

Fatal Anaphylaxis: Searching for Lessons from Tragedy



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IgE-mediated food allergy is one of the most common chronic medical conditions of childhood and affects up to 10% of the population worldwide.¹ The average classroom contains 1 to 2 children with food allergies.² Like other chronic illnesses, food allergy requires daily management. Food allergy is an “invisible disability” because there are no outward signs. Current food allergy management relies on allergen avoidance and treatment of severe reactions with epinephrine. Food allergy carries a risk of anaphylaxis, which is unpredictable in occurrence and severity. The chronic and unpredictable nature of food allergy can impact patient and family psychosocial functioning and quality of life.³

Despite the high prevalence of food allergy, fatal food-induced anaphylaxis is rare, with estimated rates of 0.03 to 0.3 deaths per million person-years.⁴ Complete recovery from anaphylaxis is the usual and expected outcome. However, any single death from anaphylaxis is one too many. Understanding food allergy involves balancing the paradoxical concepts of: (1) the commonality of food allergies, (2) omnipresence of food in our lives, and (3) risk of fatal anaphylaxis. How people weigh these odds impacts precautions taken, anaphylaxis management, and psychosocial functioning.

The rarity of fatal food-induced anaphylaxis can evoke a range of responses. There can be reassurance that fatal anaphylaxis is unlikely to happen. Others may engage in risky behaviors, such as not carrying or administering epinephrine autoinjectors. Knowing fatal anaphylaxis is a possibility can increase stress and anxiety and decrease quality of life.³ The rarity of fatal anaphylaxis can also lead to food allergies being mocked or trivialized.

Foong et al⁵ describe a tragic and unprecedented case of fatal food-induced anaphylaxis potentially due to cutaneous exposure

in a 13-year-old boy from the UK, occurring at school. The details of the events were based on witness statements. The patient had multiple IgE-mediated food allergies (including to milk and wheat), uncontrolled asthma, and active severe atopic dermatitis. Another student threw a piece of cheese from a sandwich containing wheat at the patient, which dropped down the back of his shirt, contacting his skin. He immediately complained of local pruritus and scratched furiously, leading to bleeding of the contacted skin. The reaction rapidly progressed to respiratory distress, so he self-administered his short-acting bronchodilator inhaler, but his breathing further deteriorated. The school called for an ambulance and administered an EpiPen 13 minutes after exposure; he lost consciousness 2 minutes later. The EpiPen had expired 11 months prior. When paramedics arrived 24 minutes after exposure, he had agonal breathing and was in cardiac arrest. He was intubated, administered advanced life support, and received 6 additional doses of epinephrine; the next dose was given by paramedics 11 minutes after their arrival. He was transferred to the intensive care unit, but never regained consciousness and life support was withdrawn 12 days later.

The evidence for a lack of oral ingestion was based on witnesses and coroner findings. Although it may not be possible to exclude some ingestion exposure, to the best of the available knowledge, there was no ingestion, which is what makes this case so exceptional, and also so frightening.

When parents send children to school, there is an implied trust that the school will not only teach them but also keep them safe. For families of children with food allergies, the latter comes with unique challenges. Sixteen to eighteen percent of food-allergic children experience reactions in school.⁶ Peanuts and tree nuts are the most common causes of food-induced anaphylaxis in school,⁷ as well as fatal food-induced anaphylaxis.⁸ In a 20-year study of fatal food-induced anaphylaxis in the UK, cow's milk was the second most common trigger, accounting for 8 of 39 (21%) of deaths in children.⁸

We must emphasize the rarity and unusual circumstances of this tragedy. People with food allergies live with their allergens in the environment, and having anaphylaxis from noningestion exposures is rare. Risk of anaphylaxis from skin contact has been studied for peanut, but not other food allergens. Simonte et al⁹ performed double-blinded contact exposure of 0.2 mL of peanut butter applied to the skin for 1 minute in 30 peanut-allergic children. A minority of subjects developed self-limited local skin reactions, but none developed anaphylaxis. Wainstein et al¹⁰ applied 1 g of peanut protein to the skin for 15 minutes in 52 peanut-allergic children and there were no systemic reactions. If cutaneous exposure does occur, peanut proteins can be effectively removed from the skin using commercial water-based wipes and soaps.¹¹

In skin testing, a common diagnostic test employed by allergists, allergens are routinely scratched into the skin of allergic

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patients without incident other than localized reactions. Systemic anaphylaxis is rarely induced by these tests.¹² Fatal anaphylaxis to skin testing is exceptionally rare, and more common with intradermal testing.¹² Surveys of American Academy of Allergy, Asthma, and Immunology members have identified 7 fatal skin testing reactions over 42 years (1959-2001), 4 of which were associated with foods. Of those 4, 3 occurred after intradermal testing and 1 after percutaneous testing.¹³⁻¹⁵ One of the fatalities involved percutaneous testing to environmental allergens, followed by intradermal testing to multiple food (egg, corn, beef, lamb, milk, wheat, oat) and environmental allergens.¹⁴ Two fatalities occurred after intradermal testing to walnut and flaxseed.¹⁴ The single patient who died after percutaneous testing was tested to 90 foods including fish, egg, shellfish, tree nuts, and peanut and notably had poorly controlled asthma.¹³

In contrast to skin testing, fatal anaphylaxis has never previously been reported from casual cutaneous exposure to food allergens. There are 5 reports of food anaphylaxis from cutaneous exposure to cow's milk.¹⁶⁻²⁰ Three occurred when milk-based creams were applied to disrupted skin barriers: diaper rashes in 2 infants^{16,19} and a postsurgical wound in a teenager.¹⁸ Skin barrier disruption may permit systemic allergen exposure, resulting in anaphylaxis. In Foong et al,⁵ although initial allergen exposure occurred through a disrupted skin barrier from atopic dermatitis, it is possible that further skin injury from scratching resulted in allergen penetration into deeper skin layers, and even through the bloodstream.

This case also highlights the worst possible outcome of the devastating impact of teasing and bullying on patients with food allergies. Thirty-five to forty-five percent of children with food allergies report experiencing bullying, and children with food allergies are twice as likely to be bullied compared with children without.^{3,21} Teasing about the food allergy by classmates at school is the most common experience, but having food thrown at them is also reported.²¹ Parents and allergists are often unaware that teasing and/or bullying is occurring.^{21,22} Furthermore, many allergists report discomfort in asking about and addressing teasing and/or bullying concerns.²²

Amid the tragedy of the case presented by Foong et al,⁵ we can search for lessons to help us keep our patients safe, provide reassurance when possible, and realistically discuss risks. Anaphylaxis from cutaneous food allergen exposure remains exceedingly rare, and overall guidance to patients and families should emphasize the need to avoid ingestion exposures. Effectively controlling atopic dermatitis to maintain an intact skin barrier may play a more important role than previously recognized in minimizing risk of allergen exposure. This case teaches us that cutaneous food allergen exposure should be managed promptly by cleaning the exposed skin, especially if the skin barrier is disrupted. It reminds us that caregivers must be educated to recognize signs and symptoms of anaphylaxis and provide early treatment with intramuscular epinephrine, including repeated doses as necessary. This tragedy highlights the importance of keeping asthma under control and making sure that medications are up to date. It also teaches us that teasing and bullying, which are underrecognized issues affecting many children with food allergies, carry significant psychological and physical risks. In addition, it underscores the ongoing need to educate communities about food allergy and the impact of

bullying and to promote a dialogue between patients, parents, and health care providers to identify and address bullying if it occurs. As a society, we should strive to ensure that no one is bullied because of food allergies, and no one dies from food-induced anaphylaxis.

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