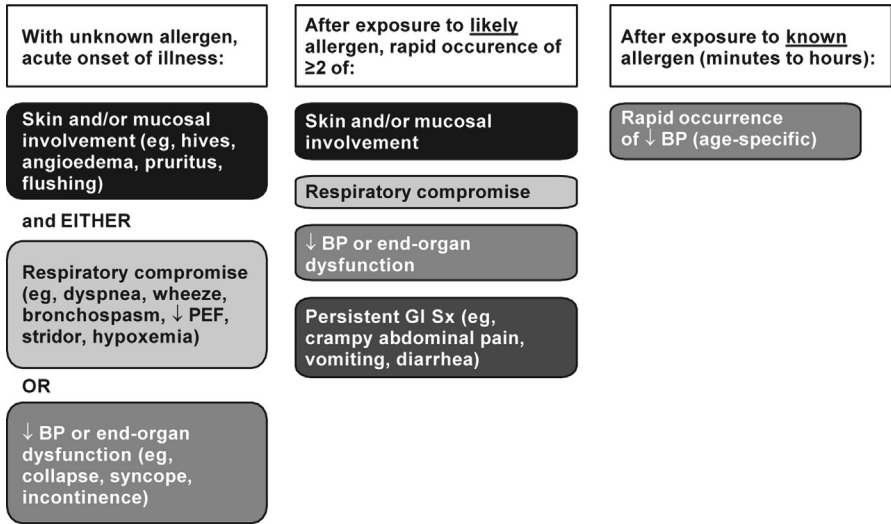


Fig. 2. Clinical diagnostic criteria for anaphylaxis. BP, blood pressure; GI Sx, gastrointestinal symptoms; PEF, peak expiratory flow. (From Lieberman PL. Recognition and first-line treatment of anaphylaxis. *Am J Med.* 2014 Jan;127(1 Suppl):S6-11; with permission (see Figure 2 in original).)

occurs within minutes to a few hours.²¹ Corticosteroids have proven efficacy in the management of multiple aspects of allergic inflammation.²¹ They are used to minimize the potential late-phase inflammatory response after an anaphylactic reaction, although this has yet to be proven as effective.²¹ Inhaled beta-agonist medications are often given to those who present with wheezing and coughing to relieve pulmonary bronchoconstriction.²¹

To reiterate, the use of adjuvant therapy should never delay the administration of epinephrine in food-induced anaphylaxis.²¹ There is some evidence that the pathophysiology of food-induced anaphylaxis differs from that of other types of anaphylaxis. In contrast to fatal venom- and drug-induced anaphylaxis, death by food-induced anaphylaxis is almost always caused by respiratory collapse. Distributive shock may be seen in cases of anaphylaxis due to rapid shifts in fluid from the intravascular space to surrounding tissues.²² Therefore, IV fluids should be administered rapidly in patients presenting with hypotension but should not be administered in isolation.²¹

Discharge from the ED requires thorough patient education. Avoidance of the possible food allergen is the mainstay of treatment. Patients should be told to avoid any foods with ingredients to their known allergen as well as foods that have unknown ingredients. They should also be made aware that cross-contamination is possible. Although the FALCPA was passed to assist consumers with this, there are more than 160 food allergens known to cause reactions, and not all are included in the FALCPA list. In pediatrics, avoidance of food carries a different risk. Avoidance increases risk of malnutrition if it includes essential nutrients. It is especially important for pediatric patients to be closely followed up by the pediatrician^{16,21} and an allergist/immunologist.³⁰ It is important to educate the patient on the possibility of biphasic reaction, which can occur 4 to 24 hours after the initial reaction.²² Patients should have easy access to at least 1 epinephrine autoinjector and have an emergency action plan. The patient should be educated on when to use the epinephrine auto-injector, and that if used, he or she should seek immediate evaluation in the ED.^{21,33,36}

Emergency providers may face another challenge related to food allergies. There are many medications and vaccines that use derived food products. These foods include milk, egg, fish and shellfish, soy, and gelatin.^{21,37} Most patients will tolerate the medications containing the foods to which they are allergic to except for gelatin. Propofol and the flu vaccine contain egg products however, egg allergy is no longer a contraindication to receiving the flu shot. Tdap contains milk products. There is no evidence that the cohort of people allergic to eggs or milk are at an increased risk of reaction to these drugs.^{37,38} The exception to this appears to be gelatin, which may be related to the larger quantity of the protein used in gelatin-containing products. This is important in the ED, as many medications have a gelatin-containing capsule. Gelatin is also used as a stabilizer in many vaccines and in IV volume expanders.²¹

CLINICS CARE POINTS

- Mild allergic symptoms like isolated urticaria, angioedema not including the larynx or posterior oropharynx, and isolated gastrointestinal symptoms can be treated with antihistamines.
- Pediatric patients with a known food allergen and isolated cutaneous manifestations are the exception to this and should be treated with epinephrine.
- Treatment of anaphylaxis owing to a food allergy is epinephrine. Anaphylaxis usually includes involvement of 2 body systems or respiratory or cardiovascular compromise.
- Treatments, such as antihistamines, glucocorticoids, and inhaled beta-agonists, are second line and are not a substitute for epinephrine in the treatment of anaphylaxis.

DISCLOSURE

The authors have nothing to disclose.

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