Published in final edited form as:

Ann Allergy Asthma Immunol. 2008 December ; 101(6): 631–636.

Prescriptions for self-injectable epinephrine and follow-up referral in emergency department patients presenting with anaphylaxis

Ronna L. Campbell, MD, PhD^{*}, Anuradha Luke, MD^{*}, Amy L. Weaver, MS[†], Jennifer L. St Sauver, PhD[‡], Eric J. Bergstralh, MS[†], James T. Li, MD, PhD[§], Veena Manivannan, MBBS^{*}, and Wyatt W. Decker, MD^{*}

^{*}Department of Emergency Medicine, Mayo Clinic, Rochester, Minnesota

[†]Division of Biostatistics, Mayo Clinic, Rochester, Minnesota

[‡]Division of Epidemiology, Mayo Clinic, Rochester, Minnesota

[§]Division of Allergic Diseases and Division of Infectious Diseases, Mayo Clinic, Rochester, Minnesota

Abstract

Background—Anaphylaxis guidelines recommend that patients with a history of anaphylactic reaction should carry self-injectable epinephrine and should be referred to an allergist.

Objective—To evaluate how frequently patients dismissed from the emergency department after treatment for anaphylaxis received a prescription for self-injectable epinephrine or allergist referral.

Methods—A retrospective medical record review identified patients with anaphylaxis in a community-based study from 1990 through 2000. Records of patients with *Hospital Adaptation of the International Classification of Diseases, Second Edition* or *International Classification of Diseases, Ninth Revision* codes representing anaphylaxis were reviewed, and a random sample of patients with associated diagnoses was also reviewed. Patients who met the criteria for diagnosis of anaphylaxis were included in the study.

Results—Among 208 patients identified with anaphylaxis, 134 (64.4%) were seen in the emergency department and discharged home. On dismissal, 49 patients (36.6%; 95% confidence interval [CI], 28.4%–44.7%) were prescribed self-injectable epinephrine, and 42 patients (31.3%; 95% CI, 23.5%–39.2%) were referred to an allergist. Treatment with epinephrine in the emergency department (odds ratio, 3.6; 95% CI, 1.6–7.9; $P = .001$) and insect sting as the inciting allergen (odds ratio, 4.0; 95% CI, 1.6–10.5; $P = .004$) were significantly associated with receiving a prescription for self-injectable epinephrine. Patient age younger than 18 years was the only factor associated with referral to an allergist ($P = .007$).

Conclusions—Most patients dismissed after treatment for anaphylaxis did not receive a self-injectable epinephrine prescription or allergist referral. Emergency physicians may be missing an important opportunity to ensure prompt treatment of future anaphylactic reactions and specialized follow-up care.

Requests for reprints should be addressed to: Ronna L. Campbell, MD, PhD, Department of Emergency Medicine, Mayo Clinic, 200 First St SW, Rochester, MN 55905, E-mail: campbell.ronna@mayo.edu.

Disclosures: Authors have nothing to disclose.

INTRODUCTION

Anaphylaxis is a systemic allergic reaction. Symptoms of anaphylaxis can range from mild and self-limited to rapidly fatal.^{1,2} Studies in children have shown that anaphylaxis is most commonly treated in emergency departments (EDs).³ In this study of children and adults, we also found that most of the patients were seen in the ED, making emergency physicians the most likely physicians to diagnose, treat, and facilitate follow-up. Guidelines recommend that all patients with a history of anaphylaxis to an allergen that they may encounter in a nonmedical setting should be given a prescription for self-injectable epinephrine. They should also be referred to an allergist for follow-up.^{2,4} However, studies evaluating patients presenting to the ED specifically with food allergies and insect sting allergies both found that less than 25% of patients with anaphylaxis were prescribed self-injectable epinephrine when discharged from the ED and even fewer were referred to an allergist.^{5,6}

We investigated the clinical presentation, ED management, home-going treatment, and follow-up of a community-based cohort of patients presenting to the ED with anaphylaxis. We determined how frequently patients were dismissed with a prescription for self-injectable epinephrine and referred to an allergist and which factors were associated with receiving a prescription for self-injectable epinephrine or allergist referral.

