

To our knowledge, this is the first study documenting the prevalence of 3 atopy diagnoses, albeit self-reported, in urban adolescents with asthma. Data showed staggering comorbidity between asthma and atopic conditions in urban adolescents. We also found that concomitant diagnoses of at least 2 atopic conditions were not uncommon. Of 3 diagnoses of atopy conditions, only allergic rhinitis was linked to specialist visits and symptom exacerbation, particularly when coupled with other atopy diagnoses. Nevertheless, atopic dermatitis or food allergy diagnosis *alone* does not appear to have direct associations with health care usage or symptom exacerbation, suggesting that these atopic conditions might exert no independent influence on asthma morbidity, particularly in urban adolescents. Alternatively, our failure to demonstrate associations might have been due to a moderating factor ameliorating the impact of atopy such as ongoing atopy management. Further research is needed to examine the scope of comorbidity between atopy and asthma in a larger adolescent population and to re-evaluate the relations between atopy and asthma morbidity by taking into account potential buffering factors.

This study is limited primarily by its reliance on self-reported data that are potentially vulnerable to reporting bias. Nonetheless, self-reported medical diagnoses requiring ongoing management such as atopic conditions are of great value given their relatively high accuracy compared with medical records.¹⁰ Our findings suggest that clinicians should be cognizant of the widespread comorbidity of atopy diagnoses and asthma in urban adolescents. Because of the implications of allergic rhinitis for asthma exacerbation, focused attention to the condition is particularly warranted. Although not all atopic conditions have an association with asthma morbidity, it is important to identify and manage atopy simultaneously with asthma to alleviate atopy-related suffering and to improve quality of life in urban adolescents.

Hyekyun Rhee, PhD*

Tanzy M. Love, PhD†

Donald Harrington, MS†

Annette Grape, PhD*

*University of Rochester School of Nursing
Rochester, New York

†Department of Biostatistics and Computational Biology
University of Rochester Medical Center
Rochester, New York
hyekyun_rhee@urmc.rochester.edu

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Diagnosis and treatment of food allergic reactions in pediatric emergency settings



We performed a retrospective chart review of potential food-related allergic reactions presenting to a tertiary care referral center, pediatric emergency department (ED), and affiliated urgent care (UC) centers. A total of 5,582 encounters were reviewed of patients who had presented to the ED or UC center from May 1, 2011 through May 31, 2013 with a diagnosis suggestive of food allergy. Diagnoses included in initial review were *International Classification of Diseases, Ninth Revision* codes for anaphylaxis, food allergy, adverse reaction to food, general allergy, urticaria, angioedema, and allergic gastroenteritis.

After initial review, only charts that were considered a “likely” food allergic reaction based on exposure, time course, and symptoms remained in the analysis. These charts were reviewed for reaction details and to determine whether the reaction qualified as anaphylaxis. Encounters qualified as anaphylaxis based on the National Institutes of Health’s National Institute of Allergy and Infectious Diseases (NIAID) definition of anaphylaxis, which includes acute onset (over minutes to several hours) of involvement of at least 2 systems, including skin and mucosal tissue, respiratory compromise (including dyspnea and wheezing), signs

of decreased blood pressure (including syncope), and persistent gastrointestinal symptoms (defined by crampy abdominal pain, nausea, vomiting, or diarrhea).¹

After initial review of thousands of charts, 587 ED or UC encounters were considered likely food allergic reactions resulting from ingestion (Table 1). Although milk is a leading cause of food allergy in the pediatric population,² peanuts and tree nuts were responsible for most reactions (60%) in our review. Mean age at reactions was 5.3 years. Not surprisingly, children who had a reaction to a known allergen were older than children who were experiencing their first allergic reaction. Accidental exposures to a known allergen accounted for 45% of total reactions. Compared with the primary reactors, the accidental exposure group had a larger percentage of patients with asthma, previous ED visits, and other food allergies ($P < .0001$ for each comparison).

Fewer than half the patients who had a prior diagnosis of food allergy and should have been carrying an epinephrine auto-injector were carrying one (43%). Some patients who experienced their first allergic reaction to the food in question had access to epinephrine; they were in possession of epinephrine for another allergy or had access to someone else’s epinephrine. One third of patients who experienced anaphylaxis and had access to epinephrine did not use the epinephrine before coming to the ED. Reasons given for not using epinephrine included not thinking it was necessary (33%),

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Table 1
Demographic Information^a

