

EPIPEN4SCHOOLS® Survey Combined Analysis: Prevalence and Triggers of Anaphylactic Events

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ABSTRACT

Rationale: The EPIPEN4SCHOOLS® program (Mylan Specialty L.P., Canonsburg, PA) provides EpiPen® (epinephrine injection) Auto-Injectors to qualifying public and private US schools. Results of a pilot survey described characteristics of anaphylactic events occurring in an initial set of participating schools during the 2013-2014 school year. This survey was subsequently readministered to large US school districts (≥50 schools per district), which were underrepresented in initial survey findings. Here, data from schools in large districts were added to initial findings in a comprehensive combined analysis.

Methods: A cross-sectional, web-based pilot survey was distributed to US schools participating in the EpiPen4Schools® program.

Results: A total of 1140 anaphylactic events were reported among 6574 participating US schools. Status of the affected individual was reported for 1063 events; of these, 89.5% (951/1063) occurred in students, 9.2% (98/1063) occurred in staff members, and 0.8% (8/1063) occurred in visitors. Of the events occurring in students with data on grade level (n=891), 44.9% (400/891) occurred in students in high school, 18.9% (168/891) occurred in students in middle school, and 32.5% (290/891) occurred in students in elementary school. Twenty-five percent of all reported events (262/1049) occurred in individuals with no known allergies. Triggers were reported for 1035 events. Among these, food triggers were most frequent (60.1%, 622/1035); however, triggers were unknown in 21.6% of events (224/1035).

Conclusions: The unpredictability of anaphylaxis is highlighted by the frequency of events with unknown triggers (21.6%) and of events occurring in individuals with no known allergies (25.0%). Results underscore the necessity for comprehensive preparedness training in US schools.

- 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:

$$\frac{\text{Number of responses for particular category}}{\text{Overall number of schools responding to question}}$$

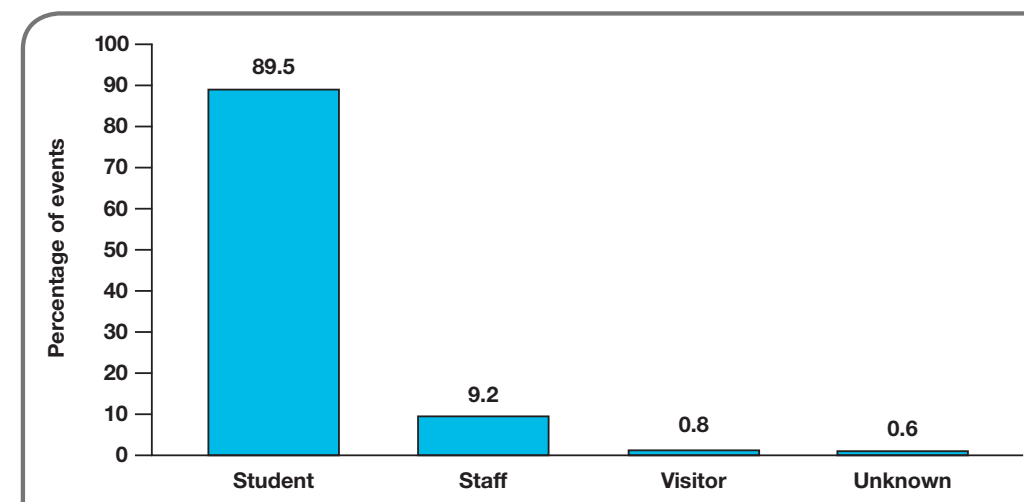
- Missing responses were excluded from the denominator in all calculations

RESULTS

Anaphylactic events

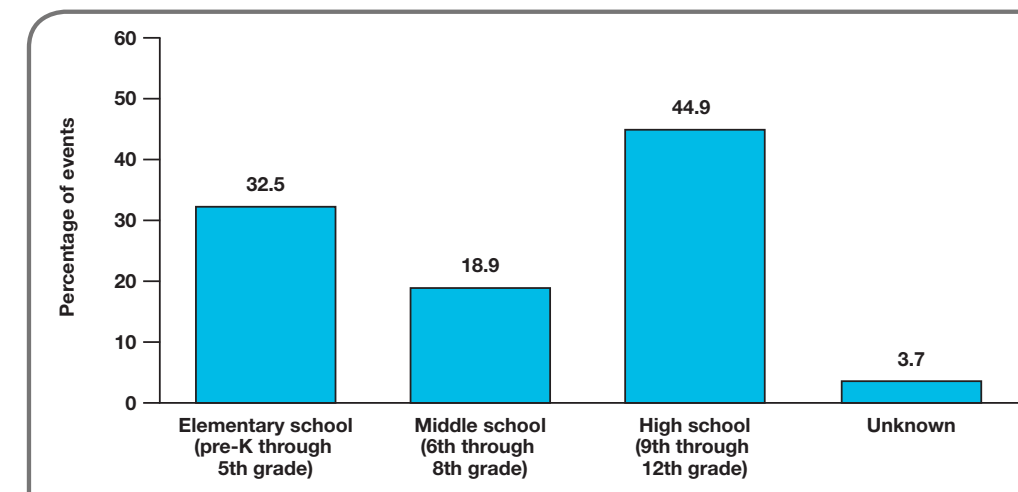
- 1140 anaphylactic events were reported among the 6574 responding schools
- Data regarding the person who had the attack were available for 1063 events. Of these, 89.5% (951/1063) occurred in students, 9.2% (98/1063) occurred in staff, and 0.8% (8/1063) occurred in visitors (Figure 1)
 - 0.6% (6/1063) occurred in individuals whose status was unknown (Figure 1)

Figure 1. Individuals who experienced a reported anaphylactic event (n=1063).



