

Emergency management of food allergy: systems perspective

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Purpose of review

Food-related allergic reactions are the leading cause of anaphylactic reactions treated in the emergency department, accounting for approximately 30 000 emergency department visits each year, and 150–200 deaths. The purpose of this review is to examine current research on food-related allergic reactions in the emergency department, and to provide suggestions for how to improve emergency department management.

Recent findings

There are few published studies since March 2003 that examine the emergency management of food-related allergic reactions. Earlier studies found that few patients treated in the emergency department for this problem received health education (e.g., instructions to avoid offending food allergens), a prescription for self-injectable epinephrine, or referral to an allergy specialist at emergency department discharge. A recent multicenter study by our research group demonstrated that emergency department patients with food-related allergic reactions continue to receive care discordant from guidelines for the emergency management of allergic disorders and anaphylaxis. Discordance is low even among those with multisystem complaints consistent with anaphylaxis.

Summary

Concordance with suggested guidelines for the treatment of severe acute allergic reactions remains poor. Development of a simple, clinical definition of food-related anaphylaxis is needed to improve emergency management. Dissemination of guidelines for the emergency management of anaphylaxis, and creation of systems to implement these guidelines, are essential for the improved treatment of food-related allergic reaction and anaphylaxis in the emergency department.

Keywords

emergency department, food allergy, management

Introduction

The prevalence of anaphylaxis in Westernized countries has been difficult to determine. A review article by Neugut and colleagues [1] estimates the US prevalence of anaphylaxis to be anywhere between 1 and 15%. By contrast, a population-based study in Olmsted County, Minnesota, by Yocum and colleagues [2] concluded that the prevalence of anaphylaxis was less than 1%. A review of recent literature from the USA, Canada, and the UK yields prevalence estimates ranging from 0.3–0.6 to 0.95% [3–6].

Estimates of the burden of specific types of anaphylaxis, such as food-related anaphylaxis, also vary. Yocum and colleagues [2], investigating the epidemiology of anaphylaxis among residents in Olmsted County, Minnesota, found 30 anaphylaxis events per 10 000 person-years (95% confidence interval 25–35 events); 36% of incident anaphylactic events were attributed to ingestants. Sicherer *et al.* [7] conducted a nationwide, random-digit-dial telephone survey and found a prevalence of self-reported peanut and tree nut allergies of 1.1%; only 24% of cases who had seen a physician for their allergy reported receiving a prescription for self-injectable epinephrine.

While estimates of the prevalence of anaphylaxis vary, and most estimates indicate that perhaps 1% are affected, the condition is not rare. Even 1% of a large number (e.g. the US population of 290 million) yields a large number of affected individuals (2.9 million). Nevertheless, and despite the life-threatening nature of anaphylactic reactions, little is known about the burden of anaphylaxis in the emergency department. Among recent studies, the prevalence of anaphylaxis among all emergency departments is estimated to be less than 1% [8,9]. More recently, food-related anaphylaxis has been cited to be the leading cause of anaphylactic reactions treated in the emergency department [10]. Estimates suggest that there are approximately 30 000 food-related anaphylactic reactions treated in the emergency department annually in the USA. These estimates also suggest that there are approximately 2000 hospitalizations and 150–200 deaths each year [2,10]. Foods responsible for most severe reactions include peanuts, tree nuts, fish, and shellfish [10–12]. Timely and appropriate treatment is necessary to prevent progression of reactions [13]. Individuals with a history of anaphylaxis are at an increased risk of a subsequent episode.

Additionally, guidelines recommend treatment of all severe allergic and anaphylactic reactions with

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epinephrine, teaching of proper techniques for self-injectable epinephrine, and referral to an allergist [2,14,15]. A prompt and accurate diagnosis to identify those at greatest risk for adverse outcomes is essential for effective emergency management [16]. Given such large variability in anaphylaxis estimates in the general population – and in the emergency department – and reports suggesting that the prevalence of allergies is rising [1,17], more work is needed develop clinical definitions that would allow for better measurement of the actual prevalence of food-related allergic reaction and anaphylaxis, and promote improved management of these problems in the emergency department.