METHODS

Study Design

This retrospective study was performed by identifying cases of anaphylaxis occurring in patients in Olmsted County, Minnesota, from 1990 through 2000. Patients were seen in the ED at Saint Mary's Hospital, a tertiary care academic medical center affiliated with Mayo Clinic, with approximately 70,000 visits per year, and at Olmsted Medical Center, a community-based ED, with approximately 19,000 visits per year. The study was approved by the institutional review boards at both centers. Informed consent was obtained from all research participants. The study linked and indexed records of virtually all medical care professionals in this defined geographic region.⁷⁻⁹ All diagnoses were coded using either *Hospital Adaptation of the International Classification of Diseases, Second Edition (HICDA)* codes or *International Classification of Diseases, Ninth Revision (ICD-9)* codes. We searched for all patients who had a new diagnostic code related to anaphylaxis from 1990 through 2000, who were residents of Olmsted County, and who had not refused permission for their medical records to be used for research. Only the initial episode of anaphylaxis during the study period was included for each patient. All 248 patients with *ICD-9* codes (or corresponding *HICDA* codes) representing the following diagnoses were reviewed: anaphylactic shock; anaphylactic shock due to food; anaphylactic shock not elsewhere classified; and shock, anaphylactic, following sting. In addition, a random sample of 600 patients from 2,442 patients with associated diagnoses was also reviewed: 300 patients diagnosed as having either venom from bee sting or toxic effect of venom and 300 patients diagnosed as having allergy, foodstuff; adverse effect, food; dermatitis due to food taken internally; or toxic effect of specific food. Of the 248 patients, 157 met criteria for anaphylaxis, and of these, 92 were treated and dismissed from the ED. Of the randomly chosen 600 cases, 54 met the initial criteria for anaphylaxis, and of these, 43 were treated and dismissed from the ED. Therefore, of the total of 211 cases of anaphylaxis initially reviewed, 135 were treated and dismissed from the ED.

Defining a Case of Anaphylaxis

This study was started before the second symposium on the definition and management of anaphylaxis. Initially, the criteria for anaphylaxis used in the study by Yocum et al were used to identify patients. These criteria are similar to those developed by the second symposium on

the definition and management of anaphylaxis.^{2,7,10} To ensure that the cases included in this study met the most recent and accepted criteria for anaphylaxis, all 211 cases that had been identified using the Yocum criteria were reanalyzed using the criteria proposed by the second symposium. There were 3 cases that did not meet the criteria proposed by the second symposium and these were removed. This left a total of 208 remaining cases of anaphylaxis. One hundred thirty-four of these cases were treated and dismissed from the ED. The criteria for diagnosis of anaphylaxis proposed by the second symposium are given in Table 1.

Data Collection

Records were screened to determine if the date and assigned code met inclusion criteria. Nurse abstractors reviewed medical records and abstracted demographic data, presenting symptoms, ED treatment, home-going treatments, and follow-up referrals.

There were 2 abstractors during the study. Abstractor 1 conducted a pilot study of 22 medical records to test the criteria for defining a case of anaphylaxis, to determine the amount of time needed to collect each data point, and to finalize the data collection forms. Abstractor 2 joined the study 2 months after abstractor 1 and reviewed 10 medical records that had been reviewed previously by abstractor 1. Time needed to review medical records was approximately the same for both abstractors, and data comparability was excellent (>95%). Abstractors and investigators met monthly to discuss progress and to resolve abstracting or coding questions. Investigators reviewed medical records for which collection of data points was unclear and were available on an ad hoc basis to resolve questions.

