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Clinical Management of Food Allergy

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Synopsis

Food allergies have become a growing public health concern. Currently the standard of care focuses on avoidance of trigger foods, education, and treatment of symptoms following accidental ingestions. Here we provide a framework for primary care physicians and allergists for the diagnosis, management, and treatment of pediatric food allergy.

Keywords

food allergy; treatments; management

Introduction

Food allergy impacts approximately 8% of children in the United States.[1] Of those children with food allergies, 38.7% have experienced a severe reaction.[1] Currently there are no proactive treatments available for food allergy; consequently, the mainstay of therapy is education and avoidance.[2] Often pediatricians are the first physicians that patients with food allergies encounter; therefore, it is critical that pediatricians are trained in the principles of proper diagnosis, management, and referral. This article reviews the five main steps of food allergy management in a primary care clinic; 1) clinical history and physical exam 2) appropriate use of diagnostic testing 3) medication 4) counseling/education for patients and families 5) referral to an allergist.

1) Clinical History

A pertinent clinical history is the single most important tool a physician should use in the diagnosis of pediatric food allergy. While many patients may report symptoms related to food ingestion, key historical elements can distinguish food allergies from other food-related disorders. All allergic disorders have their roots in inappropriate immune responses, from

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IgE-mediated immediate hypersensitivity (e.g., anaphylaxis) to non-IgE-mediated conditions.

Differential Diagnosis

The differential diagnosis of food allergy is broad and encompasses immune and non-immune mediated processes. Table 1 details the differential diagnosis of adverse reactions to foods [3]

Allergy vs Intolerance

Food allergies are often mistakenly defined as any adverse reaction owing to ingestion of specific foods or types of food. A true food allergy is an immunologic reaction leading to effector cell (ie. mast cell, basophil, T cell) activation which results in a stereotypic clinical presentation (described below). Many patients and some clinicians may attribute disorders such as celiac disease or irritable bowel syndrome to food allergies. While some of these disorders certainly have immunologic underpinnings they can largely be distinguished from hypersensitivity reactions on the basis of key findings in the clinical history such as timing, reproducibility, and symptom complex. For example, a teenage patient that newly develops abdominal pain and diarrhea alone six hours after drinking a glass of milk is more likely to have lactose intolerance as opposed to an IgE-mediated milk allergy. Adverse reactions such as these should be labeled as intolerances and managed appropriately. Here we describe salient clinical features that will assist in distinguishing IgE-mediated food allergies from other adverse reactions to foods.

Suspected Triggers

Although children can be allergic to any food, the 8 most common pediatric food allergens are peanut, cow's milk, shellfish, tree nuts, egg, fin fish, wheat, and soy.[1] Often families may be unsure of the exact food that precipitated a reaction. Common food allergens are usually explicitly stated on food labels. However, in cases where a trigger is not obvious, clinicians must assess the potential for cross-contamination. This commonly occurs in bakeries, buffets, ethnic restaurants and ice cream parlors, among other places.

The pathogenesis of IgE-mediated food allergies requires antigen exposure for sensitization to occur. Interestingly, most childhood food allergies are detected when the child is first introduced to the food.[4] Recent evidence suggests that cutaneous exposure in the context of barrier disruption (i.e. atopic dermatitis), presumably early in life, may lead to food sensitization.[5, 6] This has important implications for food allergy prevention as recent literature suggests that early oral exposures may be important for inducing tolerance.[7] In a landmark study, Du Toit et al[8] demonstrated that children 4–11 months of age randomized to early oral exposure to peanut versus avoidance had an 86% reduction in the incidence of peanut allergy by 5 years of age. Previous guidelines to avoid potentially allergenic foods during the first few years of life are no longer recommended[9] and may actually lead to food sensitization.

Type of Reaction

IgE-mediated reactions are distinguished by rapid-onset (usually within 2 hours of ingestion) and typically resolve within 24 hours. Characteristic symptoms may include any of the following alone or in combination: hives; swelling/angioedema; vomiting; respiratory compromise; and anaphylaxis.[10] Less common symptoms may include eczematous rash (late onset), rhinorrhea, diarrhea, or abdominal pain. Clinicians should note which medications (antihistamines, epinephrine) were administered as well as what kind of medical care was given. Additional factors such as alcohol ingestion, exercise, concurrent fever and non-steroidal anti-inflammatory drug use may serve to augment food-induced reactions[11] and should be noted in the patient's clinical history.

