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Epinephrine Autoinjector Prescribing Patterns in an Urban Pediatric Population

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To the Editor

In the United States, the rate of anaphylaxis related hospitalizations has increased by approximately 62% from 2.4/100,000 in 2001 to 3.8/100,000 in 2012.¹ Epinephrine is the standard of care for anaphylaxis²; current guidelines recommend an epinephrine autoinjector (EAI) for patients at risk for anaphylaxis (including food allergy, venom allergy, latex allergy, and idiopathic anaphylaxis) and those who are receiving treatment with allergy immunotherapy, palivizumab or omalizumab.³ Referral to an allergy specialist for additional evaluation is also recommended. Despite these guidelines, studies within adult populations indicate that physicians also prescribe EAI for conditions that do not pose a risk of anaphylaxis.^{4,5,6} A recent study in our department at the Mount Sinai Health System (New York, NY) highlighted these discrepancies.⁴ Angioedema, which is not a distinct risk factor for anaphylaxis, was the second most common diagnosis associated with EAI prescription.⁴ Non-allergist physicians were responsible for nearly 80% of adult EAI prescriptions at Mount Sinai, but only two-thirds of patients who had received EAI prescriptions were referred to allergists.⁴ EAI prescriptions are most often initiated in childhood, yet no studies have examined prescription patterns in pediatric populations specifically.

The aim of this study was to assess the current trends in pediatric epinephrine prescription in an urban population. A better understanding of prescribing patterns for EAIs can lead to improved guidelines, education, and most importantly, patient care.

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We performed a retrospective review of electronic medical records of pediatric patients who received their primary care at Mount Sinai Hospital (NY) between July 1, 2008 and July 1, 2010 who were provided with a new prescription for epinephrine. Medical records were reviewed for demographics, diagnosis codes, EAI prescription type, comorbidities, and relevant appointments. Descriptive statistics were used to analyze the data. The study was approved by the Mount Sinai Institutional Review Board with a waiver of consent.

From 2008–2010, 9148 children were seen for primary care visits at Mount Sinai, with epinephrine prescribed to 285 children. Charts with epinephrine prescriptions for palivizumab were removed (n=15); allergy specialist referral is not generally necessary for these patients. Of the remaining 270 children, the mean age was 7.4 years (range 0.5–22, SD 5.36). The majority were African American (50%) or mixed race (35.6%), English speaking (81.9%) and male (54.5%).

The majority of all prescriptions were dispensed by general pediatricians (70.4%) while allergy specialists prescribed 25.2% of EAIs. The most common diagnosis associated with the EAI prescriptions was food allergy (90%). The next most common diagnosis was angioedema (2.2%), followed by urticaria (1.9%) (Table I). Other diagnoses for which children were prescribed EAIs included venom, drug, latex, environmental, and contact allergies, allergic rhinitis, asthma, idiopathic anaphylaxis, and family history of allergy.

Many children provided with an EAI were not seen by an allergy specialist at Mount Sinai (41.1%) as of August, 2014. Of those children prescribed an EAI by a non-allergy specialist, 62.9% made an appointment to see a pediatric allergist at Mount Sinai while only 45.0% arrived at their appointment.

In our study, 3.6% of children weighing less than 25 kg were prescribed the 0.3 mg dose EAI, all of which were prescribed by general pediatricians. Additionally, 6.6% of children weighing more than 30 kg were prescribed the 0.15 mg dose, and these were prescribed by non-allergy specialists. There were no documented comorbid conditions that would have contraindicated the standard 0.3 mg dose for these children.

In summary, the majority of prescriptions for EAIs were provided for diagnoses associated with a risk of anaphylaxis, the most common being food allergy. This was also seen in our prior study within an adult population.⁴ A minority (7.0%) of patients were given an EAI for diagnoses that are not known to pose an anaphylaxis risk including angioedema, urticaria, asthma, allergic rhinitis, family history, contact allergy, and environmental allergy. General pediatricians were responsible for a vast majority (94.7%) of these EAI prescriptions. Although EAIs are currently indicated for those at risk for anaphylaxis, there are no consensus guidelines regarding their use for other conditions. Fortunately these were provided less frequently in children than in adults.⁴ Only 62.9% of children and 60% of adults with EAI prescriptions were referred to an allergist.⁴ This suggests that allergists are underutilized and increased education surrounding the role of allergists in assessing the risk of anaphylaxis is needed.

To dose epinephrine, package inserts indicate that a 0.15 mg autoinjector should be prescribed for children 15–30 kg whereas the 0.3 mg dose is appropriate for those > 30 kg.

Expert consensus suggests that children be switched to the 0.3 mg dose autoinjector when they reach 25 kg for the concern that children nearing 30 kg will be under-dosed with the 0.15 mg EAI. Several patients were prescribed an incorrect dose of epinephrine. This is of most concern in the 6.6% of children and 4.5% of adults weighing more than 30 kg who received an insufficient dose (0.15 mg) which can increase the risk of morbidity and mortality from anaphylaxis.⁴ All of these prescriptions were provided by non-allergists.

One limitation of this study is its small sample size from a single institution, limiting the generalizability of this data. Data was compiled from the electronic medical records in the Mount Sinai Health System and therefore data regarding appointments with allergy specialists at outside institutions before or after prescription are not available. Lastly, as this is a retrospective chart review it is difficult to determine clinical errors vs. errors made when documenting diagnosis code for EAI prescription, which is a separate but also important issue.

Despite these limitations, these results highlight the existing gaps in knowledge that are important to address to improve the care of our patients. Our findings are consistent with prescribing patterns seen in the adult Mount Sinai population and highlight the necessity of intervening in childhood so only correct prescriptions persist into adulthood. There is a need to develop guidelines for EAI prescriptions, encourage active communication between pediatricians and allergists, and develop better education tools for general practitioners on anaphylaxis risk factors, dosing, and the use of allergists' expertise.

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Clinical Implications

Epinephrine autoinjectors are recommended for individuals at risk for anaphylaxis. This study shows pediatricians also prescribe them for other diagnoses. These results highlight a need for better education regarding guidelines and risk factors for anaphylaxis.

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TABLE I

Diagnosis associated with EAI prescription and prescribers by specialty

Diagnosis associated with EAI prescription	Total patients, no. (%)	By specialty, no. (%)		
		General pediatrician	Allergist	Other
Food Allergy *	243 (90.0)	166 (68.3)	66 (27.2)	11 (4.5)
Anaphylaxis *	3 (1.1)	2 (66.7)	-	1 (33.3)
Venom Allergy *	3 (1.1)	3 (100)	-	-
Drug Allergy * ⁺	1 (0.4)	1 (100)	-	-
Latex Allergy *	1 (0.4)	-	1(100)	-
Angioedema	6 (2.2)	5 (83.3)	1 (16.7)	-
Urticaria	5 (1.9)	5 (100)	-	-
Allergic Rhinitis	2 (0.7)	2 (100)	-	-
Asthma	1 (0.4)	1 (100)	-	-
Environmental Allergy	1 (0.4)	1 (100)	-	-
Family History	1 (0.4)	1 (100)	-	-
Contact Allergy	1 (0.4)	1 (100)	-	-
No indication given	2 (0.7)	2 (100)	-	-

* Accepted indication ³⁺ Given for allergy to Guaifenesin-Sodium Citrate