

# Callum Luckie

## Are Children the Missing Link in Anaphylaxis Prevention and Treatment?

### REFLECTION STATEMENT

My journey of anaphylaxis prevention and treatment was driven by a personal connection. Surrounded by family and friends who had anaphylaxis, I felt a need to address the evident gap in training within educational settings. The growing societal awareness of the pressures on educators to take responsibility for a medical emergency further fuelled my motivation. I believed that by educating children about anaphylaxis, we could not only potentially save lives but also alleviate some of the burdens on our teachers.

I embarked on a comprehensive review of existing literature on anaphylaxis training, narrowing my focus to the training of children in educational environments. This literature review was pivotal in shaping the empirical component of my research. I developed a concise video that highlighted the key signs of an anaphylactic reaction and the correct usage of an EpiPen and then designed a pre- and post-test survey for 1,600 school children.

The video intervention demonstrated a significant improvement in the children's understanding, with a staggering 99.9% probability. This underscored the potential of visual aids in health education, especially in critical areas like anaphylaxis.

In essence, my research "Are Children the Missing Link in Anaphylaxis Prevention and Treatment?" seeks to champion the cause of integrating anaphylaxis education into our school curricula. The broader vision is to make anaphylaxis treatment common knowledge among students, thereby reducing the incidence and mortality rate, especially among teenagers who are at the highest risk. My aspiration is for this initiative to be adopted across New South Wales and, in time, throughout Australia.

In reflection, this research was not merely an academic pursuit but a mission to empower our youth with life-saving knowledge. By doing so, I hope to pave the way for a safer future where every child is equipped to respond to an anaphylactic emergency.

### ABSTRACT

**Background:** Anaphylaxis is a severe and life threatening condition which has become more prevalent within today's society. The literature review highlighted that there is minimal research regarding education for students around signs and treatment of anaphylaxis. Clinical care standards on management of anaphylaxis have recently been updated.

**Aim:** This study aimed to evaluate the impact of an educational video on the understanding of anaphylaxis among students aged 11-18 in a school environment.

**Method:** A knowledge questionnaire and an educational video were developed based on the clinical care standards. The research employed a pre- and post-test design using the knowledge questionnaire to test students' knowledge about anaphylaxis symptoms and treatment protocols before and after exposure to the educational video.

**Results:** The study found a significant improvement in knowledge scores post-video, indicating the effectiveness of the educational intervention.

**Conclusion:** The results of this study underscore the value of media education in enhancing students' understanding of critical health issues like anaphylaxis.

## INTRODUCTION

Anaphylaxis has become a prevalent issue today in society, particularly the management of anaphylaxis within a school setting. This has come under scrutiny by the media as of the writing of this paper (April 2023). There have already been three media reports about anaphylaxis deaths in Australia, the latest one being on February 15th, 2023, when a young girl died after consuming a nut at the school's Year Ten Formal Taylor (2023). This incident, together with the many other similar incidents covered by the media, has generated concern within the general public about the safety of children with anaphylaxis whilst they are at school, in particular, the ability of the school to respond in time. The government has developed specific guidelines to increase the safety of children with anaphylaxis. These guidelines, the Acute Anaphylaxis Clinical Care Standard (Australian Commission on Safety and Quality in Health Care, (2021)) specify how to treat an anaphylaxis attack and specify training requirements for the teachers/staff within schools on what to do.

The Acute Anaphylaxis Clinical Care Standard in Australia was developed by the Australian Commission on Safety and Quality in Health Care in collaboration with the National Allergy Strategy, Australasian Society of Clinical Immunology and Allergy (ASCIA) and Allergy & Anaphylaxis Australia (A&AA). These entities participated in an expert working group, supporting the review of evidence, development, and launch of the standard. The process of creating clinical care standards in Australia involves the systematic development of guidelines based on evidence-based reviews of available data, with the goal of assisting healthcare practitioners in patient care decision-making. Key steps in this process include the evaluation of new instruments and systems, approval of protocols, and training and certification of operators. Various entities contribute to this process, including the National Pathology Accreditation Advisory Council (NPAAC), Standards Australia, and the Medical Services Advisory Committee (MSAC), among others. They advise on accreditation, develop and maintain standards, and provide guidance on the safety and effectiveness of new medical technologies and procedures.