While a majority of patients will have rapid symptoms that resolve relatively quickly, a significant minority will have biphasic reactions defined as a recurrence of symptoms within 72hrs of an initial reaction.[12, 13] An even smaller number of patients may develop refractory or persistent anaphylaxis requiring volume resuscitation and inotropic support.

Current Diet

In addition to classifying food-induced reactions, it is also important to determine which foods a child is currently avoiding. For example, if a patient suspects a distant episode of hives was due to a peanut allergy, the clinician should ask about ingestion of peanut-containing foods since the time of reaction. In cases where the food was previously tolerated and is currently incorporated into the diet, no further testing is warranted. Importantly, some children with food allergies to milk or egg proteins are able to tolerate these foods in extensively heated forms.[14, 15] This is because the IgE molecules in these individuals are likely specific for conformational epitopes, which are denatured during the heating process. As a result, some children may be able to tolerate egg in a muffin but not in an omelet. These children should continue to ingest the allergen in its baked form as it may signal and hasten the development of oral tolerance.[16] In contrast, IgE to peanuts, tree nuts and shellfish among others are specific for linear epitopes, which are not denatured with heating and these allergies tend to persist.[17]

Physical Exam

Physical examination of the patient should focus on the signs of an allergic reaction as well as other atopic disorders commonly associated with food allergies.[10] For example, many patients have comorbid atopic dermatitis.[18] Others may have a history of asthma, which coupled with food allergy increases the risk of mortality from childhood asthma[19] and anaphylaxis.[20–22] Photographs of acute reactions may also be helpful if available. The physical exam may prove useful in distinguishing other conditions with specific findings. It is also important to assess growth parameters in children with food allergy, since this is an established risk factor for growth impairment.[23–25] Children at special risk include those allergic to milk and/or multiple foods. Consultation with an experienced nutritionist may be considered for all children with food allergy, especially those with poor growth. Speech and feeding therapists may also be useful in evaluating food-allergic children who may demonstrate dysfunctional feeding behavior.

IgE vs Non-IgE Mediated

While IgE-mediated food allergies are most common, additional immune-mediated food sensitivities known as eosinophilic gastrointestinal disorders have become increasingly prevalent.[26] Eosinophilic esophagitis (EoE), a disorder characterized by eosinophilic infiltration of the esophageal lining, has emerged as a closely related disease state.[27] In contrast to the rapid symptoms of IgE-mediated food reactions, EoE is defined by a more insidious course resulting in failure to thrive, vomiting, reflux and food aversion. Constant inflammation of the esophagus may eventually lead to dysphagia, stricture formation and food impaction in adolescents and adults. Eosinophilic gastrointestinal disorders, however, are not confined to the esophagus and may also involve other segments of the gastrointestinal tract.

2) Diagnostic Testing

Currently there are a number of tools to assist in the diagnosis of food allergy. Table 2 lists available tools and the settings in which they may be employed.

Pediatric Clinic

Specific IgE (ImmunoCAP®)—Allergen-specific IgE (sIgE) testing measures the presence of allergic antibody to a particular antigen. It is a blood test that can be performed at any age and is not limited by concurrent antihistamine use. Importantly, like in many other clinical situations, the detection of an antibody by a highly sensitive but nonspecific immunoassay does not necessarily equate to disease. The presence of sIgE simply denotes allergic sensitization to a particular food protein. Many individuals, especially children with atopic dermatitis, may be sensitized but not clinically allergic. While sIgE is not routinely recommended for the diagnosis of food allergies[10], a pediatrician may consider targeted sIgE testing to likely triggers. It is very important that this testing be based on a supportive clinical history after ingestion (e.g., a high pre-test probability of clinical food allergy) and not be ordered indiscriminately. Bird et al[28] recently demonstrated that bulk testing to multiple food antigens with food allergy panels leads to unnecessary cost and dietary restriction. Therefore, if a child tolerates a particular food in their diet regularly without clear evidence of allergic disease, sIgE testing should not be ordered. sIgE testing should also not generally be used to screen patients for food allergies prior to the first ingestion.[10] The application of serologic IgE testing in the diagnosis and management of food allergy patients by primary care physicians has been recently reviewed elsewhere.[29, 30]

