

Prescribing trends of epinephrine autoinjectors within an urban population

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Clinical Implications

- An epinephrine autoinjector is the standard of care for anaphylaxis; however, physicians also prescribe epinephrine autoinjectors for other diagnoses.
- Further studies are needed to elucidate reasons for epinephrine autoinjector prescriptions and to develop consensus guidelines.

TO THE EDITOR:

With the rising prevalence of food allergies and other atopic conditions, there has been a similar rise in rates of anaphylaxis.¹ Guidelines recommend a prescription for an epinephrine autoinjector (EA) for any patient with a known trigger of anaphylaxis (ie, food, latex, exercise, insect sting), idiopathic anaphylaxis, or receiving treatment with allergy immunotherapy or omalizumab.² Referral to an allergy specialist for additional evaluation and management is also advised. Although guidelines clearly emphasize the prescription of EAs for those at risk for anaphylaxis, there are studies that indicate that physicians also prescribe EAs for other conditions, such as angioedema (without other symptoms) and adverse reactions to medications.^{3,4} Thus, we conducted a retrospective analysis of EA prescribing patterns within an urban adult population that attended the internal medicine practice at a large tertiary care hospital.

A retrospective review of electronic medical records (EMR) of patients who received their primary care at Mount Sinai Hospital (New York, NY) between July 1, 2008, and July 1, 2010, that had EA prescriptions was performed. The medical records were reviewed for demographics, medical history, and diagnosis codes associated with the EA prescriptions. Descriptive statistics were used to analyze the data. This study was approved by the Mount Sinai Institutional Review Board with a waiver of consent.

From 2008 to 2010, 20,747 patients were seen for primary care services at Mount Sinai Hospital: 32.2% African American, 15.8% white, and 15.6% Hispanic. A total of 330 EMRs (1.6%) fulfilled the aforementioned search criteria. The median age of these patients was 45 years (range, 21–82 years). The majority were women (82.4%), African American (35.2%), and Hispanic (31.2%).

The most common diagnosis associated with EA prescriptions was food allergy (57%), followed by angioedema (9.4%) (Table I). Additional diagnoses associated with an EA prescription included urticaria, venom allergy, asthma, allergen immunotherapy, drug allergy, angiotensin converting enzyme inhibitor (ACEI)/angiotensin II receptor blocker (ARB)-induced angioedema, idiopathic anaphylaxis, and radiocontrast allergy. African Americans accounted for the majority of patients who received EA for asthma (60%) and ACEI/ARB-induced angioedema (62.5%).

Fifty percent of the EAs were prescribed by primary care physicians (PCP), 21% by allergists, 3% by emergency department physicians, and 6% by other subspecialty physicians

(Table II). Excluding food allergy, asthma, and allergen immunotherapy, the majority of the remaining EA prescriptions were ordered by PCPs. Fifteen (4.5%) were prescribed the junior dose EA (0.15 mg) by either a PCP or a nonallergy specialist despite having weights >66 lb. Six had a history of comorbid cardiac disease. Sixty percent of patients with EA prescriptions were referred for allergy specialty evaluation (Table I). None of the patients prescribed EAs for venom allergy were referred for allergy evaluation.

EA prescribing information states that indications include treatment of allergic reactions, type 1, including anaphylaxis to stinging and biting insects, allergy immunotherapy, foods, drugs, diagnostic substances, and other allergens as well as idiopathic anaphylaxis or exercise-induced anaphylaxis. In this study, 1.6% of adults were prescribed EAs. The most common associated diagnosis was food allergy, which is in line with guidelines. However, the second most common diagnosis was angioedema. There are no standard recommendation for EA prescription for patients with symptoms of angioedema that is not part of a larger anaphylactic reaction, and, in fact, epinephrine is not within the treatment guidelines for hereditary or ACEI-induced angioedema.⁵ Although epinephrine is indicated for treatment of anaphylaxis, there are no guidelines that support the prescription of EAs for patients with other diagnoses, for example, asthma.

The standard prescribing dose is 0.3 mg for anyone >66 lb. In our study, 4.5% of patients were given the junior dose (0.15 mg). The reasons for prescribing the low-dose EA are unclear based on a review of the EMRs. Notably, 40% of these patients had documented comorbid cardiac disease. Although case reports of severe complications (ie, ventricular dysrhythmias, angina, myocardial infarction) after epinephrine administration have been published for adults with cardiac comorbidities, these have generally been a result of administering an incorrect dose of epinephrine in an incorrect route at an inappropriate dilution,^{6–8} which would be unlikely to occur with a prefilled autoinjector. World Allergy Organization guidelines state that “epinephrine is not contraindicated in the treatment of anaphylaxis in patients with known or suspected cardiovascular disease or in middle-aged or elderly patients without any history of coronary artery disease who are at increased risk of acute coronary syndrome only because of their age.”⁹ Therefore, further education for clinicians is required regarding the dosing of epinephrine for anaphylaxis even in the setting of cardiac comorbidity. Alternatively, the incorrect dose of EA may be due to EMR entry errors, which highlights another potential area for education. Because underdosing of epinephrine may contribute to increased morbidity in anaphylaxis, “safety nets” should be incorporated into EMR systems to flag inappropriate doses of medications.