This article reviews the sparse literature, to date, on the management of food-related allergy and anaphylaxis in the emergency department. Additionally, we suggest steps that can be taken to improve the identification and management of this condition in the emergency department setting.

Assessment of emergency department management

Few articles have been published during the past year regarding the emergency management of food-related allergy and anaphylaxis. Given recent estimates suggesting that food-related anaphylaxis is the leading cause of anaphylactic reactions treated in the emergency department [10], more research is needed to help shape treatment guidelines. Better infrastructures also need to be put into place for the dissemination of information to emergency department staff, including physicians, nurses, nurse practitioners, and physician assistants.

Early publications assessed the emergency management of allergy and anaphylaxis, with a few studies describing the treatment of food-related reactions within their allergy cohorts. A 1996 British study by Stewart and Ewan [18] found that among eight patients with severe allergic reactions to known causes, three were caused by inadvertent ingestion of a food allergen. None of these anaphylaxis patients was given advice or educated about avoidance of the offending allergen, prescribed self-injectable epinephrine, or referred directly to an allergy specialist.

Similarly, a 1995 US study performed by Schwartz [19] in one emergency department found that 45 out of 326 patients presenting to the emergency department with an allergic reaction had a food-related allergic reaction. Among these 45 patients, seafood, peanuts, and nuts were most often reported as the offending allergen. Among this group of patients with a food-related reaction, none was given a prescription

for self-injectable epinephrine or referred to an allergy specialist [19].

In 2003, Bellou and colleagues [17] reviewed the charts of 324 patients in France admitted to the emergency department for an allergic event and found that 31 (9.5%) patients were diagnosed with food allergy. Six (19%) of the food-allergy patients were observed to have anaphylactic shock. Among the 233 discharged patients seen in the emergency department for an allergic event, 55 (24%) were referred by an emergency physician for a so-called allergy consultation. Among these patients, 28 patients were referred to an allergy unit and four were referred to an allergologist.

A recent article by our research group, the Emergency Medicine Network (www.emnet-usa.org), reviewed the emergency department charts of 678 patients identified by the ICD-9 code and chart review as having a food-related allergic reaction in 21 North American hospitals [20^{••}]. Among these emergency department patients, 40% were documented as having received instructions to avoid the offending allergen. Only 16% of patients were documented to receive a prescription for self-injectable epinephrine at emergency department discharge. Additionally, only 12% had documentation of referral to an allergy specialist.

Among this group of 678 patients, 51% were identified as having a severe food-related acute allergic reaction. The severe life-threatening reactions were determined based on patients' documented signs and symptoms at emergency department presentation or during the emergency department course. A severe food-related acute allergic reaction or 'anaphylaxis' was defined as the involvement of two or more organ systems from the following: skin (e.g. hives), respiratory (e.g. trouble breathing or shortness of breath, stridor, wheezing), cardiovascular (e.g. hypotension, dizziness or fainting, altered mental status), and gastrointestinal (e.g. abdominal pain). The presence of hypotension, defined as a systolic blood pressure of less than 100 mmHg, automatically led to classification as anaphylaxis.

Even among patients considered to have anaphylaxis, concordance with recommended guidelines for the emergency management of anaphylaxis was low. Only 24% of the anaphylaxis patients were treated with epinephrine in the emergency department. At emergency department discharge, 35% were given discharge instructions that stated to avoid the offending allergen, 22% were given a prescription for self-injectable epinephrine, and 13% were referred to an allergy specialist. Only 2% of these severe cases received all three recommended preventive interventions.

Requirements for improved emergency department management

In order to begin to improve patient management in the emergency department, steps need to be made to develop a clear, user-friendly definition for anaphylaxis. While most allergic reactions (e.g. simple urticaria) can be managed successfully without epinephrine treatment, clinicians should strive to quickly identify more severe allergic reactions (e.g. anaphylaxis) that would benefit from intramuscular epinephrine. The identification of these severe food-related allergic reactions is necessary before improvements in management can be made. A wide array of clinical signs and symptoms may be present because anaphylaxis is a generalized reaction [21]. Symptoms generally begin immediately, but can manifest up to an hour after exposure.