Outcomes

The primary outcomes of interest were prescriptions for self-injectable epinephrine and allergist referrals for patients presenting to the ED with anaphylaxis who were dismissed from the ED.

Statistical Analyses

Statistical analysis was based on data obtained from reviewed cases only. Univariate and multivariate logistic regression models were fit to evaluate factors for an association with outcomes of interest on ED dismissal: (1) prescription of self-injectable epinephrine and (2) referral to an allergist. Odds ratios (ORs) and corresponding 95% confidence intervals (CIs) were calculated for each association. *P* values were 2-sided, and *P* < .05 was considered statistically significant. Statistical analyses were performed using the SAS software package (version 9.0) (SAS Institute Inc, Cary, North Carolina).

RESULTS

Among 208 reviewed patients with anaphylaxis, 134 (64.4%) were seen in the ED and discharged home. The demographics of this cohort are given in Table 2. The mean age of the patients was 29.3 years, 55.2% were female, and 84.3% were white. The inciting allergens are also summarized in Table 2. The inciting agent was food in 38.1%, insect stings in 19.4%, medication in 8.2%, unspecified in 24.6%, and other agents in 9.7%.

Table 3 summarizes the symptoms of the 134 reviewed cases. Twenty-six patients (19.4%; 95% CI, 12.7%–26.1%) presented with symptoms involving 3 organ systems (oral and gastrointestinal tract, cardiovascular system, and respiratory tract) and symptoms of mucocutaneous mediator release.

Forty-nine patients (36.6%; 95% CI, 28.4%–44.7%) were prescribed self-injectable epinephrine before ED discharge, and 42 patients (31.3%; 95% CI, 23.5%–39.2%) were

referred to an allergist. Those prescribed epinephrine on dismissal were more likely to be referred to an allergist compared with those who were not prescribed epinephrine (46.9% vs 22.4%; $P = .003$).

Table 4 summarizes the factors evaluated for an association with prescription of self-injectable epinephrine on ED discharge. On the basis of multivariate logistic regression analysis, treatment with epinephrine in the ED (OR, 3.6; 95% CI, 1.6–7.9; $P = .001$) and insect sting as the inciting allergen (OR, 4.0; 95% CI, 1.6–10.5; $P = .004$) were identified as being associated with receiving self-injectable epinephrine at ED dismissal. Patient age, history of asthma, other inciting allergens, other types of ED treatment, and presenting symptoms were not associated with receiving a self-injectable epinephrine. Patient age was the only factor associated with referral to an allergist; among patients younger than 18 years, 18 to 50 years, and older than 50 years, 49%, 27%, and 11%, respectively, were referred ($P = .007$).

We also evaluated how frequently the 74 patients who were diagnosed as having anaphylaxis but not dismissed from the ED received a prescription for self-injectable epinephrine. Forty-two of these patients were admitted to the hospital, and 26 (62%) received a prescription for self-injectable epinephrine. The remaining 32 patients were evaluated in other outpatient settings (urgent care or outpatient clinics) and 16 (50%) received a prescription for self-injectable epinephrine.

DISCUSSION

We found that 36.6% of patients who experienced anaphylaxis were prescribed self-injectable epinephrine and 31.3% were referred to an allergist before dismissal. These results are slightly higher than, although generally consistent with, those of prior studies evaluating patients specifically with food allergies or with insect sting allergies.^{5,6} We also found that patients treated in other outpatient settings and those who had been admitted to the hospital for anaphylaxis were more likely to receive prescriptions for self-injectable epinephrine than those who were dismissed from the emergency department.

Epinephrine has been shown to be an effective treatment for anaphylaxis,¹¹ and guidelines recommend that all patients who have anaphylaxis to an allergen that may be encountered in nonmedical settings should be prescribed self-injectable epinephrine.^{2,4} Studies have shown that patients who do not have epinephrine available at the time of the anaphylactic reaction are at increased risk of a fatal reaction.^{12–14} In an analysis of 32 patients with fatal anaphylaxis reported to a national registry established by the American Academy of Allergy, Asthma, and Immunology, 90% did not have epinephrine available at the time of their reaction.¹² Consistent with studies in children, we found that most patients with anaphylaxis were treated in an ED.³ Hence, proper diagnosis, treatment, and referral in the ED are important.