Nearly 80% of the EAs were prescribed by nonallergy physicians, but only two-thirds of the patients were referred to an allergist for evaluation and management. Thus, increased awareness of allergists’ expertise in atopic conditions that place patients at risk for anaphylaxis is necessary. An interesting finding was that EAs prescribed for venom allergy were primarily from PCPs, but none of these patients were referred to an allergy specialist. Venom immunotherapy is a well-established, effective treatment to reduce the risk of anaphylaxis; however, these

TABLE I. Diagnosis associated with EA prescription and patient demographics

Diagnosis associated with EA prescription	Patients prescribed EA, % (no.)	Women, % (no.)	Age (y), mean (range)	Patients referred to allergist, % (no.)
Food allergy	57.0 (188)	80.9 (152)	45 (23-82)	67.6 (127)
Angioedema	9.4 (31)	80.6 (25)	48 (26-77)	77.4 (24)
Urticaria	5.5 (18)	77.8 (14)	45 (25-76)	50 (9)
Venom allergy	5.2 (17)	88.2 (15)	48 (29-73)	0 (0)
Asthma	4.5 (15)	93.3 (14)	45 (28-72)	66.7 (10)
Allergy immunotherapy	3.9 (13)	84.7 (11)	34 (28-78)	100 (13)
Other	3.3 (11)	63.6 (7)	36 (25-73)	18.2 (2)
Allergy	3.0 (10)	100 (10)	53 (26-65)	30 (3)
Drug allergy	3.0 (10)	100 (10)	53 (21-62)	60 (6)
ACEI/ARB related angioedema	2.4 (8)	87.5 (7)	59 (33-72)	50 (4)
Idiopathic anaphylaxis	2.4 (8)	75 (6)	49 (28-68)	75 (6)
Radiocontrast allergy	0.3 (1)	100 (1)	57	100 (1)

ACEI, Angiotensin converting enzyme inhibitor; ARB, angiotensin II receptor blocker; EA, epinephrine autoinjector.

TABLE II. Prescribers of EA by specialty and diagnosis associated with EA

Diagnosis associated with an EA prescription	EA prescriptions by specialty, % (no.)			
	PCP	Allergist	ED physician	Other subspecialist
Food allergy	39.9 (75)	20.7 (39)	2.1 (4)	1.6 (3)
Angioedema	77.4 (24)	19.3 (6)	0 (0)	3.2 (1)
Urticaria	61.1 (11)	16.7 (3)	11.1 (2)	11.1 (2)
Venom allergy	94.1 (16)	0 (0)	0 (0)	5.9 (1)
Asthma	46.7 (7)	26.7 (4)	13.3 (2)	13.3 (2)
Allergy immunotherapy	0 (0)	100 (13)	0 (0)	0 (0)
Other	54.5 (6)	0 (0)	0 (0)	45.5 (5)
Allergy	100 (10)	0 (0)	0 (0)	0 (0)
Drug allergy	50 (5)	0 (0)	0 (0)	50 (5)
ACEI/ARB-related angioedema	62.5 (5)	25 (2)	12.5 (1)	0 (0)
Idiopathic anaphylaxis	75 (6)	12.5 (1)	12.5 (1)	0 (0)
Radiocontrast allergy	100 (1)	0 (0)	0 (0)	0 (0)

ACEI, Angiotensin converting enzyme inhibitor; ARB, angiotensin II receptor blocker; EA, epinephrine autoinjector; ED, emergency department; PCP, primary care physician.

results suggest that PCPs may not be aware of this, which indicates that further education is warranted.

Limitations of this study include a small sample size from 1 institution that may not be representative of other general internal medicine populations, and the retrospective nature of the study, which prevents verification of the completeness and quality of the data. Despite these limitations, this study provides insight into prescribing patterns of EAs for adult patients. Routine evaluation of adequate dosing, technique, and indications for EA prescriptions are necessary by all clinicians. Although epinephrine is the standard of care for the treatment for anaphylaxis, there are no consensus guidelines regarding prescription of EAs for other diagnoses. In addition to providing EA prescriptions, referral to an allergy specialist is advised to ensure accurate diagnosis and management. Further studies are needed to elucidate reasons for EA prescriptions and to develop guidelines for clinicians.

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