

Epinephrine auto-injector use and demographics in a Veterans Administration population

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ABSTRACT

The epinephrine auto-injector has been widely used over a long period of time. Certain aspects of this therapy and demographic data, however, have not been well studied. This study investigates patient use and understanding of epinephrine auto-injector use. As part of an ongoing quality assurance program, we evaluated 66 patients who had been given an epinephrine auto-injector and followed in the Allergy and Immunology Clinics at the West Los Angeles Veterans Medical Center. Data analyzed included patient demographics, medical indications for epinephrine auto-injector prescriptions, and the patient's understanding and use of the device. The mean age of our patients was 50 years. There were 44 men (66.7%) and 22 women (33%). Twenty-three patients were prescribed epinephrine auto-injector for adverse food reactions. Ninety-two percent (92%) of the patients knew how to use their epinephrine auto-injector properly, however, only 58% carried their device with them consistently. Of the patients, 91% understood why the auto-injector was prescribed. Of the total patients prescribed epinephrine auto-injector, 79% refilled their medication before the 1 year expiration date. Only 12% of the patients studied had required the use of their auto-injector. Most patients knew how and when to administer their epinephrine auto-injector. Despite detailed instructions in a specialty clinic only a slight majority carried it consistently. These data clearly indicate that further patient education or other measures are needed to improve compliance and effective use.

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Anaphylaxis is a serious allergic reaction that is usually rapid in onset and may cause death. The mainstay of treatment for these severe allergic reactions is parenteral epinephrine.¹ It is a sympathomimetic α - and β -adrenergic agonist² that can reverse the symptoms of anaphylaxis. The α 1-adrenergic effects reverse hypotension and decrease mucosal edema.² The β 2-adrenergic effects help relieve airway obstruction and decrease mediator release from mast cells.³ Before the advent of the epinephrine auto-injector, this lifesaving treatment was often limited to use in a clinic, hospital, or emergency room setting. With the epinephrine auto-injector (EpiPen, Dey Pharma, Basking Ridge, NJ), patients have a convenient method of carrying and delivering this treatment safely and effectively.

Because of ease of administration, the EpiPen has been widely prescribed. Past studies have evaluated availability and usage, and many have shown that pediatric patients and their families fail to show correct use of their device.^{4,5} This may be caused by inadequate training of the patient or family member by the practitioner. Many medical professionals themselves are unable to correctly demonstrate the correct use of an auto-injector.^{5–7} This is in part because many clinics do not have a placebo trainer to educate providers and patients on proper usage. One study showed that 49% of physicians who prescribed an epinephrine auto-injector did not give any form of education to patients, while only 7% demonstrated the use of the device with an actual trainer.⁶ Another study revealed that only 17% of providers demonstrated use of the device with an actual trainer.⁵

Another key factor in the use of an epinephrine auto-injector is the immediate availability by the patient who may require it. Often, patients do not carry it with them regularly, leaving the device behind at home or in their car. One study showed that 86% of pediatric patients and their families reported having their device with them at all times, but only 71% were able to produce their EpiPen at the time of their clinic visit.⁵ In addition, patients do not always check and renew their auto-injector when it expires. In this same study, 10% of the patients who brought their device to the clinic were carrying an expired dose.⁵

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The use of the EpiPen may be a lifesaving procedure that can be easily carried and administered by patients. However, not all patients are able to use the medication properly when indicated. To our knowledge, there has been no study analyzing the use of an epinephrine auto-injector in a veteran's population.

METHODS

During the year 2009, patients presenting to the Allergy and Immunology Clinics at West Los Angeles Veterans Medical Center from January 1, 2009 to July of 2009 who had been prescribed an epinephrine auto-injector were eligible for this study. A survey was conducted of 66 patients during a 6-month period from January 1, 2009 to July 31, 2009. A set of questions regarding their auto-injector were asked of all patients and were recorded. Descriptive statistics (mean, standard deviation, median, interquartile range, and frequency distribution) were used to analyze patient data. We used two sample *t*-tests or Wilcoxon rank sum test to compare continuous variables of two groups, and chi-squared or Fisher's exact test to compare categorical variables. All tests were two-sided and a value of $p < 0.05$ was considered statistically significant.

The EpiPen prescriptions were divided into groups based on the treatment diagnosis. The five groups were food allergy, drug allergy, angioedema, stinging insect, and other. The drug reaction group in our study included the patients who received the epinephrine auto-injector prophylactically for xolair injections. This accounted for 9 of the 19 patients in this group. The other group consisted of one case of severe asthma, one case of tongue swelling, one case of cold-induced anaphylaxis, and two cases of angioedema attributed to systemic lupus erythematosus.

RESULTS

A total of 66 patients completed the survey during the study time period. The mean age of our patients was 50 years. There were 44 men (66.7%) and 22 women (33%). Ninety-one percent of our patients received their device from an allergist. Eighty-eight percent of our patients had never used their EpiPen. Ninety-one percent of patients knew why they were prescribed their auto-injector. Fifty-eight percent of patients carried their epinephrine auto-injector with them at all times. Ninety-two percent of patients knew how to use their auto-injector. In regard to epinephrine auto-injector prescription refills, 58% of our patients had received their device more than a year ago and were eligible to refill their prescription. Seventy-nine percent of these patients refilled their prescription (Table 1).

