

The development and evaluation of peer food allergy education videos for school-age youth



Food allergy (FA) affects nearly 8% of children in the United States.¹ Approximately 16% to 18% of children have experienced an allergic reaction at school,^{2,3} and 25% of first-time anaphylactic reactions occur at school.⁴ Children with FA believe that peer support decreases risk-taking and promotes safety.⁵ Peer education may be effective in improving FA knowledge among children, because of legitimized content by peers, whom children often trust over adults at this age.⁶ It also may improve the safety of children with FA.⁷ Limited research exists on the effectiveness of peer education for improving FA knowledge of non-food-allergic peers.⁴ This study aimed to 1) develop a peer educational FA video and 2) examine the efficacy of video-based peer education in increasing FA knowledge among children and adolescents.

This mixed-methods study was conducted from 2015 to 2017. Video content, themes, and format was determined through a survey developed by a panel of primary care physicians, allergists, and health services researchers and was administered to 142 school-age children with FA. Parents of food-allergic children ($n = 16$) recruited from a local support group also provided feedback through key informant interviews. Three FA videos were produced for elementary (grades 1–4), middle (grades 5–8), and high school students (grades 9–12). Videos averaged 5 minutes in length and were filmed in a school setting featuring children with and without FA. Content included top 8 common food allergens (peanut, tree nut, milk, wheat, soy, eggs, fin fish, and shellfish), symptoms of an allergic reaction (i.e., hives, shortness of breath, wheezing, dizziness, swelling of lips or tongue, throat tightness/closure, vomiting, etc.), as well as other FA-related information such as ways to support food-allergic peers (elementary and middle school) and epinephrine auto-injector administration steps (high school). Videos are available at teamsoaar.com/foodallergyp2p/ and via USB upon request.

Three urban Chicago schools (public and private) and 1 suburban private school in Milwaukee participated in the study. Pre- and post-tests assessing FA knowledge gained from the video were administered immediately before and after students viewed videos during school hours. Results were compared with observed changes in FA knowledge and to assess the efficacy of the videos as a learning tool.

Differences in the proportion of students with correct knowledge before and after viewing the videos were examined using McNemar's test. Students were included in the analysis if they had complete pre- and post-data for the item being analyzed. Data from students who completed only 1 test (pre- but not post-test or vice versa) or had incomplete questions were excluded from the analysis. All statistical analyses were performed using STATA statistical software (StataCorp LP, 2013, College Station, TX).

Overall, 198 elementary, 156 middle, and 203 high school students were included in the analyses. Sixty-four percent of elementary, 72.4% of middle, and 73.3% of high school students reported that they learned something new about FA after viewing the videos.

Correct identification of common food allergens increased significantly among students after viewing the video (elementary school: 92.3% at pre-test vs 96.4% at post-test, $P < .05$; middle school: 76.7% vs 96.2%, $P < .001$; high school: 88.1% vs 96.9%,

$P < .01$). Knowledge of common FA symptoms also increased significantly among students (elementary school: 61.5% at pre-test vs 85.9% at post-test, $P < .001$; middle school: 46.3% vs 70.1%, $P < .001$; high school: 66.1% vs 85.2%, $P < .001$) (Table 1).

Of elementary students, 66.1% identified epinephrine as appropriate medication for anaphylaxis at pre-test vs 85.4% at post-test ($P < .001$). Middle and high school students significantly increased their understanding of cross-contact from pre-test to post-test (middle school: 79.2% at pre-test vs 96.0% at post-test, $P < .001$; high school: 93.9% at pre-test vs 99.0% at post-test, $P < .01$). Finally, high school students significantly increased their knowledge of epinephrine auto-injector administration after video viewing (Table 1).

Knowledge of general FA concepts significantly increased among all students after watching the videos. The results demonstrate that use of peer-developed educational videos is an effective tool to raise FA awareness among students. All students demonstrated relatively high baseline knowledge of common food allergens. Elementary school students were most knowledgeable of common allergens, followed by high school and middle school students. Despite the high baseline knowledge, identification of common food allergens significantly increased at post-test.