Food-related allergic reactions can affect several organ systems. Table 1 displays the organ systems typically affected by food allergy. While the gastrointestinal system is likely the organ system most affected, abdominal symptoms are not always the most evident. Cutaneous signs and symptoms follow abdominal symptoms in frequency [12,22]. While respiratory symptoms are common in individuals with food-related allergic reactions [23], respiratory symptoms alone are uncommon, but it has been suggested that the role of food in allergic asthma is underestimated [12,24]. Although less common than other organ-system manifestations, the presence of respiratory symptoms in addition to other signs and symptoms usually indicates a more severe reaction [22].

Ideally, multi-disciplinary input that draws upon the expertise of allergy specialists and emergency-medicine specialists can be used to develop a single, clinical definition for the diagnosis of anaphylaxis that is based on signs and symptoms. For example, a definition that distinguishes less severe allergic reactions from severe

allergic reactions or anaphylaxis on the basis of multi-system organ involvement would be useful in identifying patients in need of epinephrine treatment. Clearly, a user-friendly definition is needed before one can begin to develop guidelines for the best management for these individuals, both in the emergency department and at discharge. The involvement of more than one of these organ systems could be used to identify a severe reaction and to signal the initiation of an algorithm outlining the best course of treatment. This algorithm should be based on the presence of signs and symptoms, and their resolution or progression during emergency treatment.

Delays in initial treatment following symptom onset have been found to be associated with worse outcomes in individuals with food-related anaphylaxis [23,25]. A rapid diagnosis of a severe allergic reaction is needed to initiate prompt therapy. Once in the emergency department, suggested therapy includes administration of intramuscular epinephrine [10,21]. Consensus guidelines were put forth by the Project Team of the Resuscitation Council for the treatment of anaphylaxis by medical first-responders [26]. These consensus guidelines include a schema for the identification of an anaphylactic reaction and the progression of treatment based on the continuation or resolution of symptoms. Treatment by first responders included oxygen treatment and epinephrine. Repeat epinephrine and antihistamine treatment was recommended for patients whose symptoms did not resolve after initial treatment. Intramuscular or intravenous hydrocortisone and intravenous fluids were recommended for patients who did not respond or progressed to clinical manifestations of shock.

Following appropriate emergency department management, a management plan should be put in place to help prevent future reactions and to help patients manage future reactions if they do occur. Education, a prescription for self-injectable epinephrine, and referral to an allergy specialist all are part of a successful post-emergency department management plan. Education of patients should include instructions for allergen avoidance, a written emergency action plan, and a listing of educational resources. Instructions for how to avoid the offending food allergen in the future can include guidelines for reading food labels, asking wait staff at restaurants to confirm ingredients, and meeting with teachers or camp counselors to help prevent ingestion by children outside of the home. Patient advocacy organizations, such as the Food Allergy and Anaphylaxis Network (www.foodallergy.org/), might be recommended as resources for patients to help them better manage their food-related allergy and thereby prevent future reactions.

A prescription for self-injectable epinephrine will allow individuals with a history of a severe allergic or

Table 1. Signs and symptoms of food-related allergic reactions and anaphylaxis

Organ system	Signs and symptoms
Skin/mucosal tissue	Hives Urticaria Angioedema Swelling of the lips, tongue, or uvula
Respiratory	Trouble breathing Shortness of breath Stridor Wheezing
Cardiovascular	Hypotension Dizziness or fainting Altered mental status
Gastrointestinal	Nausea, vomiting Trouble swallowing Crampy abdominal pain
Hypotension	Systolic blood pressure <100 mmHg

anaphylactic reactions to be prepared for prompt treatment if another exposure occurs. Self-injectable epinephrine can be important for treatment of future food-related allergic reactions, as well as for a biphasic reaction. Biphasic reactions are thought to comprise 20% of anaphylactic reactions [27]. While observation in the emergency department for 6–8 h, or even 24 h [21], may be ideal, this is not often practical in today's crowded emergency departments. The prescription (and filling of the prescription) for self-injectable epinephrine at emergency department discharge can be life-saving in the event of a biphasic reaction or a future anaphylactic reaction. In addition to writing the prescription and encouraging patients to fill the prescriptions, instructions for the appropriate use of a self-injectable epinephrine device should be given at the time that the patient receives the prescription. It is important that patients are only discharged with a friend or family member who can be with the patient for several hours following discharge in the event that a biphasic reaction occurs.

