

ABSTRACT

Rationale: A pilot survey of US schools participating in the EPIPEN4SCHOOLS® program (Mylan Specialty L.P., Canonsburg, PA) described anaphylactic events reported during the 2013-2014 school year. Because large school districts (≥50 schools per district) were underrepresented in the findings, the survey was readministered to these large districts. Here, an updated analysis combining all school responses is presented.

Methods: This cross-sectional, web-based pilot survey assessed anaphylactic events in US schools participating in the EpiPen4Schools® program.

Results: Among 6574 responding schools, 1140 anaphylactic events were reported. Of the 1059 events with data on epinephrine auto-injector (EAI) use, 76.5% (810/1059) were treated with EAls on school property. Stock EAls from the EpiPen4Schools® program were used to treat 38.0% of events (385/1012). Of the 6088 schools reporting on staff training for anaphylaxis recognition, 37.3% (2268/6088) provided training for the school nurse and select staff; 28.2% (1717/6088) and 30.4% (1851/6088) provided training for most and all staff, respectively. More than half of schools (55.0%, 3332/6053) permitted the school nurse and select staff to administer epinephrine to treat anaphylaxis; 15.6% (942/6053) and 21.5% (1300/6053) permitted most and all staff, respectively, to administer epinephrine.

Conclusions: Thirty-eight percent of anaphylactic events were treated with EAls provided by the EpiPen4Schools® program, highlighting the importance of stocking EAls. Because a majority of schools permitted only the school nurse and select staff to treat anaphylactic reactions, students may frequently be in settings without personnel trained to treat anaphylaxis. Results emphasize the need to provide training to manage anaphylaxis and improve access to EAls in schools.

INTRODUCTION

- Anaphylaxis is a serious, acute, and potentially fatal allergic reaction¹
- Incidence of anaphylactic events among children is increasing, particularly those due to food allergies²
- With no method to accurately predict the course of anaphylaxis, the ability to recognize an anaphylactic reaction and promptly administer proper treatment is essential³
- Because many cases of anaphylaxis occur outside of the home, adequate training programs are needed to properly educate school personnel to recognize and treat anaphylactic reactions⁴
- In a study of school nurses, participants scored lower on anaphylaxis knowledge tests compared with tests concerning diabetes and asthma, 2 other disease states commonly associated with school emergencies⁵
- These collective data demonstrate that preparedness of school personnel to appropriately recognize and manage anaphylactic events varies considerably

OBJECTIVE

- To describe the characteristics of epinephrine auto-injector (EAI) use for treatment of anaphylactic events and the preparedness of staff to recognize the signs and symptoms of anaphylaxis in US schools

METHODS

- This exploratory, cross-sectional, web-based pilot survey of schools participating in the EPIPEN4SCHOOLS® program (Mylan Specialty L.P., Canonsburg, PA) examined the characteristics and treatment of anaphylactic events at each responding school during the 2013-2014 school year. Methods have been described in detail previously⁶

Data source

- Survey of schools participating in the EpiPen4Schools® program, which provides EpiPen® (epinephrine injection) Auto-Injectors* (Mylan Specialty L.P., Canonsburg, PA) to qualifying public and private kindergarten, elementary, middle, and high schools in the United States
 - Composed of 15 web-based questions, 8 of which were repeated for each anaphylactic event reported per school
 - Answered by an individual at each school with knowledge of occurrences of anaphylactic reactions and treatment(s) administered during the 2013-2014 school year (eg, school nurse)
 - Study duration
 - Initial survey: data were collected between May 21, 2014, and July 9, 2014
 - Second survey: data from large districts were collected between October 2014 and January 2015
- This combined analysis incorporated school-level results from 2 rounds of data collection, including the original exploratory survey and a follow-up survey of large school districts in the United States
 - A school was counted only once in the analysis; if a school responded during both data collections (ie, 53 schools), then the survey from the large-district data collection was selected because it was considered the most current data
 - Only school-level responses from both data collections were included in the combined analysis reported here (ie, district-level responses were excluded)

*The EpiPen4Schools® program provided 2 EpiPen® Auto-Injector 2-packs, 2 EpiPen Jr® Auto-Injector 2-packs, or 1 of each 2-pack free of charge.