Whilst policies and procedures around staff training are well documented in these guidelines this research looks at student-based training specifically regarding the recognition and management of anaphylaxis. When Dr Wayne G. Shreffler, MD, PhD, Director of the Food

Allergy Centre at Massachusetts General Hospital, was asked the question, "do you think student based training on anaphylaxis helped?" he answered, "an ounce of prevention is worth a pound of cure. Training teachers and children about anaphylaxis and its signs and symptoms can save lives." The increasing prevalence of anaphylaxis

in children and adolescents (Children's health Queensland hospital and health service, 2013) has led to a growing concern for effective management in school settings. Schools present unique challenges due to shared food, sports equipment, and other common allergen sources.

Furthermore, the ratio of teachers to students during breaks like lunch and recess, where students' risk is at the highest, is reportedly one teacher for every 53.3 students in secondary New South Wales government schools, according to ACARA.

There is a need to explore the ability to educate students in the management of anaphylaxis in addition to the current requirements to educate school staff. The usefulness of this training needs to be assessed in the future for all these people within the school community.

## WHAT IS ANAPHYLAXIS?

Anaphylaxis is a severe, acute, and potentially life-threatening allergic reaction caused by an exaggerated immune response to a foreign substance or allergen (Johnson & Smith, 2023). It rapidly releases chemicals like histamine and cytokines. Symptoms can appear within minutes to hours after exposure to the allergen and vary from mild to severe, affecting various organ systems (Brown & Green, 2022). In rare cases, symptoms develop slowly, over hours or even days, in what's called a biphasic anaphylactic reaction, which has a slightly higher mortality rate compared to non-biphasic anaphylaxis (Lee et al., 2015).

Symptoms include skin reactions like hives and swelling, respiratory issues like difficulty breathing and chest tightness, cardiovascular symptoms like low blood pressure and rapid heartbeat, gastrointestinal problems like nausea and abdominal pain, and central nervous system effects like confusion and seizures (Sampson et al., 2006).

Common triggers are food allergens (e.g., peanuts, shellfish), insect venom, medications, and latex (Mali & Jambure, 2012). Less frequent triggers include exercise, temperature extremes, and exposure to certain chemicals.

Immediate medical attention is crucial upon the onset of symptoms (Johnson & Smith, 2023). The first-line treatment is the administration of adrenaline via an Epi-pen (Brown & Green, 2022). Effective management can prevent fatal complications like airway obstruction or cardiovascular collapse (Johnson & Smith, 2023). Individuals with a known history of anaphylaxis should carry an EpiPen and be trained on how to use it in case of an anaphylactic reaction (Mali & Jambure, 2012).

### SCIENTIFIC RESEARCH QUESTION

Does the implementation of an educational video in a school setting increase the knowledge of anaphylaxis signs and treatment among school students aged 11-18, as assessed through a questionnaire?

### SCIENTIFIC HYPOTHESIS

The implementation of an educational video increases the base knowledge of anaphylaxis signs and treatment among school students aged 11-18, as assessed through a questionnaire.

#### Null Hypothesis

"There is no significant difference in the knowledge scores of students before and after watching the educational video on anaphylaxis."

### LITERATURE REVIEW

A literature search was conducted to determine what information was required to be included in the content of the education for students and what studies had been done on how to do anaphylaxis training for students and staff within schools. The key terms were [anaphylaxis, school, children, teenager, teen, adult, staff, teacher, training]

This review consisted of two stages: - Firstly what guidelines existed in the literature which described how anaphylaxis should be managed in schools. Secondly, what research has been done on how best to educate students within schools about anaphylaxis management?