The low rate of prescriptions for self-injectable epinephrine and allergist referrals among patients dismissed from the ED may have several explanations. Lack of documentation may be partially responsible. Failure to diagnose anaphylaxis may be another reason. A study by Klein and Yocum¹⁰ found that many patients who are diagnosed as having an allergic reaction in the ED were subsequently, on allergist review, considered to have experienced an anaphylactic episode.

The most important factor contributing to failure to diagnose an anaphylactic reaction may be the lack of a universally accepted definition. This was addressed during the second symposium on the definition and management of anaphylaxis, and criteria for the diagnosis of anaphylaxis were proposed.² There is growing consensus that anaphylaxis is a systemic allergic reaction that typically involves more than 1 organ system but can present with cardiovascular

compromise as the only symptom. The criteria for diagnosis of anaphylaxis proposed by the second symposium are given in Table 1.

On the basis of these criteria, anaphylaxis need not be life-threatening. Respiratory tract and cardiovascular symptoms are not mandatory for diagnosis of anaphylaxis. This is an important distinction because historically many practitioners have believed that cardiovascular or respiratory tract symptoms were invariably present in anaphylaxis.

It is imperative that ED physicians diagnose even mild anaphylaxis (for example, rash and vomiting after an allergen exposure). These patients should be provided with self-injectable epinephrine and follow-up referrals because subsequent reactions may be life-threatening. In a study of 139 fatalities, 78% of deaths attributed to food allergy and 82% of deaths attributed to venom allergy occurred in patients with no previous history of severe allergic reactions.¹³

Recent studies have shown that biphasic reactions occur in approximately 5% to 20% of anaphylactic reactions. The second phase can occur 4 to 72 hours after the initial reaction.^{14–20} The second reaction can be more severe than the initial reaction and can involve organ systems not involved in the initial reaction. Biphasic reactions can be fatal.¹⁴ Thus, patients need to have self-injectable epinephrine available to them during this early period. Usually, the patient is able to see a primary physician or allergist only at a later date.

We found that patients who received treatment with epinephrine in the ED were more likely to be prescribed self-injectable epinephrine. These findings are consistent with prior studies that have evaluated predictors for self-injectable epinephrine prescriptions in patients with food allergies⁵ or insect stings.⁶ However, we did not find that patients with a history of asthma were more likely to be prescribed self-injectable epinephrine. This is in contrast to a study of patients presenting with food allergies (including anaphylaxis) by Clark et al,⁵ who found that patients with history of asthma were more likely to be prescribed self-injectable epinephrine on dismissal from the ED.

Asthma and history of allergy to peanuts or tree nuts are known risk factors for fatal anaphylaxis.^{12,14} Bock et al¹² analyzed a national registry of fatal anaphylactic reactions and found that 93% of patients who died had a history of asthma and 94% were allergic to peanuts or tree nuts. It is important that emergency physicians recognize these risk factors.

Although guidelines recommend referral to an allergist, this may not be feasible in many health care settings. It may be more realistic to refer patients to their primary care physician, who can then make appropriate referrals. Patients must understand that follow-up care is needed. One study showed that many patients treated in the ED for anaphylaxis did not realize that follow-up care was needed.¹⁰

The primary limitation of this study is its retrospective nature. Another limitation imposed by our study setting is that the characteristics of the study population are similar to the US white population and may not be generalizable to minority or ethnic populations.⁷ Finally, the clinical criteria used to diagnose anaphylaxis will affect the results. All patients included in this study met the criteria proposed by the second symposium on the definition and management of anaphylaxis. However, to date, no universally accepted set of criteria for diagnosis of anaphylaxis is available.

