

Perspective

Overcoming barriers to effective management of food-induced anaphylaxis in underserved populations through school-based interventions



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Food allergy is an important public health concern in the United States, affecting an estimated 1 in 13 children and 2% to 3% of adults with evidence of increasing prevalence. Food exposure is the most common cause of anaphylaxis in children, and 40% of US children with food allergy will experience a severe reaction.¹ Management of food allergy centers on avoidance of the culprit food(s) and access to epinephrine autoinjectors in case of accidental exposure. Furthermore, early recognition of anaphylaxis and administration of epinephrine are essential during severe food reactions. Many people are first diagnosed with having food allergy in childhood and US children face considerable disparities in food allergy care. Lower socioeconomic status and minority race are associated with lower rates of food allergy diagnosis, decreased access to epinephrine autoinjector prescriptions, and higher rates of presentation with food-induced anaphylaxis.² Here, we review the literature regarding disparities in food-induced anaphylaxis and discuss school-based programs that attempt to address these. On this basis, we propose that the American society, particularly schools, should take responsibility for providing undesignated epinephrine autoinjectors and training to recognize anaphylaxis, to minimize the disparities in care which currently exist.

A work group report of the American Academy of Allergy, Asthma & Immunology Committee on the Underserved reviewed multiple studies that demonstrated disparities in food allergy diagnosis and management across different races and socioeconomic classes.² A study of New York City school children by Taylor-Black et al revealed that 17.5% of private school respondents had a physician-diagnosed

food allergy, compared with only 7.4% of public school respondents.² Minority children had only a 3.5% rate of physician-diagnosed food allergy, much lower than national estimates.² When a child does not carry a diagnosis of food allergy, it is challenging to quickly recognize that he or she is experiencing a severe food reaction. Undiagnosed children will not have food allergy action plans or personal epinephrine autoinjectors. Hannaway et al found that, among students in Massachusetts, White children were 5 times more likely to have been prescribed and dispensed epinephrine autoinjectors than their non-White peers.² Another study by Shah et al revealed that schools with higher socioeconomic status are 6 times more likely to have epinephrine autoinjectors available than lower socioeconomic status schools, adjusted for the number of students with reported food allergy.²

Children are particularly vulnerable to food allergen exposure in school. They spend much of the day there and may have little, if any, control over food preparation or what foods their peers bring. Within this high-risk environment, there is an opportunity to improve access to epinephrine autoinjectors for children who have previously been excluded by cost or lack of a food allergy diagnosis. With this aim, the Chicago Public Schools (CPS) developed the District-Issued Emergency Epinephrine Initiative. CPS stocked their schools with undesignated epinephrine autoinjectors and collected data regarding their use between 2012 and 2013.³ In 1 year, the epinephrine autoinjectors were used 38 times, 21 of these for food reactions. More than half of the injections (55%) were given for first-time anaphylaxis in children without a diagnosed allergy.³ This highlights the importance of access to adequate medical evaluation, which allows patients to be accurately diagnosed with food allergy. Disparities in access to this medical care are suggested by the locations where the CPS autoinjectors were administered. The North-Northwest Side of Chicago comprised 47% of all students in CPS with a documented food allergy, and 36% of the autoinjectors were administered there. Meanwhile, the Far South Side comprised only 8% of CPS students with documented

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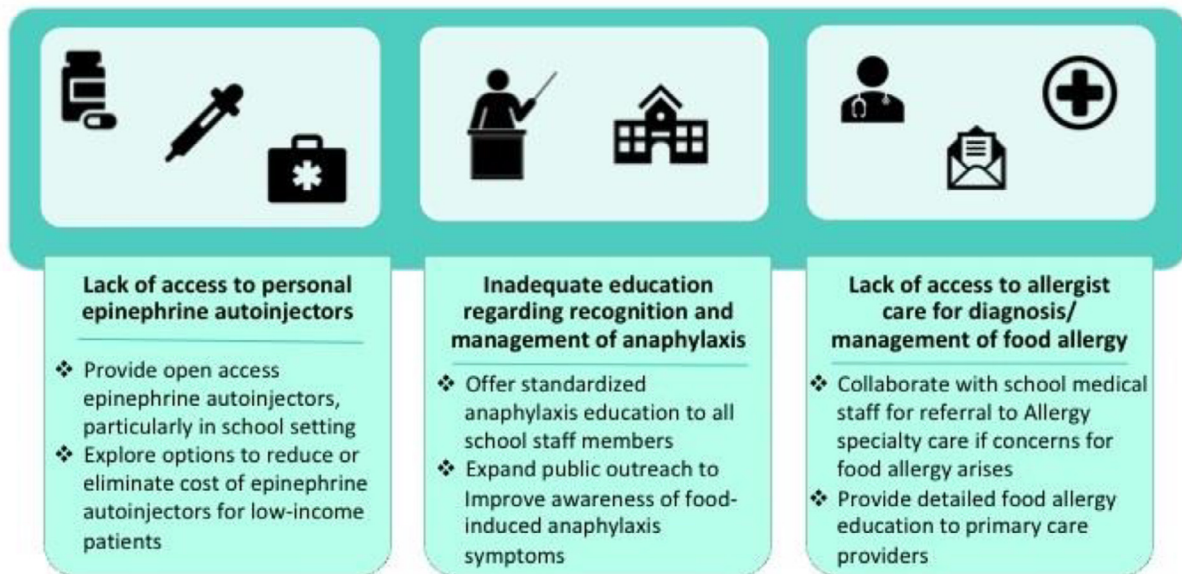