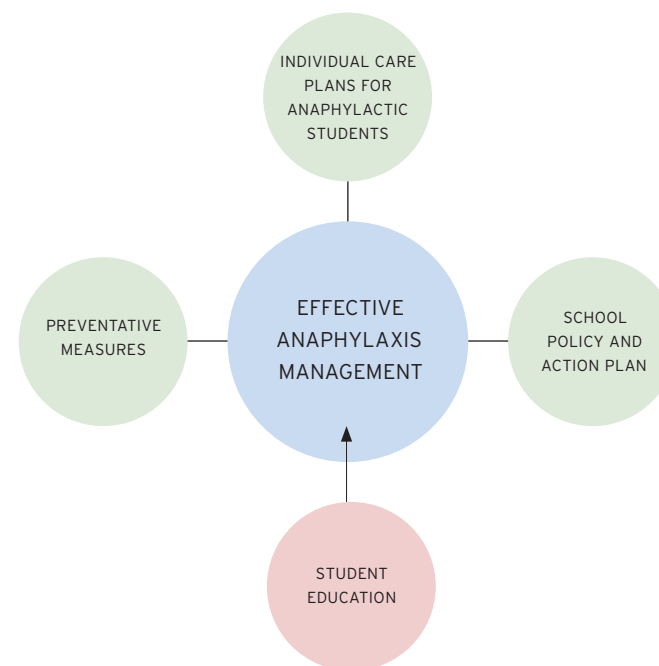
#### Current Guidelines

Current guidelines and management practices were recently updated and incorporated into the clinical care standard for guidelines for the management of anaphylaxis. (Australian Commission on Safety and Quality in Health Care, 2021) The care standards drew upon national guidelines, expert consensus, and published studies. They also utilised the key organisations providing guidance across Australia, which included the Australasian Society of Clinical Immunology and Allergy (ASCIA), National Allergy Strategy, and State and Territory Education Departments. They also incorporated the current anaphylaxis management practices in Australian

schools, which consisted of risk minimisation strategies, education and training, and individualised health care plans. This care standard helps inform schools on how to reduce allergen exposure, ensure the availability and accessibility of epinephrine auto-injectors, and have clear emergency response procedures in place. However, a crucial aspect missing from the guidelines is student education. Within diagram 1 it represents each sector sounding the management of anaphylaxis.

#### Effective Anaphylaxis Management

[Diagram 1]



The Australian government has recently published a comprehensive guideline document known as the 'Clinical Care Standards for the Treatment of Acute Anaphylaxis' (Australian Commission on Safety and Quality in Health Care, 2021). These guidelines have identified three main areas: care plans, preventive measures, and school policies.

### Individual Care Plans

S. Schoessler, and M. White (2013), Patty Morris, D. Baker, Caroline Belot, Audrey Edward (2011) and A. Muraro, G. Roberts, M. Worm (2004) highlighted the importance of an individual care plan for each student present with anaphylaxis. This care plan should be up to date with the current guidelines and tailored for each student. They should always be created in cooperation with the child's parents and paediatrician. The plan outlines the specific allergy, identifies potential hazards, and offers details about the signs and initial aid measures to be implemented during an emergency situation.

### School Policy

Clear school policies and action plans for the management of anaphylaxis are crucial to ensure the safety and well-being of students with allergies. They help to prevent life-threatening reactions and promote timely responses to emergencies. Action plans are used to manage emergency situations efficiently, especially for those with allergies. They provide detailed instructions for recognising and responding to an allergic reaction or anaphylaxis, including medication usage and when to seek medical help. They are crucial for prompt and accurate responses, particularly in situations where the individual may not be able to communicate their condition effectively. The Australasian Society of Clinical Immunology and Allergy (ASCIA) offers distinct action plans for managing various types of allergies. The Anaphylaxis Action Plan (RED) is for those prescribed adrenaline injectors due to severe allergies, excluding allergic rhinitis. The Drug Allergy Action Plan (GREEN) is intended for individuals with medication allergies, who typically don't need an adrenaline injector because drug exposure can be avoided, and these individuals are often advised to wear medical ID. Another Green Plan addresses allergic reactions for those not needing adrenaline injectors, excluding those with allergic rhinitis. The First Aid Plans for Anaphylaxis (ORANGE) serve as a guide for emergency situations involving anaphylaxis and can be used in public places like aircraft, along with general-use adrenaline injectors.