Students in all age groups were the least knowledgeable about common symptoms at baseline. Symptom knowledge improved significantly after the video. Past studies suggest inadequate knowledge of anaphylaxis symptoms apart from classic skin and respiratory manifestations.^{7,8} Improving symptom knowledge has the potential to prevent FA mortality, because anaphylactic reactions can be identified and treated more promptly. The videos also significantly increased knowledge of appropriate anaphylaxis treatment. This is an important factor in keeping students with FA safe, because delayed epinephrine administration is a key contributor to anaphylaxis fatalities.⁶ Audio-video education materials may improve knowledge of emergency management of FA among caregivers.⁹

This study is not free of limitations: the study sample that helped develop content and that viewed the videos may not be representative of the general population. Information on school FA policies, previous FA education, and personal FA experiences were not collected. Additionally, our survey design was not able to assess long-term knowledge retention and limited the number of answers students could select for common food allergens as well as reaction symptoms.

Peer educational videos are a useful tool in introducing FA concepts and improving FA knowledge, especially when presented in a medium that is relatable to the target audience. Future work should explore the impact of peer-education videos on long-term knowledge retention and the efficacy of other peer education mediums. Integration of these educational tools into school curriculum may improve FA awareness among children, as well as the safety and well-being of students with FA, decreasing FA exacerbations in school.

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Table 1

Food Allergy Knowledge Among Elementary, Middle, and High School Students

Knowledge item	Students with target knowledge at baseline %	Students with target knowledge at post-test %	P value McNemar test
Elementary school			
Common food allergens (n = 195) ^a	92.3%	96.4%	<.05
Common anaphylaxis symptoms (n = 192) ^a	61.5%	85.9%	<.001
Not sharing food (n = 195)	98.5%	100.0%	.083
Epinephrine use (n = 192)	66.1%	85.4%	<.001
Middle school			
Common food allergens (n = 133) ^a	76.7%	96.2%	<.001
Common anaphylaxis symptoms (n = 147) ^a	46.3%	70.1%	<.001
Cross-contact (n = 149)	79.2%	96.0%	<.001
High school			
Common food allergens (n = 160) ^a	88.1%	96.9%	<.01
Common anaphylaxis symptoms (n = 189) ^a	66.1%	85.2%	<.001
Cross-contact (n = 196)	93.9%	99.0%	<.01
Steps for epinephrine auto-injector administration (n = 201)			
Step 1: Safety cap	73.1%	96.0%	<.001
Step 2: Outer thigh	83.0%	94.5%	<.001
Step 3: Hold for 3 seconds	12.4%	95.0%	<.001

Note: McNemar's test tests the null hypothesis that the distribution of pre- and post-test correct answers are the same.

^aElementary school students were asked to select 2 food allergens and 2 FA symptoms; middle school and high school students were asked to select 4. McNemar test excludes students who selected less than the required number indicated.

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Improving allergy skin testing proficiency

Skin prick/puncture testing (SPT) is currently considered the “gold standard” method for epicutaneous allergy testing. It has multiple advantages compared with in vitro testing. It is less expensive, less invasive, and provides faster, highly specific results and a better correlation with inhalant allergy symptoms.¹ However, disadvantages to the SPT method have been noted, largely based on variability factors. These include controllable variables, such as patient medications (antihistamines, psychotropic agents, high-dose oral corticosteroids, and immunotherapy), the device used for the SPT, and the technique and proficiency of the test administrator. Patients are often reliant on these medications to relieve symptoms, and the washout periods for SPT can be troublesome for some patients. Uncontrollable variables include the patient's age

and sex, the location on the body where SPT is performed (back vs forearm), and the time of day when SPT is administered. These factors can alter test outcomes and impact the diagnosis and management of allergies.^{2,3}

Oppenheimer and Nelson³ have proposed a method to determine SPT proficiency in which they recommend that the histamine wheal coefficient of variation (CV) percentage be less than 30%.² However, certification and recertification processes are not widely practiced because of overconfidence, doubting the necessity and validity, misguided fear of failed attempts, and the difficulty of finding volunteer SPT recipients (because of antihistamines and privacy issues). Here we report the experience of the first-year implementation of SPT proficiency in a single academic practice. The objectives were to determine the necessity of the process and gain insight into the training requirements of allergy staff and physicians.

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