Most patients treated for anaphylaxis are not prescribed self-injectable epinephrine or referred to an allergist on ED discharge. Emergency physicians may be missing an important opportunity to ensure prompt treatment of future anaphylactic reactions and specialized follow-up care. Collaboration between emergency physicians and allergists with a goal toward agreement on criteria for diagnosis of anaphylaxis and indications for prescription of self-

injectable epinephrine will ensure better management of anaphylaxis. These efforts are already ongoing as evidenced by the Be SAFE guide, a tool developed by a panel of allergists and emergency physicians to improve ED management of anaphylaxis.²¹

Acknowledgments

Editing, proofreading, and reference verification were provided by the Section of Scientific Publications, Mayo Clinic.

Funding Sources: This study was supported in part by a research grant provided by the Food Allergy and Anaphylaxis Network and Mayo Foundation for Medical Education and Research.

REFERENCES

1. Sampson HA, Muñoz-Furlong A, Bock SA, et al. Symposium on the definition and management of anaphylaxis: summary report. *J Allergy Clin Immunol* 2005;115:584–591. [PubMed: 15753908]
2. Sampson HA, Muñoz-Furlong A, Campbell RL, et al. Second symposium on the definition and management of anaphylaxis: summary report—Second National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network symposium. *J Allergy Clin Immunol* 2006;117:391–397. [PubMed: 16461139]
3. Bohlke K, Davis RL, DeStefano F, Marcy SM, Braun MM, Thompson RS. Vaccine Safety Datalink Team. Epidemiology of anaphylaxis among children and adolescents enrolled in a health maintenance organization. *J Allergy Clin Immunol* 2004;113:536–542. [PubMed: 15007358]
4. Joint Task Force on Practice Parameters, American Academy of Allergy, Asthma and Immunology, American College of Allergy, Asthma and Immunology, Joint Council of Allergy, Asthma and Immunology. The diagnosis and management of anaphylaxis: an updated practice parameter. *J Allergy Clin Immunol* 2005;115(3):S483–S523. [PubMed: 15753926]
5. Clark S, Bock SA, Gaeta TJ, Brenner BE, Cydulka RK, Camargo CA. Multicenter Airway Research Collaboration-8 Investigators. Multicenter study of emergency department visits for food allergies. *J Allergy Clin Immunol* 2004;113:347–352. [PubMed: 14767453]
6. Clark S, Long AA, Gaeta TJ, Camargo CA Jr. Multicenter study of emergency department visits for insect sting allergies. *J Allergy Clin Immunol* 2005;116:643–649. [PubMed: 16159637]
7. Yocum MW, Butterfield JH, Klein JS, Volcheck GW, Schroeder DR, Silverstein MD. Epidemiology of anaphylaxis in Olmsted County: a population-based study. *J Allergy Clin Immunol* 1999;104:452–456. [PubMed: 10452770]
8. Melton LJ III. History of the Rochester Epidemiology Project. *Mayo Clin Proc* 1996;71:266–274. [PubMed: 8594285]
9. Kurland LT, Molgaard CA. The patient record in epidemiology. *Sci Am* 1981;245:54–63. [PubMed: 7027437]
10. Klein JS, Yocum MW. Underreporting of anaphylaxis in a community emergency room. *J Allergy Clin Immunol* 1995;95:637–638. [PubMed: 7852677]
11. Brown SG, Blackman KE, Stenlake V, Heddle RJ. Insect sting anaphylaxis: prospective evaluation of treatment with intravenous adren-aline and volume resuscitation. *Emerg Med J* 2004;21:149–154. [PubMed: 14988337]
12. Bock SA, Muñoz-Furlong A, Sampson HA. Fatalities due to anaphylactic reactions to foods. *J Allergy Clin Immunol* 2001;107:191–193. [PubMed: 11150011]
13. Pumphrey RS. Lessons for management of anaphylaxis from a study of fatal reactions. *Clin Exp Allergy* 2000;30:1144–1150. [PubMed: 10931122]
14. 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. [PubMed: 1294076]
15. Lieberman P. Biphasic anaphylactic reactions. *Ann Allergy Asthma Immunol* 2005;95:217–226. [PubMed: 16200811]
16. Ellis AK, Day JH. Incidence and characteristics of biphasic anaphylaxis: a prospective evaluation of 103 patients. *Ann Allergy Asthma Immunol* 2007;98:64–69. [PubMed: 17225722]