Ninety-five percent of patients who carried their EpiPen with them also refilled them. Only 59% of

Table 1 Data for 66 patients with epinephrine auto-injector prescriptions

	No. of Patients (%)
Prescription by an allergist	60 (91)
Prescription by nonallergist	6 (9)
Self-administered epinephrine	8 (12)
Did not administer epinephrine	58 (88)
Understood why prescribed	60 (91)
Did not understand why prescribed	6 (9)
Carried regularly	38 (58)
Did not carry regularly	28 (42)
Understood how to use	60 (92)
Did not understand how to use	5 (8)
Refilled	30 (79)
Not refilled	8 (21)
Diagnosis	
Food allergy	23 (35)
Drug allergy	19 (29)
Angioedema (idiopathic or autoimmune)	16 (24)
Stinging insect	3 (5)
Other	5 (8)

patients that refilled their epinephrine auto-injector did not carry it with them. One hundred percent of patients that carried their device knew why it was prescribed and how to use it. Only 12% of the patients studied had required the use of their epinephrine auto-injector (Table 2). Tables 3 and 4 show that patients who understood why the auto-injector was prescribed and knew how to use it were more likely to refill their device and to carry it.

DISCUSSION

Our data showed that over one-half of our patients (58%) reported carrying their epinephrine auto-injector with them at all times. This number is surprisingly low given the fact that almost all of our patients (91%) are prescribed their device by the Allergy and Immunology specialty clinic and were properly instructed in the usage. A pediatric study has previously shown that 86% of patients and their families reported carrying their EpiPen with them at all times.⁵ The mean age of these children was 6.4 years old, and it was the children's families who were often carrying the medication. Another study showed that 78% of families whose children had been prescribed the EpiPen carried it with them almost always.⁸

Our study showed that 100% of the patients who carried their EpiPen knew why it was prescribed and how to correctly use it. There was a statistically significant difference compared with the group of patients

Table 2 Carrying status of patients prescribed epinephrine auto-injector

	Patients Who Carry Regularly	Patients Who Did Not Carry	<i>p</i> Value
No. of patients	38	28	—
Age (yr)	50.76 ± 1	49.96 ± 1	0.814
Male	26	18	0.795
Female	12	10	
Food allergy	12	11	0.626
Drug allergy	12	7	
Angioedema (idiopathic or autoimmune)	8	8	
Stinging insect	3	0	
Other	0	0	
Prescribed by allergist	33	27	0.23
Prescribed by nonallergist	5	1	
Refilled	20	10	0.024*
Not refilled	1	7	
Self-administered epinephrine	7	1	0.124
Did not administer	31	27	
Visited ED for diagnosis	12	10	0.797
Never visited ED	25	18	
Understood why prescribed	38	22	0.004
Did not understand why prescribed	0	6	
Understood how to use	38	22	0.009
Did not understand how to use	0	5	

*Twenty-eight patients had prescriptions <1 yr old that had not yet expired. ED = emergency room department.

Table 3 Knowledge about epinephrine auto-injector prescription

	Understood Why Prescribed	Did Not Understand Why Prescribed	<i>p</i> Value
No. of patients	60	6	—
Refilled	26	4	0.046*
Not refilled	6	2	
Carries regularly	38	0	0.004
Did not carry regularly	22	6	
Understood how to use	58	2	0.002
Did not understand how to use	2	3	

*Twenty-eight patients had prescriptions <1 yr old that had not yet expired.

Table 4 Knowledge about epinephrine auto-injector use

	Understood How to Use	Did Not Understand How to Use	<i>p</i> Value
No. of patients	60	5	—
Refilled	27	3	0.026*
Not refilled	5	2	
Carries regularly	38	0	0.009
Did not carry regularly	22	5	
Understood why prescribed	58	2	0.002
Did not understand why prescribed	2	3	

*Twenty-eight patients had prescriptions <1 yr old that had not yet expired.

who did not carry their epinephrine auto-injector regularly. Some of these patients did not know why it was prescribed (21%) or how to use it (19%). This shows the importance and influence of proper education by the practitioner on patient behavior. Furthermore, patients who carried their epinephrine auto-injector were more likely to refill their prescription (95%) versus patients who did not carry their auto-injector (59%; $p < 0.05$). Patients were no more likely to carry or refill their EpiPen based on their ages, genders, underlying diagnoses, or emergency room visits. This is surprising in that we assumed those who required emergency room visits would be more likely to carry their EpiPen.

The number of patients reporting to know how to use their epinephrine auto-injector may have been overestimated because they were not required to demonstrate it in front of the provider. Also, given that the survey was conducted in person and over the phone with the physician instead of as an anonymous questionnaire could have biased the results. When dividing the diagnoses for which a patient was prescribed an auto-injector, there is an overestimation of the prevalence in the group designated "drug reaction." All patients in our clinic who are receiving omalizumab are automatically given an EpiPen and were included in this group.

Experts recommend instructions be given on how to correctly use an EpiPen to patients at the time the prescription is written.⁹ For the use of an epinephrine auto-injector to be a success, there are a number of steps that need to be taken. First, every medical professional who prescribes an EpiPen must have a placebo trainer in their clinic and must know how to properly use it themselves. Second, patients must be aware of the diagnosis that requires the epinephrine auto-injector prescription. Third, the provider must teach patients the correct indications for auto-injector use. Fourth, the practitioner must provide a hands-on demonstration to the patients using a placebo trainer. Fifth, patients should be asked to redemonstrate proper technique with the trainer. Finally, patients

should be periodically reminded and questioned about their EpiPen status on subsequent clinic visits.

Education about diagnosis, the reason the epinephrine auto-injector is needed, knowing when and how to use, are all important factors in helping patients carry the auto-injector. Patient education is paramount and must come from the medical provider. Overall, patients who understood why they were prescribed an epinephrine auto-injector and understood how to correctly use it were more likely to carry it with them and more likely to refill their prescription.

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