Traditionally, sIgE has been assessed for an entire food molecule, composed of multiple component proteins. Recently, component resolved diagnostics (CRD) have become available, potentially increasing the sensitivity and specificity of IgE measurements,[31] though this is still being studied. Although CRD for milk, egg, peanut, tree nuts, fish and shellfish are commercially available, their use is not routinely recommended in food allergy diagnostic guidelines, and many such tests are not covered by insurance carriers. Most of the data supporting CRD come from English and European studies of component IgE testing in peanut-allergic patients, a topic that has been recently reviewed elsewhere.[32]

Allergy Clinic

Skin Prick Testing—In addition to sIgE, skin prick testing (SPT) may be useful in confirming clinical food allergy. SPT is an in vivo assessment of mast cell activation where a small amount of allergen is placed in the epidermis. Sensitized patients usually develop a wheal and flare reaction at the site of antigen placement within minutes. Skin reactions are then compared to positive and negative controls, as recent antihistamine use or dermatographism may result in false negative or false positive results, respectively. This is a safe, rapid, and relatively inexpensive way to assess for food sensitization. Generally, SPT has an excellent negative predictive value (NPV ~ 95%) but a poor positive predictive value (PPV ~ 50%).[33]

For those patients who successfully avoid culprit foods and the persistence of food allergy remains uncertain, serial sIgE and SPT may be used to determine whether an oral food challenge is warranted in order to definitively establish ongoing allergy or tolerance.[3] Table 3 gives general recommendations for the frequency of laboratory monitoring and skin prick testing in children with food allergies. Interpretation of skin prick testing and sIgE must be performed in the appropriate clinical context. Regardless of test values patients with a recent history of anaphylaxis within the past year should not undergo oral food challenge. Conversely, children who have incorporated a food into their diet without symptoms do not require further testing.

Oral Food Challenge—The double-blinded placebo controlled food challenge is the gold standard for diagnosis of food allergy or for confirming its persistence.[10] Due to its labor- and time-intensive nature, open food challenges with commercially available food products are usually employed in clinical practice. Before performing an OFC, the patient should understand the risks associated with the procedure and also display an interest in eating the food afterwards if he/she passes the challenge. Well-accepted protocols for OFCs have been published[34] but, generally, gradually increasing amounts of a food allergen are administered over successive intervals under close clinical observation. Once a designated quantity is safely consumed a patient is allowed to incorporate the food into the diet.

Interpretation of Test Results—Challenge thresholds for interpretation of sIgE and skin prick tests have been established.[3, 35] Table 4 provides the decision points used by many allergists in deciding whether to perform an OFC. These recommendations provide 95% positive and 50% negative predictive values for reactions to OFC's. A challenge is usually not recommended when sIgE and/or SPT is > 95% PPV. Conversely a challenge may be considered when the sIgE and SPT are < 50% NPV. Positive and negative predictive thresholds do not exist for many food allergens and those listed cannot be extrapolated to antigens such as wheat and soy. These foods typically have much higher sIgE reaction thresholds. It is important to note that most predictive cutoffs were developed using the ImmunoCAPTM system in children with a high pre-test probability of food allergy presenting to a tertiary care allergy subspecialty clinic;[36] therefore, values generated using other testing platforms cannot be reliably compared to these thresholds.[37] In addition, population based estimates have shown that these cutoffs may be much higher if testing is

performed indiscriminately or in the general population,[38] in which the tests may more readily detect sensitization than clinical allergy.

