

ICD-9-CM Coding of Emergency Department Visits for Food and Insect Sting Allergy

SUNDAY CLARK, MPH, THEODORE J. GAETA, DO, MPH,
GEETA S. KAMARTHI, MD, AND CARLOS A. CAMARGO, MD, DRPH

PURPOSE: Little is known about the role of *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes for identification of specific allergic reactions in the emergency department (ED).

METHODS: Investigators in 10 EDs reviewed 1395 charts of consecutive patients presenting with food allergy (ICD-9-CM codes 693.1 and 995.60 to 995.69) and insect sting allergy (code 989.5). They also reviewed charts of patients with “unspecified” allergic reactions (codes 995.0 [other anaphylactic shock] and 995.3 [allergy, unspecified]) to identify additional patients with food or insect sting allergy.

RESULTS: Of 406 patients with food allergy, 216 patients (53%) were coded as food allergy, whereas the remaining 190 patients (47%) were not. Of 394 patients with insect sting allergy, 341 (87%) were coded as insect sting allergy, whereas 53 patients (13%) were not. Characteristics of ICD-9-CM-identified compared with chart-review-identified patients differed for both food and insect sting allergy. ICD-9-CM-identified patients with food allergy were less likely to experience anaphylaxis.

CONCLUSIONS: Almost half the patients with food allergy would have been missed by using food-specific ICD-9-CM codes alone, whereas only 13% of patients with insect sting allergy would have been missed. Furthermore, characteristics of these allergy patients would have been biased by studying only patients identified by using the allergen-specific ICD-9-CM codes.

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INTRODUCTION

Ascertainment of cases for epidemiologic studies performed in clinical settings often involves the use of *International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)* codes. Many studies examined the accuracy of identifying disease cases by ICD-9-CM code (1–5) and found that the ICD-9-CM classification system has several limitations, including diagnostic codes that do not completely encompass the condition of interest and conditions being distributed across multiple codes (3). These studies

found that identification of soft tissue disorders of the neck and upper limbs (2), ischemic cerebrovascular disease (3), acute ischemic stroke (1), pneumococcal pneumonia (5), and cerebrovascular malformations (4) by using ICD-9-CM codes often yielded incomplete or inaccurate case lists and concluded that ICD-9-CM codes should not be the only source used to identify cases of disease.

In 1993, the ICD-9-CM system introduced codes to identify specific food allergies. To our knowledge, no study has examined the accuracy of ICD-9-CM coding for allergic reactions or anaphylaxis. Additionally, little is known about how frequently these specific codes are used to identify specific allergic reactions, such as food allergy or insect sting allergy, in the emergency department (ED). The objective of the current study is to determine the accuracy of using ICD-9-CM codes to identify ED visits for food and insect sting allergies and determine the potential bias that might be introduced by sole reliance on ICD-9-CM codes.

METHODS

This retrospective cohort study was performed as part of the Multicenter Airway Research Collaboration, a division of the Emergency Medicine Network (EMNet) (6). Using a standardized protocol and data abstraction forms,

From the Department of Emergency Medicine, Massachusetts General Hospital (S.C., G.S.K., C.A.C.); Department of Epidemiology, Harvard School of Public Health, Boston, MA (S.C., C.A.C.); and the Department of Emergency Medicine, New York Methodist Hospital, Brooklyn, NY (T.J.G.).

Address correspondence to: Sunday Clark, MPH; EMNet Coordinating Center, Department of Emergency Medicine, Massachusetts General Hospital, 326 Cambridge Street, Suite 410, Boston, MA 02114. Tel.: (617) 724-0304; fax: (617) 724-4050. E-mail: sclark3@partners.org.

