

Letter to the Editor

Frequency of US emergency department visits for food-related acute allergic reactions*To the Editor:*

Estimates of the burden of food-related acute allergic reactions have been reported across various health care settings, including ambulatory care,¹ hospitalizations,¹ and the emergency department (ED).¹⁻³ Food-related anaphylaxis has been cited as the most frequent cause of anaphylaxis treated in the ED.³ Treatment delays are associated with poor outcomes and suggest the need for additional training and resources for patients and providers. To that end, we describe the national burden of food-related acute allergic reactions treated in the ED by using data from 2 large ED-based cohort studies and the National Hospital Ambulatory Medical Care Survey (NHAMCS).

Data from 2 ED-based studies were used to identify the proportion of patients assigned to each International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) code that was later determined to be a food-related acute allergic reaction⁴ and the proportion of these patients who had food-induced anaphylaxis.^{4,5} We multiplied these 2 proportions against counts from the 2001 to 2005 NHAMCS to estimate the national number of ED visits for each ICD-9-CM code with food-related acute allergic reaction and with food-induced anaphylaxis. [Table I](#) lists the ICD-9-CM codes.

The first ED-based study was a multicenter retrospective cohort study performed at 21 North American EDs to examine ED visits for food allergy; ICD-9-CM codes 693.1, 995.60, 995.61 to 995.69, 995.0, and 995.3 were used to identify cases of food allergy.⁵ Physician investigators at each of the participating sites determined whether the ED visit was a result of food allergy. The second ED-based study was a multicenter retrospective cohort study performed at 3 Boston EDs to describe the management of food-related acute allergic reactions.⁴ In the second study, all ED visits identified by ICD-9-CM codes 995.60, 995.61 to 995.69, 995.0, 693.1, 995.7, 558.3, and 692.5, and a random sample of the codes 995.3, 995.1, and 708.x, were reviewed by 2 physicians to determine whether the ED visit was a result of food allergy. In both studies, a food-related acute allergic reaction was defined as an acute episode of IgE-mediated symptoms in which the onset was immediately related to a known or suspected food allergen. The working definition of anaphylaxis resembled national criteria.⁶ Specifically, we defined anaphylaxis as an acute allergic reaction involving 2 or more organ systems or hypotension alone. Hypotension was defined as a systolic blood pressure <100 mmHg for adults and <90 mmHg for children between ages 10 and 17 years. For children younger than 10 years, hypotension was defined as a systolic blood pressure less than 70 mmHg + (age multiplied by 2).⁶

NHAMCS, the third study, is a 4-stage probability sample of visits to noninstitutional general and short-stay hospitals, excluding federal, military, and Veterans Affairs hospitals, in the United States. NHAMCS is conducted annually and covers geographic primary sampling units located in all 50 states and the District of Columbia. At each sampled hospital, trained hospital staff collect data during a randomly assigned 4-week data period, and a US Census Bureau field supervisor reviews the data collection. The nonresponse rate for most items was <5%, and error rates were

<2% for items that required medical coding. Completed data collection forms are sent for coding using the ICD-9-CM. National estimates are obtained through use of a multistage estimation procedure and patient visit weights. A detailed description of NHAMCS procedures is available in the technical notes section of each year's NHAMCS Emergency Department Survey.⁷ Descriptive analyses were performed using STATA 10.1 (StataCorp, College Station, Tex).

Overall, from 2001 to 2005, a total of 7,075,000 ED visits were identified by using the specified ICD-9-CM codes,⁷ of which an estimated 1,015,000 visits (14%) were considered to be true food-related acute allergic reactions.^{4,5} This accounts for approximately 203,000 ED visits for food-related acute allergic reactions each year (final line of [Table II](#)). With a total of 525,600 minutes per year, this suggests—on average—an ED visit for food-related acute allergic reaction somewhere in the United States every 3 minutes. Among the 1,015,000 ED visits for food-related allergic reactions from 2001 to 2005, an estimated 448,000 visits (44%), or 90,000 visits each year, would be classified as probable anaphylaxis.^{4,5} On average, an ED visit caused by food-related anaphylaxis occurred somewhere in the US every 6 minutes. These estimates are for number of ED visits and include repeat visits; they are not numbers of unique (individual) patients with food allergy.