3) Medications

Prescription of Epinephrine

As a provider it is important to identify those patients most likely to develop fatal or near-fatal anaphylaxis and prescribe injectable epinephrine.[10] Table 5 presents clinical scenarios known to represent increased risk, but it is well established that food allergic reactions are inherently unpredictable, making risk stratification difficult. Therefore, epinephrine prescription may be considered in any patient with IgE-mediated food allergy, as the severity of subsequent reactions cannot be predicted. Additional factors to consider, in addition to those listed in Table 5, include the age of the patient (adolescents and young adults at higher risk for fatality) and the distance from the patient's home to an appropriate medical facility.[33] Dosing of available auto-injector devices is detailed in Table 6.

First-line treatment of anaphylaxis is always epinephrine.[2] Second line medications such as albuterol or antihistamines may also be prescribed for treatment of mild symptoms or adjunctive therapy, but unlike epinephrine, they have no direct effect on the mast cells or basophils themselves. Prompt treatment with epinephrine is encouraged as this may slow or halt progression of severe anaphylaxis. Furthermore, most fatalities from food-induced anaphylaxis are associated with delayed administration of epinephrine;[22] yet, despite this knowledge there is a persistent and well-established underutilization of epinephrine in the treatment of anaphylaxis. When an epinephrine auto-injector is prescribed, families should be taught how and when to administer it. Written anaphylaxis action plans are encouraged, listing medications and their doses, and detailing emergency follow up procedures including activation of emergency medical services (EMS).

Other Medications: Antihistamines, Albuterol and Steroids

Antihistamines such as diphenhydramine and cetirizine are commonly given for mild food-induced reactions. Though these medications may be useful in relieving symptoms, such as itch, they do not halt the progression of an allergic reaction, and are best considered an adjunctive therapy. Albuterol should be used as adjunctive therapy for respiratory symptoms especially in patients with a history of bronchospasm or asthma. Asthmatic individuals experiencing lower respiratory symptoms such as cough or wheeze during an allergic reaction to food should always receive epinephrine. Corticosteroids have a delayed onset of effect, making them unhelpful in immediate management. Although commonly used in this context, there is little evidence supporting their effectiveness.

4) Counseling and Education

Despite best efforts, a majority of patients with food allergies will be exposed to culprit foods.[39, 40] As a result, it is incumbent on healthcare providers to prepare families to recognize and treat anaphylaxis.[3] Food-induced reactions may be subtle and it is useful to teach patients that anaphylaxis may present anywhere on a spectrum of symptoms; ranging from a few hives and throat clearing to respiratory failure and cardiac arrest. Because

anaphylaxis may progress rapidly, early detection and action is a critical step in successful management. Patients and families should be encouraged to inject epinephrine at the first sign of anaphylaxis, even if relatively mild. More educational and counseling food allergy resources for providers and caregivers can be found at, http://www.ruchigupta.com/i-will-thrive-video/.

Epinephrine Use

Patients, or their caregivers, should immediately inject epinephrine for any obvious signs of a potentially severe systemic reaction including: cardiovascular collapse (lethargy, pallor, behavioral changes); respiratory distress (wheezing, coughing, increased work of breathing); or laryngeal edema (drooling, difficulty swallowing, throat tightness). It is important to convey to affected individuals and caregivers that anaphylaxis may not present with such potentially life-threatening symptoms at the onset. Operationally, a generalized allergic reaction involving symptoms affecting more than one organ system can be identified as anaphylaxis. For example, a child experiencing urticaria and vomiting after a likely or confirmed allergen exposure can be considered to be having anaphylaxis, and such a child should receive epinephrine even if symptoms are not considered to be immediately life-threatening. More specific indications can be individualized based on the patient's medical history.

Use of an epinephrine auto-injector first requires removal of the safety lock. Once removed, the epinephrine should be injected into the lateral thigh. Clothing need not be removed, as the needle of the auto-injector should pass through without difficulty. The auto-injector should be held in place for at least 10 seconds to ensure complete dose delivery. One removed from the thigh a protective sheath will cover the needle. If symptoms do not resolve within 5–15 minutes, patient's experiencing anaphylaxis should be given a second dose. The patient should be placed in the recumbent position with the lower extremities elevated.[41] Patients and families should be instructed to call 9-1-1 once epinephrine has been administered. Trainer devices from several manufacturers are available for demonstration and testing of proficiency.