Sample contact and notification

- US schools registered with the EpiPen4Schools® program (>40,000) were matched to Common Core of Data (US Department of Education, Washington, DC) or to the Private School Universe Survey (US Department of Education, Washington, DC) databases to obtain demographic and school contact information to request participation in the survey
 - 32,387 schools had available contact information
 - Sample for combined analysis was 6574 responding schools
 - Most questions included a count of missing data, as respondents were not required to answer every question

Data analysis

- Characteristics of participating schools (eg, census region, grade levels of responding schools, type and source of EAls stocked) and of anaphylactic events (eg, individual who experienced the anaphylactic event, previously known allergies, the trigger that initiated the anaphylactic event, treatment administered) were reported using descriptive statistics
 - Relative frequency of each characteristic was calculated as follows:

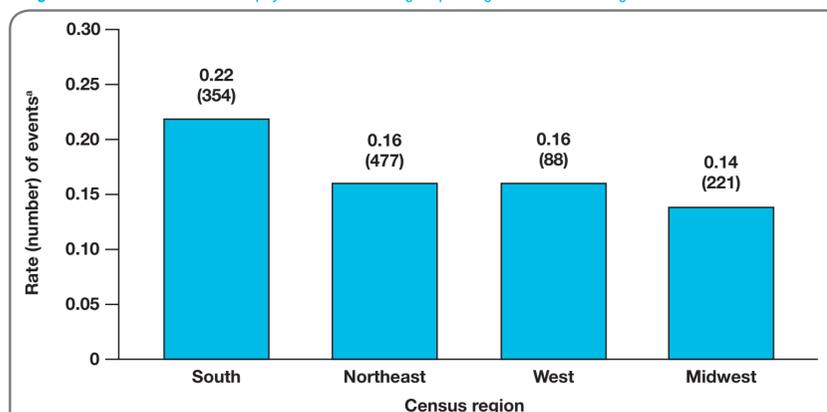
$$\frac{\text{Number of responses for particular category}}{\text{Overall number of schools responding to question}}$$
 - Missing responses were excluded from the denominator in all calculations

RESULTS

Treatment of anaphylactic events

- Among 6574 responding schools, 1140 anaphylactic events were reported
- Regional prevalence rate of anaphylactic events was highest for the South (Figure 1), with 0.22 events/school (N=354), followed by the Northeast and West (both 0.16 events/school)

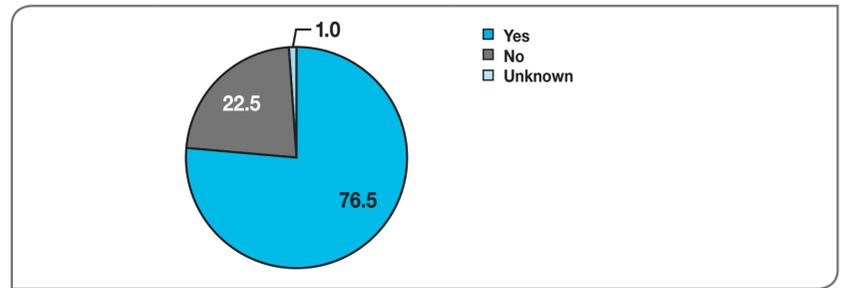
Figure 1. Rate and number of anaphylactic events among responding schools in each region.



*Rate was calculated as the number of events in each region divided by the number of schools for that specific region and did not account for the total number of students per school. Multiple events could be reported for a single school.

- More than half of schools with available information stocked ≥2 EpiPen® Auto-Injector 2-packs (57.3%, 3562/6219), 38.9% (2421/6219) stocked 1 EpiPen® Auto-Injector 2-pack, and 3.8% (236/6219) stocked no EpiPen® Auto-Injector 2-packs
- Of the 1059 events with data on EAI use on school property, 76.5% (810/1059) were treated with EAls (Figure 2)

Figure 2. Percentage of events treated with EAls on school property (n=1059).



EAI, epinephrine auto-injector.

