Anaphylaxis knowledge in camp personnel

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Clinical Implications

- Survey data were collected from camp directors, medical personnel, and camp staff concerning food allergy and anaphylaxis. Knowledge gaps were identified in these groups, particularly in identifying anaphylaxis, but recent training was associated with increased knowledge.

TO THE EDITOR:

Food allergies are estimated to affect 5% to 8% of children and have increased in prevalence from 1997 to 2011.[1-3] Effective food allergy management requires careful avoidance of food allergens, verbal or written communication with food handlers and caregivers, and rapid access to an epinephrine autoinjector in case of anaphylaxis.[4-6] Efforts have been made to change policies in schools to make these environments safer for children with food allergies, but established guidelines for summer camps are lacking. A study using a camp electronic health record identified 2.5% of campers with food allergy, but the prevalence across the United States among children attending camp is unknown.[7]

The primary aim of our study was to assess the knowledge and comfort level of camp personnel regarding food allergies and anaphylaxis. The education and management recommendations provided by the 2014 Center for Disease Control (CDC) voluntary guidelines provided the framework for this assessment.[8]

In May 2016, surveys were developed for camp directors (CD), medical personnel (MP), and camp staff (CS). CD and MP were identified from online directories and private list-serves. CS were invited to participate through their CD because a database of CS does not exist. Participants were invited via e-mail to complete an electronic survey (SurveyGizmo Inc., Boulder, Colo). Survey questions were developed by the authors. A portion of the survey was adapted from a similar study involving school staff.[9] Other questions were based on clinical guidelines including the CDC 2014 voluntary guidelines for schools.[8] Participation in the survey was voluntary and anonymous. The completion of a survey was treated as consent to participate, though an e-mail was provided to participants if they wished to withdraw consent and inclusion of their answers after completion. Gift cards were given on completion of the survey.

All surveys included questions regarding demographics, previous food allergy training, and knowledge questions concerning safe handling techniques, recognition of anaphylaxis, correct storage of epinephrine autoinjectors, and treatment of allergic reactions. Surveys sent to CD and MP also included questions about overall camp demographics along with policies and protocols in place at the camp concerning food allergy and anaphylaxis. Survey results were de-identified and exported to an external database (Microsoft Excel 2007) for analysis. Answers were compared with the χ^2 test.

Survey data were collected from 158 CD, 141 MP, and 198 CS. We had a response rate of 6.1% for CD and 26% of MP. The demographic data for the CD, MP, and CS are presented in Table I, and characteristics of the camps are presented in Table II. Thirty-five percent of CD (n = 55) and 34% of CS (n = 73) reported no prior food allergy education. In CS who self-identified as being authorized to administer epinephrine (40%, 80/198), 51% (n = 41) reported training in the last 12 months and 14% (n = 11) no prior training. In contrast, 93% (n = 147) of CD and 89% (n = 126) of MP reported that their staff had attended required food allergy training.

Knowledge questions focused on prevention, recognition, and treatment of food allergy reactions. Approximately 60% of respondents from all groups were able to correctly identify all appropriate methods for effective ways to remove food allergen from a table or similar surface. Seventy-nine percent (n = 125) of CD, 89% (n = 126) of MP, and 51% (n = 100) of CS were able to correctly identify the manufacturer temperature storage recommendations for epinephrine autoinjectors ($P < .001$).

The survey asked respondents to correctly identify scenarios consistent with anaphylaxis. Vignettes included food-induced anaphylaxis, venom-induced anaphylaxis, and 2 scenarios consistent with viral illness. In total, 26% (n = 41) of CD, 36% (n = 51) of MP, and none of the 198 CS were able to correctly recognize both anaphylaxis vignettes and not incorrectly identify viral illness as anaphylaxis ($P < .001$).

When asked to identify the sequence of actions to properly treat anaphylaxis, 77% of CD (n = 122), 77% of MP (n = 109), and 53% (n = 42) of CS who reported being authorized to administer epinephrine (n = 80) answered correctly ($P < .001$). Similarly, 85% of CD (n = 135), 95% of MP (n = 134), and 68% of CS

TABLE I. Demographics of survey respondents

	Directors (n = 158)	Medical personnel (n = 141)	Staff (n = 198)
Geographic representation	37 US states	31 US states 2 Canadian provinces	25 US states 1 province
Gender, n (%)	96 (60) female	131 (93) female	119 (60) female
Median age category	25-44 years old	45-65 years old	18-24 years old
Years of camp work, experience, n (%)	71 (45) > 16	51 (36) < 5	104 (53) < 5
No previous food allergy education, n (%)	55 (35)	26 (17)	68 (32)

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TABLE II. Characteristics of camps

Camps reported by	Directors (n = 158)	Medical personnel (n = 141)
Overnight camp, n (%)	89 (56)	117 (83)
K-12 age of campers, n (%)	109 (69)	90 (70)
Rural locale, n (%)	77 (49)	79 (56)
Miles to nearest hospital 5-20 miles, n (%)	81 (51)	88 (62)
Medical personnel available at all times, n (%)	108 (62)	131 (93)

(n = 54) were able to correctly identify the correct anatomic site of epinephrine autoinjector administration ($P < .001$). Thirty-nine percent (n = 61) of CD, 71% (n = 100) of MP, and 29% (n = 58) of CS were aware of the option to repeat epinephrine dose if symptoms persist 5 minutes after the first dose ($P < .001$ between MP vs CD and CS). Seventy-eight percent (n = 123) of CD, 96% (n = 135) of MP, and 52% (n = 102) of all CS answered that campers treated for all anaphylaxis should be transported to the emergency department by Emergency Medical Services ($P < .001$ between MP vs CD and CS).

When evaluating the effect of food allergy/anaphylaxis training in the last 12 months on responses, CD had similar rates of correct answers regardless of timing since their last training. Comparing the effect of training in the last 12 months for MP, a significant difference was seen only in awareness that a repeat dose of epinephrine can be given when needed after 5 minutes (60% to 79%; $P = .03$). Training in the last 12 months improved CS ability to identify the correct storage temperature for epinephrine autoinjectors (37% to 63%; $P = .004$), the correct sequence of actions to treat anaphylaxis (30% to 57%; $P = .002$), and the correct site for administration of epinephrine (50% to 81%; $P < .001$).

The results of our study indicate knowledge gaps in the recognition of anaphylaxis by camp personnel. Although the majority of respondents were able to identify effective methods for allergen removal, proper epinephrine storage, and treatment of anaphylaxis, a third were unable to identify the correct actions to treat anaphylaxis and majority were unable to recognize anaphylaxis from vignette. It was shown that recent training improved knowledge for CS. Limitations include the low response rate for CD compared with MP (6% and 26%, respectively), possible selection bias both in previous training and region of the country, and unknown content of previous training.

Although it is appropriate to focus on food allergy management within the daycare and school environments, summer camps warrant similar attention. Focused education should be provided to all summer camp employees at least annually to ensure proper prevention, recognition, and management of food allergy reactions.

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Conflicts of interest: M. Pistiner has received consultancy fees from Massachusetts Department of Public Health Early Education and Care; has received lecture fees from the Allergy Asthma Network and Maine Department of Public Health and School Nutrition Services; receives royalties for "Everyday Cool with Food Allergies"; has received payment for developing educational presentations from Allergy Safe Kids, Inc.; is cofounder and content creator of AllergyHome LLC; and attended Kaleo and DBV Advisory board meetings. The rest of the authors declare that they have no relevant conflicts of interest.

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