Emergency Action Plan

Once a provider is comfortable with a patient and/or their caregiver's competency using the device they should discuss indications for use. Formulating an emergency action plan may facilitate this. Personalized action plan forms are available in English and Spanish through the American Academy of Allergy Asthma and Immunology (www.aaaai.org) and Food Allergy Research and Education (www.foodallergy.org) websites. These forms list a patient's food triggers and provide guidelines for treatment.

Avoidance

Strict avoidance of allergens is the only sure way to prevent food-induced reactions. Relatively small amounts of food can trigger acute reactions in highly sensitized individuals.[42] However, this may vary considerably depending on the patient and the allergen[43], resulting in misdiagnosis or a false sense of security if small amounts of food can be ingested without symptoms. It is important to note that the severity of a food-induced

reaction does not predict the severity of future reactions; therefore, a child with a peanut allergy who only develops hives after an initial ingestion might develop life-threatening anaphylaxis following subsequent exposure.

While patients may be exposed to food antigens through a variety of routes (cutaneous, respiratory, oral), typically only oral ingestion causes severe reactions. Investigators have examined the potential for food-induced reactions through casual contact.[44, 45] In 2003, Simonte et al[44] performed a randomized, DBPC trial of 30 children with significant peanut allergy. Subjects underwent cutaneous and inhalation challenge with peanut and none experienced a systemic or respiratory reaction. Mild cutaneous symptoms were noted in a minority of patients. A notable exception is that in children with asthma and food allergy, bronchial challenge with aerosolized food allergens can provoke respiratory symptoms, particularly in those with allergy to fish or crustacea.[46] In order for symptoms to occur, protein antigens must be vigorously aerosolized during food preparation (e.g., cooking seafood in a rolling boil) and come in direct contact with the respiratory mucosa. An important distinction is that the smell of foods produced by volatile organic compounds does not cause clinical reactions.

Food Labeling

In order to properly adhere to recommended elimination diets, patients and families should be instructed to pay careful attention to ingredient lists and food labels.[3] The Food Allergen Labeling and Consumer Protection Act (FALCPA)[47] of 2004 was passed in an effort to make food labels more accurate and understandable for consumers with food allergies. This legislation requires manufactures to label in plain English foods containing any of the eight major food allergens (peanut, milk, crustacean shellfish, tree nuts, egg, fin fish, wheat, and soy). Major implications of the law are as listed in Table 7.

In addition to those foods listed containing allergens, patients should also be counseled to avoid products that are processed in a facility where other food allergens are processed, due to cross-contamination. It should be noted that use of the phrases “may contain”, “may contain traces of”, and “manufactured in a facility that also processes” are voluntary; therefore, families must be aware of the potential for cross-contamination. A recent study in Canada[48] found that 17% of accidental exposures resulted from unintentional cross-contamination during manufacturing or packaging and no precautionary statement was provided. Unfortunately, widespread and inconsistent use of these phrases has also resulted in a devaluation of this warning; and, up to 40% of individuals ignore “may contain” statements and consume foods with potential food allergens.[49] Helpful patient information to assist with food allergen avoidance is available through the Food Allergy Research and Education (FARE) Network (wwww.foodallergy.org) and the Consortium of Food Allergy Research (www.cofargroup.org).

Different Environments

While most food-induced reactions occur in the home[50] many families find that eating out at a restaurant or a friend’s home can be difficult. At home, ingredient lists can be screened and meals carefully prepared to prevent cross-contamination, but eating away from home may

pose unique challenges. Studies suggest 40 to 100% of fatalities from food-induced reactions are due to food prepared or catered outside the home.[33] While risks can be mitigated with advance planning, it is important to identify high-risk situations. Ice cream parlors, ethnic restaurants, bakeries (peanut, egg, milk and tree nuts), and buffets (all foods) are common places where cross-contamination or occult exposure may occur.[51] Such environments appear to pose special risk to adolescents and young adults[20, 21], who may be relatively inexperienced in self-management and have been shown to willfully engage in risk-taking behavior pertaining to food allergen exposure.[52]

5) Referral to an Allergist

If a food allergy is suspected or diagnosed, the patient should be referred to an allergist. As mentioned previously, allergists can provide additional diagnostic testing (i.e. SPT, OFC) and are equipped to manage anaphylaxis in the clinic. In addition to assisting with diagnosis, allergists can monitor and assess for the development of tolerance, as well as helping to manage the comorbid conditions such as atopic dermatitis and asthma that are commonly encountered in food-allergic children.