17. Lee JM, Greenes DS. Biphasic anaphylactic reactions in pediatrics. *Pediatrics* 2000;106:762–766. [PubMed: 11015520]
18. Smit DV, Cameron PA, Rainer TH. Anaphylaxis presentations to an emergency department in Hong Kong: incidence and predictors of biphasic reactions. *J Emerg Med* 2005;28:381–388. [PubMed: 15837017]
19. Stark BJ, Sullivan TJ. Biphasic and protracted anaphylaxis. *J Allergy Clin Immunol* 1986;78:76–83. [PubMed: 3722636]
20. Douglas DM, Sukenick E, Andrade WP, Brown JS. Biphasic systemic anaphylaxis: an inpatient and outpatient study. *J Allergy Clin Immunol* 1994;93:977–985. [PubMed: 8006319]
21. Lieberman P, Decker W, Camargo CA Jr, O'Connor R, Oppenheimer J, Simons FE. SAFE: a multidisciplinary approach to anaphylaxis education in the emergency department. *Ann Allergy Asthma Immunol* 2007;98:519–523. [PubMed: 17601263]

Table 1**National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network Criteria^a****Anaphylaxis is likely when any 1 of the 3 criteria are fulfilled:**

1. Acute onset of an illness (minutes to several hours) with involvement of the skin, mucosal tissue, or both (eg, generalized hives, pruritus or flushing, swollen lips, tongue, or uvula)

AND AT LEAST 1 OF THE FOLLOWING

- a. Respiratory compromise (eg, dyspnea, wheeze or bronchospasm, stridor, reduced peak expiratory flow, hypoxemia)
- b. Reduced blood pressure or associated symptoms of end-organ dysfunction (eg, hypotonia [collapse], syncope, incontinence)
2. Two or more of the following that occur rapidly after exposure to a likely allergen for that patient (minutes to several hours):
 - a. Involvement of the skin or mucosal tissue (eg, generalized hives, itch or flush, swollen lips, tongue, or uvula)
 - b. Respiratory compromise (eg, dyspnea, wheeze or bronchospasm, stridor, reduced peak expiratory flow, hypoxemia)
 - c. Reduced blood pressure or associated symptoms (eg, hypotonia [collapse], syncope, incontinence)
 - d. Persistent gastrointestinal tract symptoms (eg, crampy abdominal pain, vomiting)
3. Reduced blood pressure after exposure to known allergen for that patient (minutes to several hours):
 - a. Infants and children: low systolic blood pressure (age specific) or >30% decrease in systolic blood pressure^b
 - b. Adults: systolic blood pressure <90 mm Hg or >30% decrease from that person's baseline

^aData are used with permission from Sampson et al.²

^bLow systolic blood pressure for children is defined as less than 70 mm Hg from 1 month to 1 year, less than (70 mm Hg + [2 × age]) from 1 to 10 years, and less than 90 mm Hg from 11 to 17 years.

