

Partnering with Patients and Communities to Improve Prehospital Anaphylaxis Care



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In this issue of the *Journal of Allergy and Clinical Immunology: In Practice*, Miles et al¹ provide a review and meta-analysis of community epinephrine use. This is an important topic, because the lifetime prevalence of anaphylaxis is 1.6% to 5.1%, and food allergy affects 8% to 11% of children and adults in the United States.² The authors report that children with anaphylaxis are more likely to receive prehospital epinephrine than adults (20.98% vs 7.17%)¹; however, what remains striking is that less than a quarter of individuals with anaphylaxis receive prehospital epinephrine. This is concerning because epinephrine has been repeatedly placed at the forefront of anaphylaxis management for decades, and for good reason. During anaphylaxis, epinephrine quickly increases peripheral vascular resistance and cardiac output, stabilizes mast cells, and reverses bronchoconstriction and mucosal edema.² Although anaphylaxis fatality is rare, early epinephrine may confer a survival benefit to patients with anaphylaxis, and may reduce the risk for biphasic anaphylaxis.^{2,3}

Given the importance of early epinephrine use, why is it so infrequently administered? Miles et al¹ suggest several reasons including low prescription rates and lack of stock epinephrine in schools. For starters, an epinephrine device cannot be used if it is not prescribed. In the Miles' analysis, a total of 75 studies reported epinephrine prescription rates, which varied greatly. However, only 21% of studies reported epinephrine prescription

rates above 80%, whereas in 59% of studies, epinephrine prescription rates were below 50%.¹ In addition, refill prescription rates were also below 50%, suggesting that many patients may be carrying an expired device or no device at all.¹ Clearly, this must improve.

One strategy to accommodate for low epinephrine prescription rates is to consider stock epinephrine supplies. Indeed, as Miles et al highlight, evidence suggests that stock epinephrine is cost-effective not only in schools but also in aircraft.^{1,4,5} It is likely that stock epinephrine in other public venues, including food courts, concert venues, and other public areas, would also be cost-effective because device costs are spread across hundreds to thousands of lives to provide risk reduction, giving them significant value.¹ One solution would be to place self-injectable epinephrine in sites where automatic electronic defibrillators are located, with signage provided to indicate the location of life-saving devices.

The ability to leverage stock epinephrine addresses 2 sequential barriers to epinephrine access: device cost and device carriage. An epinephrine autoinjector (EAI) cannot be purchased if it is not prescribed, and cannot be carried if it is not purchased. Unfortunately, cost has become a significant barrier for many families in the past decade, an issue compounded by the recommendation that families purchase multiple supplemental devices.⁶

The mandate for multiple device carriage may serve as a disincentive to carry purchased devices. Paradoxically, just as leveraging shared decision making to conditionally activate emergency medical services (EMS) may facilitate the prompt use of an EAI during anaphylaxis,^{7,8} limiting the recommendation for carrying multiple devices only to patients who have previously experienced anaphylaxis (or anaphylaxis requiring multiple epinephrine doses) may improve device access for those who are only willing to carry a single device.⁶ Such an approach could also produce more optimal health economic outcomes. For example, when considering food allergy, universal prescription of multiple devices for all patients costs \$10,696,036 per quality-adjusted life year compared with only providing a second EAI to those with prior anaphylaxis.⁶ More to the point, it is impossible for a patient to carry a second device if the patient does not carry a first EAI, and during anaphylaxis the first dose is the most important. If a second EAI requirement impairs a patient's ability to carry any epinephrine at all, then for that patient, such a recommendation does more harm than good.

In one study of 408 patients presenting to the emergency department or urgent care, reactions occurring at home were less likely to be treated than those at school (odds ratio: 0.29, 95% confidence interval: 0.15-0.59).⁸ The impact of a reflex EMS requirement after EAI use and reluctance to follow prescribed thresholds for epinephrine administration may each be responsible for lower device use in the home. Particularly during the

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TABLE I. Considerations when prescribing an epinephrine autoinjector (EAI)

Consideration	Example
Cost and equity	Will the patient and family be able to afford the device—if so, how many can they afford? Is stock epinephrine available in the school setting?
Access and carriage	Will the patient and family be more likely to carry 1 device or 2? Are they more likely to carry one device design vs another (eg, Auvi-Q vs Epipen)?
Fear of the device	Are there psychological barriers to EAI device use? Is the fear of anaphylaxis treatment greater than the fear of anaphylaxis itself?
Knowledge and practice	Are the patient and family able to identify signs and symptoms of anaphylaxis? Have the patient and family practiced with the EAI trainer device and do they understand how to use it?
Partnership and empowerment	Will the patient and family use the EAI device at the thresholds of epinephrine use discussed and described on the action plan? Do the patient and family have empowerment for self-management of anaphylaxis?
Context and subsequent management	Are the patient and family more likely to use the EAI if it is more contextually linked to a requirement for EMS activation? Do the patient and family understand thresholds for further care?

EMS, Emergency medical services.

COVID-19 pandemic, practices of routine EMS activation after EAI administration have been re-evaluated. Reflex EMS activation compared with contextual decision making after EAI may cost more than \$1.3 billion per death prevented.⁹ The benefit provided by ambulance transport and emergency department observation to a patient with resolved symptoms after epinephrine treatment is low, provided that patients and families are educated and understand thresholds for further care. In 2020, Casale et al⁷ provided a revised anaphylaxis management algorithm leveraging a contextual approach to EMS activation that advised management at home in the setting of prompt symptom resolution. Although implementing such an approach is contingent on a process of shared clinical decision making, it does highlight an avenue for patient empowerment that may increase community EAI utilization.⁷

As a practical matter, many epinephrine devices are bulky and awkward to carry in a pocket—an issue solved to some degree by the Auvi-Q device, but with a solution hamstrung to an ever increasing degree by complicated payer models that limit access. However, even if all of these barriers were overcome, there remains the psychological aspect of having to carry self-injectable epinephrine at all times and the reality that an EAI delivers epinephrine through an intramuscular injection.¹⁰ Many patients fear using their EAI more than they fear the possibility of an allergic reaction.¹⁰ Paradoxically, for these patients, supervised elective self-injection with an allergist may improve their comfort levels. In a study by Shemesh et al,¹⁰ self-injection was associated with an immediate increase in comfort levels with the EAI by adolescent/parent pairs. Those who performed supervised self-injection had a 52% improvement in quality of life.¹⁰

Miles et al¹ make it clear that it is not enough to simply recognize anaphylaxis risk and prescribe an EAI—although these are critical steps. As clinicians, we must dig deeper to explore the implications of the EAI device for the patient and the family (Table I). Will the family be able to afford the device, and if so, how many can they afford? Will the patient be more likely to carry 1 device or 2 (and are 2 devices even necessary)? Are there psychological barriers to EAI device use? Does the patient have buy-in at the thresholds of epinephrine use described? Lastly, are they more likely to use the EAI if it is more conditionally linked to a requirement for EMS activation?

Epinephrine remains the cornerstone of anaphylaxis management, whereas enigmatically its use in prehospital treatment of anaphylaxis continues to remain anemic.^{1,2} Improving community epinephrine use will require a partnership between patients and those who care for and about them—a partnership that will involve specialists, primary care providers, emergency department clinicians, patients, families, schools, and communities on multiple levels. The strategy must consider the broad inputs responsible for nonepinephrine use and address each individually. Miles et al provided a valuable contribution and highlighted the scope of a problem that challenges effective practice to address a potentially life-threatening condition. However, with patient engagement, we can begin to rise to meet these challenges while empowering those at risk for anaphylaxis.

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