Monitoring for Tolerance

An oral food challenge, performed in the allergist's office, is the gold-standard test to determine if tolerance has occurred. Serial measurements indicating a decline in the patient's allergen-specific IgE level often provide useful predictive power that a patient is outgrowing a food allergy, and that a challenge is indicated. IgE-based online calculators developed by the Consortium of Food Allergy Research are available for public use to generate individualized probabilities for outgrowing milk and egg allergies.[53] Often, the patient's interval history can provide important clues; for example, a child may accidentally be exposed to a trigger food without developing symptoms. If a significant quantity of the food has been tolerated several times without ill effect the food allergy has likely resolved. Acquisition of tolerance is more likely to occur in younger children, who are allergic to foods such as wheat, soy, milk or egg.[54, 55] In contrast, allergies to nuts including peanut, fish, and shellfish are much less commonly outgrown.[17]

Tolerance of Extensively Heated Allergens

As mentioned previously, some children with milk or egg allergy may be able to tolerate these allergens in their baked forms.[14, 15] Researchers hypothesize that this is due to sensitization to conformational epitopes that are unable to cross-link surface IgE molecules when extensively heated.[56] Some data suggest that tolerance to baked milk or egg may be an early intermediate step in the development of immunologic tolerance to the food antigen; and, that consumption of baked allergens may actually hasten resolution of clinical allergy.[16] OFCs with products containing baked milk or egg are routinely performed in the allergist's office.

Routine Follow Up

A specialist in allergy and immunology should see patients with food allergies at least annually. Periodic visits allow for the following:

- Assessment of interval progress including a history of accidental ingestions;
- Renewal of epinephrine prescription;
- Renewal and revision of emergency action plans;
- Additional education regarding avoidance and recognition/treatment of anaphylaxis, and transition to self-management for teenagers;
- Assessment of nutritional status;
- Monitoring of coexisting conditions, such as asthma or atopic dermatitis;
- Monitoring for development of tolerance to food antigens.

Allergen-specific immunotherapy as a proactive treatment strategy for food allergy is currently being developed in Phase II/III clinical trials.[57] Its use is not recommended outside of research settings at present[10], but allergists may be able to routinely provide this life-changing clinical treatment in coming years.

Conclusion

- Successful diagnosis and management of food allergies is complex and takes collaboration from both pediatricians and board certified allergists, in addition to skilled nurses, nutritionists, and occasionally other team members such as psychologists and feeding therapists. It is our hope that these five steps for primary care providers will provide a more straightforward approach 1) clinical history and physical examination 2) diagnostic testing 3) medication 4) counseling/education for patients and families 5) referral to an allergist. While some clinical trials of interventional food allergy treatments have generated promising preliminary data (reviewed in Current Options for the Treatment of Food Allergies, Lanser, et al.in this issue), the standard of care continues to focus on prescribing the proper elimination diet, education, and training in the recognition and management of accidental allergic reactions.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Key Points

- There are no proactive treatments currently available for food allergy.
- Severe life threatening reactions typically only occur following oral ingestion.
- Identifying the potential food trigger is critical and diagnostic testing along with clinical history is needed for diagnosis with a food challenge being confirmative.
- Providers should teach recognition and treatment of allergic reactions and provide an emergency action plan.
- Children with food allergies should be seen annually to assess for interval ingestions, provide education, and monitor for tolerance.