Figure 1. A summary of several key barriers that lead to disparities in the diagnosis and management of food-induced anaphylaxis. Proposed potential solutions, as described in the text, are outlined here.

food allergy, yet 26% of the autoinjectors were administered there.³ Providing access to undesignated epinephrine autoinjectors may help overcome unequal access to clinical allergy evaluation, improving outcomes by allowing any child to receive epinephrine when life-threatening food-induced anaphylaxis occurs.

Although access to epinephrine is critical, school staff must also be trained to recognize anaphylaxis to respond effectively. Data from the EpiPen4Schools program revealed deficits in anaphylaxis recognition training for school staff nationwide. The program provides EpiPen autoinjectors and training materials to more than 40,000 public and private schools in the United States.⁴ According to Hogue et al,⁴ only 31% of schools trained all their staff to recognize symptoms of anaphylaxis. This is a key concern because early recognition of anaphylaxis is essential to effective management. The ability to administer epinephrine is also limited in many schools. In the same study, 54% of schools only allowed the school nurse and select staff to administer epinephrine, and only 3% of schools permitted both students and staff to administer epinephrine autoinjectors.⁴ These percentages vary by state, likely owing to differing legislation among states regarding the ability to stock and administer epinephrine in schools. Individual districts and schools may have their own policies, which further limits the emergency administration of epinephrine. Addressing laws and policies that restrict epinephrine administration is an important step in improving the response to food-induced anaphylaxis. In addition, expanding the number of staff trained in recognition of anaphylaxis and administration of epinephrine may improve anaphylaxis outcomes, especially when anaphylaxis occurs outside of the normal school environment, including field trips and extracurriculars, where access to the school nurse is limited.

In reviewing the available data from prior studies, it is clear that there are disparities in food-related anaphylaxis diagnosis and management. These disparities and some potential solutions are illustrated in Figure 1. To overcome the key barriers of lack of knowledge to recognize anaphylaxis and lack of access to epinephrine autoinjectors, we propose that the society needs to take responsibility for improving access to this key information and medication. Particularly in the school setting, this can be done by having undesignated epinephrine autoinjectors available for use instead of requiring students to have costly individual epinephrine autoinjectors and by providing training to school staff to allow early recognition of food-induced anaphylaxis. Programs have already been implemented that reveal some success in achieving these goals, and we, as allergists, need to help advocate for expansion of similar initiatives, including development of cooperative relationships among local schools, health systems, and primary care providers to identify at-risk students and facilitate access to nearby allergists.

References

1. Parrish CP, Kim H. Food-induced anaphylaxis: an update. *Curr Allergy Asthma Rep.* 2018;32(1):165–195.
2. Davis CM, Apter AJ, Casillas A, Foggs MB, Louisias M, Morris EC, et al. Health disparities in allergic and immunologic conditions in racial and ethnic underserved populations: a Work Group Report of the AAAAI Committee on the Underserved. *J Allergy Clin Immunol.* 2021;147(5):1579–1593.
3. DeSantiago-Cardenas L, Rivkina V, Whyte SA, Harvey-Gintoft BC, Bunning BJ, Gupta RS. Emergency epinephrine use for food allergy reactions in Chicago public schools. *Am J Prev Med.* 2015;48(2):170–173.
4. Hogue SL, Goss D, Hollis K, Silvia S, White MV. Training and administration of epinephrine auto-injectors for anaphylaxis treatment in US schools: results from the EpiPen4Schools(®) pilot survey. *J Asthma Allergy.* 2016;9:109–115.