As well as prescribing self-injectable epinephrine at emergency department discharge, individuals who are at high risk for future severe reactions also should be prescribed self-injectable epinephrine. These individuals include asthmatic patients treated in the emergency department for a food-related allergic reaction [10].

Finally, anaphylaxis patients should be referred to an allergy specialist following an anaphylactic reaction treated in the emergency department. This referral will allow patients to receive a thorough evaluation, specialized follow-up care, and more intensive education about allergic reactions and anaphylaxis, including guidance for early recognition of signs and symptoms of an allergic reaction. Identification of these patients for referral would be greatly facilitated by general agreement on a single user-friendly definition.

Implementing new systems

The implementation of new systems for the emergency management of acute allergic reactions and anaphylaxis, especially food-related reactions, will require education and participation of both emergency department staff and patients. Emergency physicians, nurses, nurse practitioners, and physician assistants need to be better educated in the diagnosis of acute allergic reactions and anaphylaxis, as well as management in the emergency department and at discharge.

An algorithm for the diagnosis of acute allergic reactions and anaphylaxis, especially food-related reactions, and for the treatment of these reactions, may help emergency-medicine practitioners to more quickly recognize and treat allergic reactions in the emergency department. One approach to facilitating the implementation of an

emergency-management algorithm would be to develop electronic diagnosis and order forms that prompt emergency department staff to assess signs and symptoms if an allergic reaction is suspected, and to initiate appropriate treatment in the emergency department. A management algorithm also could supply discharge instructions for both practitioners and patients.

Criteria consistent with anaphylaxis that might be used to define severe food-related allergic reactions and anaphylaxis should include multi-organ system involvement. The goal should not be to create a definition with 100% sensitivity (with an inevitably high number of false positives), but rather a definition that identifies the most cases possible so that more emergency department patients receive optimal anaphylaxis care. Some patients would still be missed using this definition because of atypical presentation, but a majority of cases would be identified.

A recent multidisciplinary conference sponsored by the National Institutes of Health and the Food Allergy and Anaphylaxis Network proposed examples of clinical criteria for the diagnosis of anaphylaxis [28]. Likewise, a recent publication by Brown [29] put forth clinical features recommended for use in diagnosing anaphylaxis along with a severity grading system. The overall consistency of these two independent efforts is promising.

For patients with an acute onset illness, two organ systems should be involved, including skin/mucosal tissue and either airway compromise or reduced blood pressure. Alternatively, anaphylaxis is likely if a patient has exposure to a known allergen, symptoms develop within minutes to hours of exposure, and two of the following criteria are met: including a history of anaphylaxis, involvement of skin/mucosal tissue, airway compromise, reduced blood pressure, or definite gastrointestinal symptoms (e.g. crampy abdominal pain, vomiting). Finally, exposure to a known allergen and the presence of hypotension should raise concern about anaphylaxis. A patient seen in the emergency department for an allergic reaction who meets one of these three separate criteria for anaphylaxis very likely has anaphylaxis.

In such a case, the patient should receive treatment with intramuscular epinephrine as well as a discharge plan that includes education, a prescription for self-injectable epinephrine, and referral to an allergy specialist. While this definition will not capture all cases of anaphylaxis, it will capture a large majority of cases presenting with more classic symptoms. Patients with less typical symptoms who are diagnosed with anaphylaxis should also receive recommended treatment, including education,

prescription for self-injectable epinephrine, and referral to an allergy specialist.

The first step to improving the diagnosis of acute allergic reaction and anaphylaxis is to disseminate this simple, clinical definition to emergency department staff. Research has shown that traditional continuing medical education is ineffective in changing physicians' practice [30,31]. A new clinical definition of anaphylaxis and renewed focus on the optimal management of acute allergic reactions might be best taught to healthcare professionals through simulation-based training. Full-scale simulators have been shown to improve performance of healthcare professionals in the management of medical crises [32].