	All	Accidental exposures	First-time reactors	P value
Total, n	587	267	320	
Age (y), mean $\pm$ SD	5.3 $\pm$ 4.8	6.8 $\pm$ 4.8	4.1 $\pm$ 4.4	
Boys, n (%)	370 (63)	178 (67)	192 (60)	.096
History of asthma, n (%)	185 (32)	128 (48)	57 (18)	<.0001
Public insurance, n (%)	204 (35)	104 (39)	100 (31)	.05
Prior ED visit for food allergy, n (%)	76 (13)	61 (23)	15 (5)	<.0001
History of other food allergy, n (%)	184 (31)	122 (46)	62 (19)	<.0001
Trigger, n (%)				
Peanut	197 (34)	112 (42)	85 (27)	.0001
Tree nut	152 (26)	46 (17)	106 (33)	<.0001
Milk	57 (10)	42 (16)	15 (5)	<.0001
Egg	33 (5)	14 (5)	19 (6)	.8
Fish	38 (6)	9 (3)	29 (9)	.013
Shellfish	28 (5)	15 (6)	13 (4)	.22
Wheat	13 (2)	6 (2)	7 (2)	.96
Other	35 (6)	11 (4)	24 (8)	.09
Unknown	34 (6)	12 (4)	22 (7)	.22

Abbreviation: ED, emergency department.

^aAccidental exposures (trigger was a known food allergen to the patient) occurred significantly more in those with a history of asthma, those with a prior ED visit for food allergy or history of another food allergy, and those with a peanut or milk trigger. First-time reactions occurred significantly more in those with a tree nut or fish trigger.

discomfort or fear (19%), not knowing how to use it (11%), and having an expired auto-injector (6%).

Most patients (73%) had symptoms that met the NIAID definition of anaphylaxis. However, only 42% of these patients were diagnosed with anaphylaxis. Of all patients meeting the NIAID definition of anaphylaxis, patients with cutaneous symptoms were almost 3 times more likely to be diagnosed with anaphylaxis (odds ratio [OR], 2.7; $P < .0001$). Patients with gastrointestinal symptoms (OR, 0.41; $P < .0001$) and oropharyngeal symptoms (OR, 0.33; $P < .0001$) were less likely to be diagnosed with anaphylaxis. Patients also were more likely to be diagnosed with anaphylaxis when they had a reaction to peanut (OR, 1.6; $P = .017$). Surprisingly, patients with a history of asthma (OR, 0.44; $P < .0001$) or food allergy (OR, 0.34; $P < .0001$) were less likely to be diagnosed with anaphylaxis.

Most patients received antihistamines (72%) and steroids (70%) in the ED or UC center. However, only 27% of patients received epinephrine. There were significant differences in the management of patients based on ED or UC diagnosis, with more aggressive observation, treatment, and epinephrine prescriptions when the ED or UC provider recognized and diagnosed the encounter as anaphylaxis compared with a diagnosis of an allergic reaction or a diagnosis of an allergy symptom (eg, urticaria). When looking at all patients with anaphylaxis based on our review using the NIAID guidelines, patients who received an ED or UC diagnosis of anaphylaxis were 8 times more likely to be treated with epinephrine at all (in the ED or UC center or before visiting the ED or UC center; 89% vs 28%; $P < .0001$), 16 times more likely to be observed in the ED for longer than 6 hours (60% vs 10%; $P < .0001$), 16 times more likely to be prescribed epinephrine (92% vs 67%; $P < .0001$), and 10 times more likely to be admitted to the hospital (40% vs 6%; $P < .0001$) than patients who did not have an ED or UC diagnosis of anaphylaxis. Fewer than one fourth of patients were referred to an allergy specialist, with a negligible difference in referral rate based on diagnosis.

In this study, we learned that patients with a prior visit to the ED or UC center for a food allergic reaction were likely to return to the ED (1 in 4 children who presented with an accidental exposure had been to the ED previously with a food allergic reaction). This group could be targeted for education and intervention. It also was

alarming to learn that fewer than half the patients with a known food allergy had epinephrine available at the time of the reaction and that epinephrine was not used, even when available, for one third of anaphylactic reactions.

In the ED or UC center, nearly three fourths of patients had symptoms consistent with anaphylaxis. However, more than half these cases were not diagnosed as anaphylaxis. We can conjecture that anaphylaxis was not diagnosed for atypical presentations, mild presentations, or anaphylaxis that had resolved. Overall, ED and UC physicians are managing anaphylaxis appropriately when it is recognized. However, more work needs to be done to understand why other patients who met the definition of anaphylaxis were not being observed or prescribed epinephrine. It is possible that patients were not being treated when they presented with mild anaphylaxis. However, these patients are still at risk for life-threatening reactions in the future. Our study also showed a low rate of allergy referral from the ED or UC center. ED and UC providers are more likely to follow guidelines for the treatment of anaphylaxis when they recognize anaphylaxis. However, they are likely not using established guidelines in making determinations of what cases qualify as anaphylaxis.

Christopher Brooks, MD*

Alexa Coffman, MD*

Elizabeth Erwin, MD†

Irene Mikhail, MD†

*The Ohio State University College of Medicine
Columbus, Ohio

†Section of Allergy and Immunology
Nationwide Children's Hospital
Columbus, Ohio

irene.mikhail@nationwidechildrens.org

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