These results suggest that the number of US ED visits for food-related acute allergic reactions may be significantly higher than estimated in previous reports.¹⁻³ Based on the work of Yocum et al⁸ in the late 1990s, an early estimate was ~29,000 ED visits for food-induced anaphylaxis annually.³ Ross et al² used symptom codes in the National Electronic Injury Surveillance System during August and September 2003 to estimate 2,333 ED visits for food-induced anaphylaxis, or 14,000 ED visits annually. Our results show nearly 90,000 ED visits for anaphylaxis annually ([Table II](#)).

In a recent study, Branum and Lukacs¹ reported aggregate visits for food allergy to EDs, hospital outpatient departments, and physician offices by using NHAMCS and the National Ambulatory Medical Care Survey between 1993 and 2006. In total, they found 353,300 visits among children <18 years of age or approximately 25,000 visits to these outpatient settings annually. In our current study, children accounted for 38% (388,000 ED visits during the 5-year study period) of all food-related allergic reactions, or 77,000 ED visits annually.

Ross et al² also estimated the frequency of food-related allergic reactions, reporting a total of 20,821 ED visits for food allergy during a 2-month period, or approximately 125,000 visits annually. The current analysis, which accounts for the number of visits estimated to be true food-related allergic reactions, identified >75,000 additional ED visits each year.

Future work should more closely evaluate differences in the frequency of ED visits for food-related acute allergic reactions between children and adults, and also evaluate the appropriateness of commonly used ICD-9-CM codes to identify cases of food-related allergic reactions. Recent concerns about the increasing prevalence of food allergy support further research on time trends in ED use for food-related acute allergic reactions.⁹ Well designed surveillance programs are needed to improve our understanding of the incidence and prevalence of food-related

TABLE I. ICD-9-CM codes used to identify food-related acute allergic reactions, including anaphylaxis

ICD-9-CM code	Description
477.1	Allergic rhinitis due to food
558.3	Allergic gastroenteritis and colitis
692.5	Contact dermatitis due to food in contact with skin
693.1	Dermatitis due to food taken internally
708.x	Urticaria
988.0	Toxic effect of fish and shellfish
989.0	Toxic effect of hydrocyanic acid and cyanides
989.9	Toxic effect of unspecified substance
995.0	Other anaphylactic shock
995.1	Angioneurotic edema
995.2	Unspecified adverse effect of drug, etc
995.3	Allergy unspecified
995.4	Shock due to anesthesia
995.60-995.69	Anaphylactic shock due to adverse food reaction with specific codes for unspecified food, peanuts, crustaceans, fruits and vegetables, tree nuts and seeds, fish, food additives, milk products, eggs, other specified food
995.7	Other adverse food reactions not elsewhere classified
999.4	Anaphylactic shock to serum

TABLE II. Estimated number of ED visits for food-related acute allergic reactions and anaphylaxis

Study	Years	Method of case identification	Acute allergic reaction		Subset with anaphylaxis	
			ED visits/y	Minutes*	ED visits/y	Minutes*
Yocum et al, ⁸ Sampson ³	1983-1987	Medical records	—	—	29,000	18
Branum and Lukacs ¹	1993-2006	ICD-9-CM codes	25,000†‡	21†‡	—	—
Ross et al ²	2003	Symptom codes	125,000	4	14,000	38
Current study	2001-2005	ICD-9-CM codes	203,000	3	90,000	6

—, Not reported.

*On average, there was an ED visit for the specified condition every — minutes.

†Among children age <18 years.

‡Includes visits to EDs, hospital outpatient departments, and physician office.

allergic reactions. Together, such work will improve public awareness about food allergy and assist efforts to ensure that appropriate resources are allocated for this potentially life-threatening condition.

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