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Food allergy management and anaphylaxis preparedness in a suburban school district varies by school level

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Food allergy (FA) affects up to 8% of school-age children,[1] and management of FA in schools has become a major public health issue. Although there are few proven strategies for improving FA safety in schools, consensus guidelines recommend that all students at risk for anaphylaxis due to FA have an individualized emergency action plan (EAP), as well as an epinephrine auto-injector (EAI) available at all times.[2,3] Few studies have evaluated the percentage of children with FA with an EAP and an EAI available at school and, to our knowledge, none have evaluated for differences between school levels.[4,5] The objective of our study was to determine the percentage of students with FA who had an EAP and EAI available, according to school level in a suburban school district.

The school district we assessed had a total of 5,738 students, with a mean household income of $106,134, per United States Census data. The district was comprised of 5 elementary schools (grades K–5), 2 junior high schools (grades 6–8), and 2 high schools (grades 9–12). All 9 schools in the district were staffed with a school nurse, and each school nurse provided data for grades K–12 for the 2015–2016 school year. Data were collected at the start of the school year, and included the types of self-reported FA for each student and whether these students had an EAP and EAI available at school. Students with permission to self-carry an EAI were also required to provide an EAP to the school nurse. All schools had undesignated stock EAIs.

Data were available for 5,015 of 5,738 (87.4%) students in the district. Of the students, 2,327 (46.4%) were in grades K–5, 757 (15.1%) in grades 6–8, and 1,931 (38.5%) in grades 9–12. Of the 418 (8.33%) students who self-reported FA, 235 (56.2%) reported a peanut allergy, 196 (46.9%) a tree nut allergy, 58 (13.9%) a cow's milk allergy, 46 (11.0%) an egg allergy, and 45 (10.8%) a shellfish allergy. One hundred eighty students (43.1%) reported an allergy to other foods, including 22 (5.3%) to sesame, 18 (4.3%) to wheat, and 17 (4.1%) to soy. Forty-nine students (11.7%) reported an allergy to various fruits. There was minimal variation in the percentage of students with reported FA per grade (mean, 8.3%; range, 6.3%–10.1%, $P = .82$). There was also minimal variation in type of reported FA per grade (peanut, $P = .11$; tree nuts, $P = .66$; milk, $P = .08$; egg, $P = .12$; and shellfish, $P = .12$).

In grades K–5, the percentage of students with EAPs was 70.5% (136 of 193), as compared with 67.2% (41 of 61) of students in grades 6–8 (odds ratio [OR], 0.86; 95% confidence interval [CI], 0.46–1.59) (Fig 1). For grades 9–12, 1.8% (3 of 164) of students had an EAP, significantly lower than for grades K–5 and grades 6–8 (odds ratio, 0.01; 95% CI, 0.00–0.03).

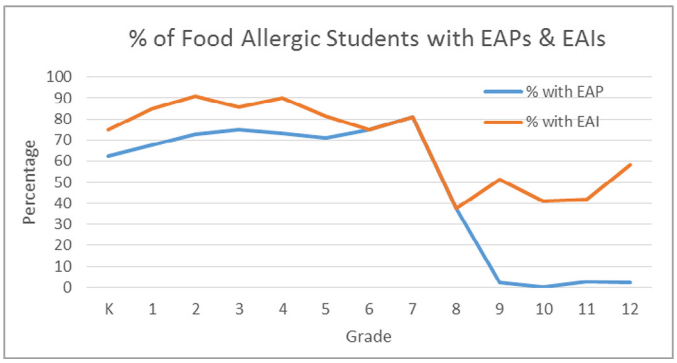

Figure 1. Percentage of food allergic students with an emergency action plan (EAP) and an epinephrine auto-injector (EAI).

In grades K–5, the percentage of students with an EAI was 85.0% (164 of 193), compared with 67.2% (41 of 61) of students in grades 6–8 (OR, 0.36; 95% CI, 0.19–0.70). For grades 9–12, 48.2% (79 of 164) of students had an EAI. Compared with grades 6–8, the OR of a student in grades 9–12 having an EAI was 0.45 (95% CI, 0.24–0.84). Compared with K–5, the OR of a student in grades 9–12 having an EAI was 0.19 (95% CI, 0.10–0.27). These figures accounted for students with permission to self-carry their EAI.

In this study, there was a significantly lower percentage of students with EAPs in grades 9–12 compared with grades K–5 and 6–8. In addition, students in grades 9–12 were less likely to have an EAI compared with students in grades K–5 and 6–8. Students in grades 6–8 were also less likely to have an EAI compared with students in K–5. Although previous studies have shown suboptimal rates for EAPs and EAIs in the school setting, to our knowledge, this is the first study to show a significant difference between high school vs middle school and elementary school students.[6] The lower percentage of students with individualized EAPs and EAIs in grades 9–12 may reflect a decreasing parental vigilance as children grow older and progress through the school system. It may also reflect the consequences of shifting responsibility for FA management in the school setting from parents to adolescents.

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Adolescence is a risk factor for poor outcomes from FA anaphylaxis due to risk-taking behaviors regarding dietary intake and failure to carry and/or use an EAI.[7] These data highlight a gap in anaphylaxis preparedness in the school setting in a known high-risk population, and identify an educational opportunity for high school students. Healthcare providers, school staff, and families should consider specifically targeting high school students to improve numbers of EAPs and EAIs at school. This would also improve adherence to guidelines for FA management and anaphylaxis preparedness in the school setting.

The most notable limitation of this study is that data were based on self-reported FAs, and this carries with it an inherent risk of overreporting of FA. This likely explains the significant proportion of reported FAs falling into the "other" category. However, the 8.33% of students with a self-reported FA in this study is just slightly higher than previously reported rates in the United States.[1] Further, this overreporting is likely to exist in all grades and would not explain the stark difference in numbers of EAPs and EAIs in grades 9–12 when compared with the lower grades. Further studies are needed to confirm whether these findings are generalizable to other school districts, including private schools, districts in different geographic regions of the country, and districts with varying socioeconomic status.

In conclusion, this study shows that, despite similar rates and types of self-reported FAs in grades K–12, there was a significantly lower percentage of students with EAPs and EAIs at school in grades 9–12 compared with grades 6–8 and K–5, thus identifying an educational opportunity within this high-risk population.

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