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Selected Abbreviations and Acronyms

ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification
 ED = Emergency department
 EMNet = Emergency Medicine Network

investigators at 10 EDs examined two cohorts, one of ED visits for food allergy and one of ED visits for insect sting allergy, each during any 1-year period between January 1999 and November 2001. Sites reviewed charts of randomly selected patients who presented with ICD-9-CM–identified food allergy (693.1 [dermatitis due to food], 995.60 [allergy due to unspecified food], and 995.61 to 995.69 [allergy due to specified foods]) and charts of all patients who presented with insect sting allergy (ICD-9-CM code 989.5 [toxic effect of venom]). Additionally, sites reviewed charts of patients with “unspecified” allergic reactions (995.0 [other anaphylactic shock] and 995.3 [allergy, unspecified]) to identify additional patients with food or insect sting allergy.

Charts of patients with unspecified allergic reactions were screened to identify patients with definite or probable food or insect sting allergy. Definite cases identified among the unspecified allergic reaction codes were patients with charts suggesting that the allergic reaction clearly was caused by food or insect sting. Probable cases were charts in which the documentation suggested that the allergic reaction very likely was caused by food or insect sting. Patients were not considered to have a food or insect sting allergic reaction if the cause of the reaction was unknown or the reaction possibly or definitely was not caused by a food or insect sting.

The institutional review board at each of the 10 participating hospitals approved the study. Details of data collection have been described elsewhere (7, 8).

Statistical Analysis

All analyses were performed using STATA 9.0 (StataCorp., College Station, TX) (9). The association between method of identification and other factors was examined by using chi-squared test, Fisher exact test, Student *t*-test, and Kruskal-Wallis rank test, as appropriate. All *p* are two tailed, with *p* < 0.05 considered statistically significant.

RESULTS

Food Allergy

Of 775 consecutive patients with an acute allergic reaction, 216 patients (28%) were coded as having a food-related allergic reaction. Of the remaining 559 patients with unspecified allergy, 190 patients (34%) were identified as having

probable or definite food allergy based on chart review. Thus, only 53% (95% confidence interval, 48%–58%) of patients with a food-related allergic reaction were identified by specific ICD-9-CM codes. The number of patients identified by each ICD-9-CM code is listed in Table 1.

ICD-9-CM–identified patients with food allergy did not differ from those identified by chart review for many characteristics, but there were some notable differences (Table 2). ICD-9-CM–identified patients were more likely to have a history of asthma. They also were more likely to have documentation of skin and cardiovascular involvement. Although the groups did not differ according to ED management, patients with an ICD-9-CM–identified reaction were less likely to experience a reaction classified as anaphylaxis by our study criteria and more likely to be discharged to home. Discharge instructions to avoid the offending allergen and prescription of self-injectable epinephrine did not differ between the two groups, but ICD-9-CM–identified patients were significantly less likely to be referred to an allergist as part of the discharge instructions.

Insect Sting Allergy

Of 620 consecutive patients with acute allergic reaction, 341 patients (55%) were coded as having an insect sting allergic reaction. Of the remaining 279 patients with unspecified allergy, 53 patients (19%) were identified as having a probable or definite insect sting allergy based on

TABLE 1. Identification of patients with food allergy and insect sting allergy

	ICD-9-CM– identified	Chart- identified only
Food allergy		
693.1 (dermatitis due to food)	168	—
995.60 (allergy due to unspecified food)	6	—
995.61 (allergy due to peanuts)	13	—
995.62 (allergy due to crustaceans)	3	—
995.63 (allergy due to fruits & vegetables)	1	—
995.64 (allergy due to tree nuts & seeds)	9	—
995.65 (allergy due to fish)	4	—
995.66 (allergy due to food additives)	0	—
995.67 (allergy due to milk products)	1	—
995.68 (allergy due to eggs)	4	—
995.69 (allergy due to other specified food)	7	—
995.0 (other anaphylactic shock)	—	37
995.3 (allergy, unspecified)	—	153
Insect sting allergy		
989.5 (toxic effect of venom)	341	—
995.0 (other anaphylactic shock)	—	1
995.3 (allergy, unspecified)	—	52

ICD-9-CM = International Classification of Diseases, Ninth Revision, Clinical Modification.

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