### Preventative Measures

Managing anaphylaxis involves more than just dealing with the reaction itself (Hourihane, as mentioned in Colver, 2006, p. 498). Hay, Harper, and Moore (2006) emphasise the need to frequently clean surfaces to avoid contact with allergens and to plan ahead for outdoor activities and field trips. Checking food labels for hidden allergens is also important.

Munoz-Furlong (2004) says that "reading labels is the key to preventing a reaction" (p. 269). However, research shows that many teachers are not well-educated about this topic (Rhim & McMorris, 2001; Watura, 2002), and a lot of products have unclear labels.

Studies done by Polloni et al., 2020 have shown that school-based anaphylaxis training programs can improve knowledge, attitudes, and self-efficacy among teachers (Polloni et al., 2020) demonstrate that comprehensive, multimedia training can significantly enhance the confidence and competence of school staff in handling food allergy-related emergencies. This highlights the importance of providing proper education to ensure a safer school environment for students with food allergies. This is further supported by F. Cantariño & Novio, (2019), who assessed the proficiency of teachers in handling anaphylaxis emergencies in educational settings. It highlights the varying degrees of competence among teachers and underscores the importance of comprehensive training and support to improve their ability to manage anaphylactic reactions in schools effectively. But the question remains, can students also benefit from interactive activities, peer education, and multimedia resources which are commonly used to engage students and facilitate learning? Just as teachers, school staff benefit from them. The question must be asked, would there be benefits if anaphylaxis education was provided to all students regardless of whether or not they were anaphylactic? Further to this, what is the optimal content format, and delivery of training programs and their implementation in school environments?

Several studies have investigated different aspects of anaphylaxis management and training in schools and the effectiveness of multimedia education. Leszkowicz et al., (2021), examines the impact of non-formal educational interventions on medical students' understanding of anaphylaxis. The study's results indicated that informal education could effectively improve anaphylaxis awareness, highlighting its potential as a useful educational tool for the understanding of anaphylaxis. Karim et al., (2022) investigate the impact of multimedia education on school personnels' self-competence in managing food allergy and anaphylaxis where in the study, she explores the effectiveness of using visual aids to enhance understanding and proficiency in managing anaphylaxis. The findings suggest that video-based resources can significantly improve knowledge and knowledge retention, contributing to better preparedness for anaphylactic emergencies. However, there is limited research specifically targeting the education of students, highlighting the need for further investigation in this area.

Student education is a critical element that, from the literature, appears to have been overlooked. There are, in fact, many benefits to educating students in the treatment of anaphylaxis, such as the exponential spread of information, reinforcing knowledge and communication skills of future physicians, this is according to Kamell et al. (2010), who carried out early education in schools in California for the recognition and preventive measures for melanoma with 1200 students. These benefits proven by Kamell cannot be seen until we can assess whether or not a simple educational intervention can increase the knowledge around the management of anaphylaxis.

Studies emphasise the need for clear policies, action plans, and preventative measures, such as frequent cleaning, planning for outdoor activities, and checking food labels (Hourihane, as mentioned in Colver, 2006; Hay et al., 2006; Munoz-Furlong, 2004; Rhim & McMorris, 2001; Watura, 2002).

### **Student Education**

In school settings, teachers and students play a critical role in preventing, recognising, and responding to anaphylactic events. Together with the preventative measures and policy and procedure documentation, which include individualised action plans, it is important that the staff at schools have been given adequate training, so they know where to look in a timely manner.

### **Student Education on Anaphylaxis Management**

This literature review focused on the training aspect of anaphylaxis management in schools, specifically the education of students.