- Of the 1012 anaphylactic events with data on EAI use on school property and use of school stock EpiPen® Auto-Injectors, 38.0% (385/1012) were treated with stock EpiPen® Auto-Injectors from the EpiPen4Schools® program, 33.7% (341/1012) were treated with a personal EpiPen® Auto-Injector, and 2.9% (29/1012) were treated with another type of EAI (Table)
 - Additionally, 17.6% of events (178/1012) were treated with an antihistamine, and 3.4% (34/1012) were treated with another alternative treatment (Table)

Table. Source and Type of Treatment of Anaphylactic Events

Type of treatment, n (%)	Total events (N=1012)
School stock EpiPen® Auto-Injector	385 (38.0)
Personal EpiPen® Auto-Injector	341 (33.7)
Other type of EAI	29 (2.9)
Unknown EAI	9 (0.9)
Antihistamine	178 (17.6)
Other treatment	34 (3.4)
Unknown treatment	5 (0.5)
No treatment given	20 (2.0)
Unknown if EAI administered	11 (1.1)

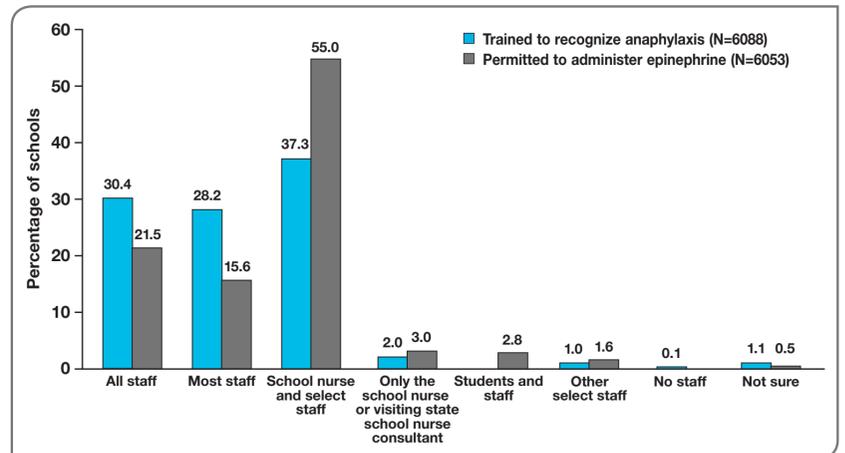
EAI, epinephrine auto-injector.

- Of the 1039 anaphylactic events with available data, 81.1% of individuals (843/1039) were transported to the hospital
- Among 1140 events, no deaths were reported

Recognition of anaphylaxis and administration of epinephrine by school staff

- Of the 6088 schools reporting on staff training for anaphylaxis recognition, 30.4% (1851/6088) provided training for all staff, 28.2% (1717/6088) provided training for most staff, and 37.3% (2268/6088) provided training for the school nurse and select staff (Figure 3)
- Of the 6053 schools reporting on staff permitted to administer epinephrine, 21.5% (1300/6053) permitted all staff, 15.6% (942/6053) permitted most staff, and 55.0% (3332/6053) permitted the school nurse and select staff (Figure 3)

Figure 3. School staff trained to recognize the signs and symptoms of anaphylaxis and staff permitted to administer epinephrine.



STRENGTHS AND LIMITATIONS

- This is the first comprehensive analysis of anaphylactic events and use of EAls in US schools
- This exploratory survey was subject to limitations such as response bias and potential measurement errors, including systematic and random variance resulting from the respondents (eg, failing to carefully read a question or misreporting an event)
- Responses were limited by the level of detailed information retained at the schools related to anaphylaxis and were subject to respondent recollection of the events
- Some larger districts could provide only aggregate data (ie, data for all schools in a district). Only school-level responses from both data collections were included in the combined analysis

DISCUSSION AND CONCLUSIONS

- 38.0% of anaphylactic events were treated with EpiPen® Auto-Injectors provided by the EpiPen4Schools® program, highlighting the importance of stocking EAls
- Because a majority of schools permitted only the school nurse and select staff to administer epinephrine, students may frequently be in settings without personnel trained to treat anaphylaxis
- Results emphasize the need to provide training to manage anaphylaxis and improve access to EAls in schools

Acknowledgments

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