Table 1

Differential diagnosis of adverse food reactions

Mechanism	Disorder	Example
Immune-mediated	Celiac disease	Wheat ingestion results in abdominal pain, diarrhea, vomiting and weight loss.
	Eosinophilic gastrointestinal disorders	Ingestion of dairy products causes eosinophilic esophagitis manifesting as failure to thrive, vomiting, dysphagia or food impaction.
	Food protein-induced enterocolitis syndromes (FPIES)	Severe vomiting and hypotension hours after rice ingestion.
	IgE-mediated food allergy	Severe anaphylaxis caused by peanut ingestion.
	Milk protein allergy	Milk ingestion leads to bloody stools, diarrhea and failure to thrive during the first few months of life.
	Pollen-food allergy syndrome	Sensitization to birch pollens results in oropharyngeal symptom following consumption of raw apple or carrots.
Non-immune mediated	Auriculotemporal (Frey) syndrome	Gustatory flushing caused by foods.
	Chemical effects	Gustatory rhinitis caused by hot/spicy foods.
	Food intolerance/aversion	Nonspecific symptoms resulting in unwillingness to ingest a particular food.
	Metabolic disorders	Lactose intolerance characterized by abdominal pain, distention and diarrhea following milk ingestion.
	Pharmacologic reactions	Adverse effects related caffeine, tryptamine or alcohol consumption.
	Toxic reactions	Scromboid fish toxin, food poisoning.

Table 2

Food allergy diagnostic testing

Test	Primary Care Clinic	Allergy Clinic
sIgE	x	x
full protein	x	x
component*	x	x
skin prick test		x
oral food challenge		x

* The utility of component testing in diagnosing food allergy is still under investigation

Table 3

General recommendations for the frequency of testing patients with food allergy[33]

Allergen	Test	<= 5 years old	> 5 years old
Milk, egg, wheat, soy, peanut	sIgE, SPT	Every 12–18 mo	Every 2–3 yrs
Tree nuts, fish, shellfish	sIgE, SPT	Every 2–4 yrs	Every 2–4yrs

Table 4

Predictive value of SPT and sIgE in positive or negative OFC results[35, 58]

	>95% Positive		~50% Negative	
Food	**SPT**	**sIgE**	**SPT**	**sIgE**
Egg white	≥7	≥7 ≥ 2 if age <2y	≤3	≤2
Cow's milk	≥8	≥15 ≥5 if age <1y		≤2
Peanut	≥8	≥14	≤3	≤2 (history of prior reaction) ≤5 (no history of prior reaction)
Fish		≥20		

Table 5

Guidelines for prescription of an epinephrine auto-injector[10]

Prescribe epinephrine if a child has any one of the following:
• History of anaphylaxis
• Prior history of systemic allergic reaction
• History of food allergy and asthma
• Known food allergy to peanut, tree nuts, fish and crustacean shellfish (ie, allergens known to be associated with more fatal and near-fatal allergic reactions)

* consider epinephrine prescription in any child with a history of IgE-mediated food allergy

Table 6

Dosing of available epinephrine auto-injectors

Brand:	**AdrenaClick® & (generic)**	**Auvi-Q®**	**EpiPen®**
Dose:	0.15 mg (for kids <25kg)		0.3 mg (for kids >25kg)

[>] Ensure child has 2 auto-injectors accessible at all times

Table 7

Major Implications of the Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2004

1	Food allergens in products must be declared in plain English by one of the following:
	a. Placing the word “Contains” followed by the name of food source from which the allergen is derived. (ie, “Contains milk, egg, peanut”)
	b. Including the common or usual name in parentheses next to food source in the ingredient list (ie, “albumin [eggs].”)
2	Manufacturers are subject to penalties in the Federal Food, Drug and Cosmetic Act if food allergens do not appear on labels.
3	FALCPA does not establish standards for the use of “May Contain” statements.
4	FALCPA only applies to packaged foods sold in the United States. (Except meat, poultry, certain egg products and alcoholic beverages)
5	Companies may receive exemptions from labeling requirements if the allergen satisfies one of the following requirements:
	a. Highly refined oils are exempt (ie, peanut oil)
	b. Scientific evidence establishes that the food ingredient does not contain the allergenic protein
	c. The FDA determines that the food allergen does not elicit and allergic response in sensitized individuals.