Despite the importance of anaphylaxis management, there is a lack of research focusing on the training of students. Studies have been conducted in educating adolescent-aged people with a diagnosis of anaphylaxis, but Unruh et al., (2014) and Vale et al. (2018) found that education of people aged 11-16 increased the knowledge around anaphylaxis management. It was found that broad-based education of a whole student body has not been fully tested. Addressing this gap is essential for developing effective ways to educate students on recognising and responding to anaphylactic reactions.

Age-appropriate training is crucial for children aged 10-17, as it empowers them to recognise and respond to anaphylaxis symptoms. Both Unruh et al, (2014) and Newman et al., (2022) did a systematic review of the literature on educational interventions in people with anaphylaxis. Unruh et al's., (2014) paper examines the effectiveness of various food allergy education strategies targeting adolescents. It highlights the need for tailored, age-appropriate interventions to increase awareness and understanding of food allergies, whereas Newman et al., (2022) focused on the perceptions and understanding of food allergies among teenagers. The findings underscore the importance of targeted education and interventions to address misconceptions and improve knowledge. While this research analysed the behaviours of a group of patients in a narrow age bracket, it did not include a broader age group of patients both with and without anaphylaxis. Furthermore, the experiment was only conducted outside of a school setting. There has been research done on the education of staff in schools (Sasaki et al. 2015). This research on anaphylaxis training programs employed various methodologies, such as randomised controlled trials, observational

studies, and qualitative research. These methodologies helped assess factors like knowledge retention, skill development, and behaviour change.

The existing literature shows that there are well-developed guidelines and information available on the best management of anaphylaxis in school children. The literature also shows that educational programs could be effective in reducing the risk of anaphylactic incidents. However, further research is needed to determine the most effective training strategies and components to enhance the success of these programs in various school settings for students, regardless of their diagnosis of anaphylaxis.

## **PARTICIPANTS AND METHODS**

### **Development of the Anaphylaxis Knowledge Questionnaire for School Children**

The methodology employed in this study centred on primary data collection. This approach was necessitated by the lack of existing data on the level of anaphylaxis knowledge among school-aged students. Therefore, the study was designed to directly gather fresh data, which not only enabled a targeted exploration of the research question but also ensured the novelty and relevancy of the findings.

Participants of the study were administered a comprehensive questionnaire specially designed to collect empirical data on students' knowledge regarding anaphylaxis symptoms and treatment protocols. It also collected information about whether or not the student had a diagnosis of anaphylaxis. Subsequently, the participants were exposed to a video that highlighted how to identify the signs and symptoms of anaphylaxis and how to administer an epi-pen. Finally, a post-test assessment was employed by providing the students with the same questionnaire provided at first administration to evaluate whether or not the knowledge scores changed after viewing the educational video hence showing the efficacy of the educational intervention.

### **Participants and Procedures**

Convenience sampling was utilised to select a high school located in the Sydney North Shore region. The report was initially presented to the school principal and the board of directors to approve the research. The research was approved on the provision that there were no unique identifiers attached to the data. An email was also sent to all the parents within the school to advise them of the research and give them the opportunity to withdraw their children from the research project. The students were advised that participation was voluntary. The survey was administered to a cohort

of 1600 students aged between 10 and 18 years under the supervision of teachers in groups of approximately 10 people each.

### Questionnaire Development

Based on the Clinical Care Standards, the literature review and consultation with a registered nurse, a questionnaire was developed to assess students' knowledge about Anaphylaxis. The questionnaire was designed to be user-friendly and engaging, with Yes, No, and I don't know answers, where the correct answer was = 1 and incorrect = 0, and I don't know answers where classified as always incorrect therefore = 0. The questionnaire was reviewed by a registered nurse who works within a school and an academic researcher in social pharmacy. The reviewers provided valuable insights on question phrasing and content, ensuring the questionnaire was accurate and relevant. A copy of the questionnaire has been included as Appendix 1.