Additional improvement in patient management could be obtained through direct patient involvement. Education of patients, including computerized discharge sheets where patients can reference recommendations made by emergency nurses and physicians should be implemented. Computerized emergency department discharge instructions have been shown to be effective in improving compliance with emergency department referral recommendations [33], and in changing patient behavior [34]. Contact information for patient advocacy organizations that patients can contact for more information about anaphylaxis could be included on the computerized discharge sheet.

Better communication between emergency-medicine personnel and primary-care providers could also improve patient care following an emergency department visit for food-related acute allergic reaction or anaphylaxis. This might occur through automatic e-mail notification systems, which have been implemented in some hospitals. These e-mail alerts notify the primary-care provider about the visit itself, the discharge diagnosis, and plan. Primary-care involvement would increase the likelihood that self-injectable epinephrine prescriptions were refilled, and could serve as a means of follow up and additional referral to specialist if needed. A goal of better physician education, patient education, and communication with primary care would be to decrease the need for emergency treatment for acute allergic reactions or anaphylaxis.

Finally, better communication between emergency personnel and school nurses could improve the quality of life of children with food allergies. This would require a system that allowed emergency medical personnel to obtain permission from parents to release medical information regarding acute allergic reactions or anaphylaxis to schools when children are brought to the emergency department from school and to contact school nurses.

Conclusion

Concordance with suggested guidelines for the treatment of severe acute allergic reactions remains low. Development of a simple, clinical definition of severe food-related allergic reaction and anaphylaxis is urgently needed. Additionally, dissemination of guidelines for the emergency management of anaphylaxis, and creation of systems to implement these guidelines, are essential for the improved treatment of food allergy and anaphylaxis in the emergency department. Over the past year there has been definite progress toward these goals although much ground remains to be covered.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

- of special interest
- of outstanding interest

- 1 Neugut AI, Ghatak AT, Miller RL. Anaphylaxis in the United States: an investigation into its epidemiology. *Arch Intern Med* 2001; 161:15–21.
- 2 Yocum MW, Butterfield JH, Klein JS, *et al.* Epidemiology of anaphylaxis in Olmsted County: a population-based study. *J Allergy Clin Immunol* 1999; 104:452–456.
- 3 Bohlke K, Davis RL, DeStefano F, *et al.* Epidemiology of anaphylaxis among children and adolescents enrolled in a health maintenance organization. *J Allergy Clin Immunol* 2004; 113:536–542.
- 4 Simons FE, Peterson S, Black CD. Epinephrine dispensing patterns for an out-of-hospital population: a novel approach to studying the epidemiology of anaphylaxis. *J Allergy Clin Immunol* 2002; 110:647–651.
- 5 Peng MM, Jick H. A population-based study of the incidence, cause, and severity of anaphylaxis in the United Kingdom. *Arch Int Med* 2004; 164:317–319.
- 6 Gupta R, Sheikh A, Strachan DP, *et al.* Burden of allergic disease in the UK: secondary analyses of national databases. *Clin Exp Allergy* 2004; 34:520–526.
- 7 Sicherer SH, Munoz Furlong A, Burks AW, *et al.* Prevalence of peanut and tree nut allergy in the US determined by a random digit dial telephone survey. *J Allergy Clin Immunol* 1999; 103:559–562.
- 8 Klein JS, Yocum MW. Underreporting of anaphylaxis in a community emergency room. *J Allergy Clin Immunol* 1995; 95:637–638.
- 9 Gaeta TJ, Roberts J, Clark S, *et al.* Management of acute allergic reactions and anaphylaxis in the emergency department between 1992–1998 [abstract]. *Acad Emerg Med* 2001; 8:449.
- 10 Sampson HA. Anaphylaxis and emergency treatment. *J Allergy Clin Immunol* 2003; 111:1601–1608.
- 11 Sampson HA. Food allergy. *J Allergy Clin Immunol* 2003; 111:S540–S547.
- 12 Bahna SL. Clinical expressions of food allergy. *Ann Allergy Asthma Immunol* 2003; 90(Suppl 3):41–44.
- 13 Patel L, Radivan FS, David TJ. Management of anaphylactic reactions to food. *Arch Dis Child* 1994; 33:1033–1040.
- 14 American Academy of Allergy, Asthma, & Immunology. Tips to remember. What is anaphylaxis? <http://www.aaaai.org/patients/publicedmat/tips/what-is-anaphylaxis.stm>. [Accessed 1 February 2005]
- 15 O'Brien J, Howell JM. Allergic emergencies and anaphylaxis: how to avoid getting stung. *Emerg Med Practice* 2000; 2:1–19.
- 16 Walker S, Sheikh A. Managing anaphylaxis: effective emergency and long-term care are necessary. *Clin Exp Allergy* 2003; 33:1015–1018.
- 17 Bellou A, Manel J, Samman-Kaakaji H, *et al.* Spectrum of acute allergic diseases in an emergency department: an evaluation of one year's experience. *Emerg Med* 2003; 15:341–347.
- 18 Stewart AG, Ewan PW. The incidence, aetiology and management of anaphylaxis presenting to an accident and emergency department. *QJM* 1996; 89:859–864.
- 19 Schwartz H. Acute allergic disease in a hospital emergency room: a retrospective evaluation of one year's experience. *Allergy Proc* 1995; 16:247–250.