Table 2**Patient Demographics and Inciting Allergens^a**

Variable	Finding (n = 134)
Female	74 (55.2)
Age, y	
Mean (SD)	29.3 (18.5)
Range	0.8–78.2
Race	
White	113 (84.3)
Hispanic	1 (0.8)
Black	4 (3.0)
Asian/Pacific	3 (2.2)
Islander	
Other	1 (0.8)
Unknown	12 (9.0)
Inciting allergen	
Food	51 (38.1)
Insect sting	26 (19.4)
Medication	11 (8.2)
Contrast agent	0
Other	13 (9.7)
Unspecified	33 (24.6)

^aValues are number (percentage) unless indicated otherwise.

Table 3**Symptoms on Presentation**

Symptom	No. (%)
Mucocutaneous symptoms	
Diffuse urticaria	73 (54.5)
Local angioedema	64 (47.8)
Pruritus	63 (47.0)
Flushing	52 (38.8)
Local urticaria	25 (18.7)
Intraoral angioedema	17 (12.7)
Conjunctivitis	15 (11.2)
Oropharyngeal or hypopharyngeal edema	13 (9.7)
Diffuse angioedema	10 (7.5)
Diaphoresis	4 (3.0)
Chemosis/edema ocular conjunctiva	2 (1.5)
Oral pruritus	2 (1.5)
Oral and gastrointestinal tract symptoms	
Emesis	23 (17.2)
Nausea	19 (14.2)
Dysphagia	16 (11.9)
Abdominal cramping	11 (8.2)
Diarrhea	7 (5.2)
Cardiovascular system symptoms	
Tachycardia	55 (41.0)
Presyncope/lightheadedness or dizziness	17 (12.7)
Chest pain	14 (10.5)
Hypotension	10 (7.5)
Arrhythmia	5 (3.7)
Headache	4 (3.0)
Syncope	4 (3.0)
Bradycardia	2 (1.5)
Orthostatic hypotension	0
Seizures	0
Shock with fall in blood pressures	0
Respiratory tract symptoms	
Dyspnea/difficulty breathing	60 (44.8)
Tightness/fullness of the throat	57 (42.5)
Wheezing/bronchospasm	31 (23.1)
Cough	15 (11.2)
Hoarseness/raspy voice	11 (8.2)
Rhinitis	8 (6.0)
Laryngeal edema	5 (3.7)
Cyanosis	4 (3.0)

Symptom	No. (%)
Stridor	3 (2.2)
Aphonia	3 (2.2)

Table 4

Association Between Patient Characteristics and Having Self-Injectable Epinephrine Prescribed at Dismissal From the Emergency Department

Factor	No. of patients (n = 134)	Prescribed self-injectable epinephrine, No. (%)	Univariate analysis <i>P</i> value	Multivariate analysis results
Inciting allergen				
Food	51	19 (37)	.90	OR, 4.0; 95% CI, 1.6–10.5 ^a ; <i>P</i> = .004
Insect stings	26	15 (58)	.013	
All others	24	6 (25)	.19	
Unspecified	33	9 (27)	.20	
Treatment				
Epinephrine			.004	OR, 3.6; 95% CI, 1.6–7.9; <i>P</i> = .001
Yes	63	31 (49)		
No	71	18 (25)		
Antihistamine			.85	
Yes	97	35 (36)		
No	37	14 (38)		
Systemic corticosteroids			.55	
Yes	62	21 (34)		
No	72	28 (39)		
Respiratory tract treatment			.93	
Yes	16	6 (38)		
No	118	43 (36)		
Presenting symptoms				
Gastrointestinal tract			.39	
Yes	51	21 (41)		
No	83	28 (34)		
Cardiovascular system			.29	
Yes	88	35 (40)		
No	46	14 (30)		
Respiratory tract			.74	
Yes	106	38 (36)		
No	28	11 (39)		
History of asthma			.07	
Yes	43	11 (26)		
No	91	38 (42)		
Age group			.27	
<81 y	41	19 (46)		
18–49 y	75	25 (33)		
≥50 y	18	5 (28)		

Abbreviations: CI, confidence interval; OR, odds ratio.

^aThe OR is for insect sting vs non-insect sting inciting allergens.