- Grade level information was reported for 891 events
 - 44.9% of events (400/891) occurred in high school students (9th through 12th grade), 18.9% (168/891) occurred in middle school students (6th through 8th grade), 32.5% (290/891) occurred in elementary school students (pre-K through 5th grade), and 3.7% (33/891) occurred in students whose grade level was unknown (Figure 2)

Figure 2. Anaphylactic events among students by grade level (n=891).

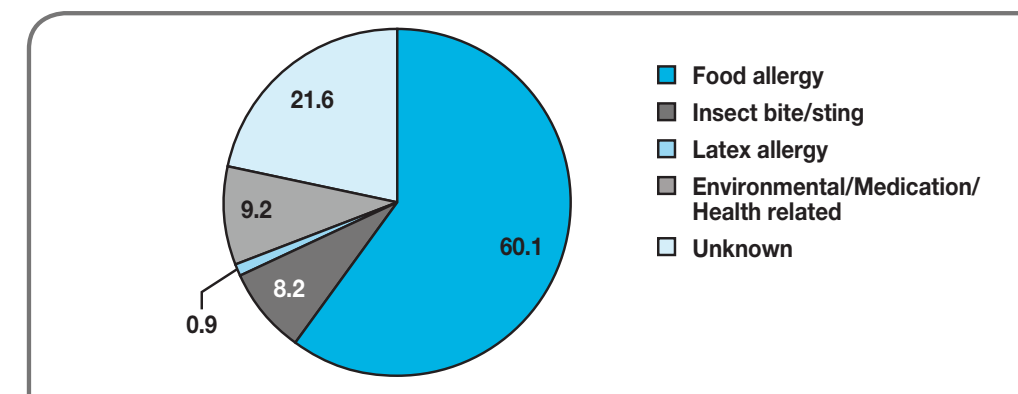


- Of the reported anaphylactic events with available information (n=1049), the majority (68.1%, 714/1049) occurred in individuals who had a known allergy, 25.0% (262/1049) occurred in individuals who had no known allergy, and 7.0% (73/1049) occurred in individuals whose preexisting allergy status was unknown

Anaphylactic triggers

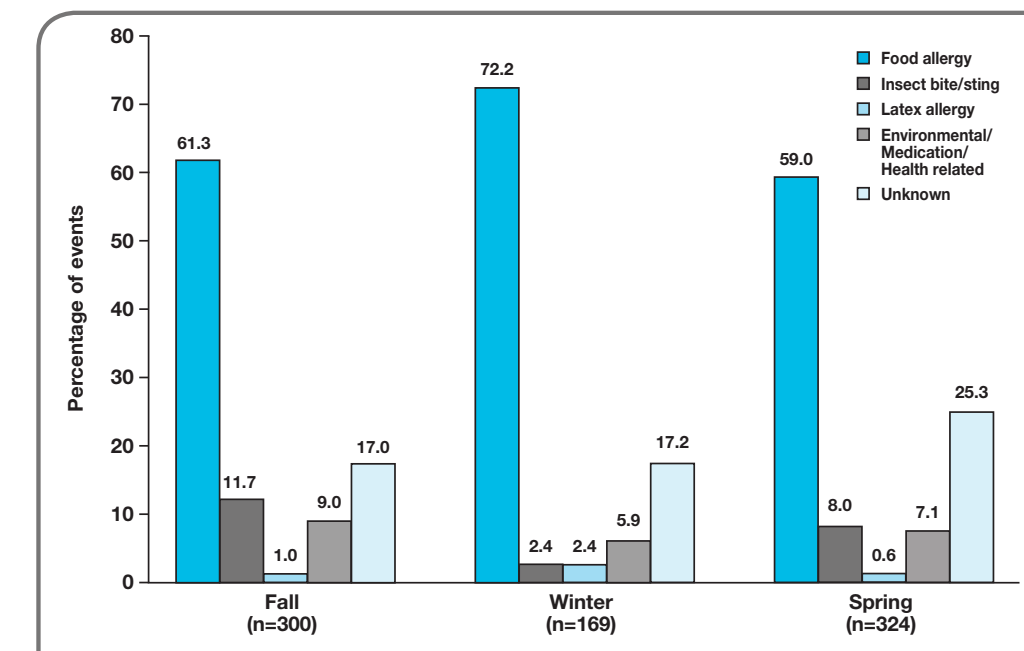
- Data on triggers were available for 1035 anaphylactic events for all students, staff, and visitors
- The most common trigger (60.1%, 622/1035) was reported as food; 8.2% (85/1035) were reported as insect bites or stings; 9.2% (95/1035) were reported as environmental, medication, or health related; and 0.9% (9/1035) were reported as latex
 - 21.6% of events (224/1035) had an unknown trigger (Figure 3)

Figure 3. Percentage of types of triggers (n=1035).



- Data were available on the seasonality of allergens that triggered 793 anaphylactic events experienced by students. Events that occurred during the summer were excluded, as not all participating schools were open
 - Fewer anaphylactic events occurred in winter (n=169) relative to fall (n=300) and spring (n=324; Figure 4)
 - Food allergy triggers remained predominant throughout the school year, while the prevalence of other triggers varied by season (Figure 4)
 - Fewer events triggered by insect stings or bites occurred in the winter compared with spring or fall (Figure 4)

Figure 4. Seasonal distribution of anaphylactic events in students (n=793).



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

- 1140 anaphylactic events were reported among 6574 schools, suggesting that anaphylaxis is not uncommon in such settings
- Most anaphylactic events (89.5%) were experienced by students
- Food was the predominant trigger of anaphylactic events in students throughout the school year
- This combined analysis provides a more comprehensive picture of anaphylaxis in US schools, and these data may be instrumental toward raising awareness for the importance of anaphylaxis recognition and management training in schools

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