- 20 Clark S, Bock SA, Gaeta TJ, *et al*. Multicenter study of emergency department visits for food allergies. *J Allergy Clin Immunol* 2004; 113:347–352. The largest study we could find on the management of food allergy in the emergency department. Emergency management was found to be discordant with recommended guidelines for the treatment of food allergy and anaphylaxis. Among 678 patients treated in the emergency department for food allergy, only 16% received a discharge prescription for self-injectable epinephrine. Even among patients considered to have anaphylaxis, only 22% received a discharge prescription for self-injectable epinephrine.
- 21 Ellis AK, Day JH. Diagnosis and management of anaphylaxis. *CMAJ* 2003; 169:307–312.
- 22 James JM. Respiratory manifestations of food allergy. *Pediatrics* 2003; 111:1625–1630.
- 23 Sampson HA, Mendelson L, Rosen JP. Fatal and near-fatal anaphylactic reactions to food in children and adolescents. *N Engl J Med* 1992; 327:380–384.
- 24 Tan BM, Bahna SL. Respiratory manifestations of food allergy. *Curr Allergy Clin Immunol* 2000; 13:6–8.
- 25 Bock SA, Munoz-Furlong A, Sampson HA. Fatalities due to anaphylactic reactions to foods. *J Allergy Clin Immunol* 2001; 107:191–193.
- 26 Project Team of The Resuscitation Council (UK). Update on the emergency medical treatment of anaphylactic reactions for first medical responders and for community nurses. *Emerg Med J* 2001; 18:393–395.
- 27 Stark BJ, Sullivan TJ. Biphasic and protracted anaphylaxis. *J Allergy Clin Immunol* 1986; 78:76–83.
- 28 Sampson HA. Symposium on the definition and management of anaphylaxis: Summary Report. *J Allergy Clin Immunol* 2005; 115:584–591.
- 29 Brown SGA. Clinical features and severity grading of anaphylaxis. *J Allergy Clin Immunol* 2004; 114:371–376.
- 30 McLeod PJ, McLeod AH. If formal CME is ineffective, why do physicians still participate? *Med Teach* 2004; 26:184–186.
- 31 Harrison C, Hogg W. Why do doctors attend traditional CME events if they don't change what they do in their surgeries? Evaluation of doctors' reasons for attending a traditional CME programme. *Med Edu* 2003; 37:884–888.
- 32 Gaba DM, Howard SK, Fish KJ, *et al*. Simulation-based training in anesthesia crisis resource management (ACRM): a decade of experience. *Simulation Gaming* 2001; 32:175–193.
- 33 Vukmir RB, Kremen R, Ellis GL, *et al*. Compliance with emergency department referral: the effect of computerized discharge instructions. *Ann Emerg Med* 1993; 22:819–823.
- 34 Zonfrillo MR, Mello MJ, Palmisciano LM. Usefulness of computerized pediatric motor vehicle safety discharge instructions. *Acad Emerg Med* 2003; 10:1131–1133.