### Video Development

An educational video was developed with the assistance of the registered nurse. The video aimed to convey essential information about anaphylaxis in a clear, concise, and visually engaging manner. The information was again based on the clinical care guidelines (Australian Commission on Safety and Quality in Health Care, 2021). A short video from ASCIA on how to properly administer an EpiPen was also incorporated.

### Participant Recruitment and Data Collection

All 1,600 students at the participating school were invited to participate in the study. The data collection process involved the following steps:

1. **Pre-video questionnaire:** Students were asked to complete the questionnaire before watching the video to establish a baseline for their knowledge about anaphylaxis. This was conducted in small groups of about 10 people during the times of 10:50 am to 11:10am. The students were supervised by a teacher which ensured no copying between students or cheating, which ensured better reliability for the results.
2. **Video viewing:** Students were then asked to watch the educational video after completing the questionnaire. This video was administered by a teacher supervising each small group.
3. **Post-video questionnaire:** One week after watching the video, students were asked to complete the same questionnaire to measure any changes in their

knowledge and understanding of anaphylaxis. It was conducted 1 week later to measure the students' ability to retain the knowledge from the video.

### Data Preparation

The answers to the 2 questionnaires completed one week apart were obtained via Google Forms as it was a trustworthy and easily accessible website which allows to the collection of data, the information was downloaded into an Excel spreadsheet. Which again was used as it was trustworthy and able to handle large amounts of data, plus it was compatible with the IBM computer software program SPSS. The data was then assigned '1' for correct answers, while incorrect and uncertain "I don't know" answers received a '0'. This was done by two people to ensure that all results were marked/coded correctly and to increase the reliability and accuracy in the scoring. The results were then analysed using The IBM SPSS software program. As the results were not identified it was not possible to show the change in scores within individuals, therefore, to examine the significance of the improvement in knowledge scores after watching a video, the statistical tests that were used in the study, were analysed by one-way between-groups analysis of variance (ANOVA). This was used as the data was not normal so a two-tailed unpaired t-test could not be used. The ANOVA test can be used for nonparametric data, where the assumptions of normality are violated. The Nonparametric Tests used were The Mann-Whitney U test (for two groups) and the Kruskal-Wallis H test (for three or more groups). The data was then further analysed to see if there was a significant difference after watching the educational video in the knowledge scores of those students who had a diagnosis of anaphylaxis and those who did not. The dependent variable was knowledge scores and independent variable used was the educational video.

**Independent Variable:** This variable can be manipulated by the researchers; in this case, it refers to the introduction of an educational video designed to increase the knowledge of anaphylaxis signs and treatment in students within a school aged 11-18.

**Dependent Variable:** The knowledge scores of anaphylaxis signs and treatment among school students aged 11-18. This variable is dependent on the independent variable, and its changes are observed and measured in the study. Here, it would be assessed through a questionnaire, the results of which should indicate the level of understanding or knowledge students have about anaphylaxis following the implementation of the educational video.



### Control Variables

**Participant Age:** The study participants were all within a specific age range (10-18 years), which maintained consistency in terms of cognitive development and ability to comprehend the material presented in the educational video.

**Consistent Administration:** The administration was standardised across all ages and groups with detailed instructions given to teachers to help control the environment. These instructions included the manner of administering the pre- and post-video questionnaires and the video itself. This consistency minimized variations in the data that could have been attributed to differences in data collection procedure rather than the intervention.

**Supervision:** All data collection sessions were supervised by a teacher, which ensured no copying or cheating occurred. This ensured the responses on the questionnaire were the individual student's understanding, not influenced by others.

**Use of Standardized Tools:** The questionnaires used for data collection were developed with the aid of professionals, ensuring that they were suitable for the study population and standardized across all participants.

**Timing:** The time intervals between the pre-video questionnaire, video viewing, and post-video questionnaire were kept constant for all participants.

**Environment:** The physical environment was controlled by conducting the sessions in the same location, minimizing external distractions, and ensuring a similar environment for all participants.

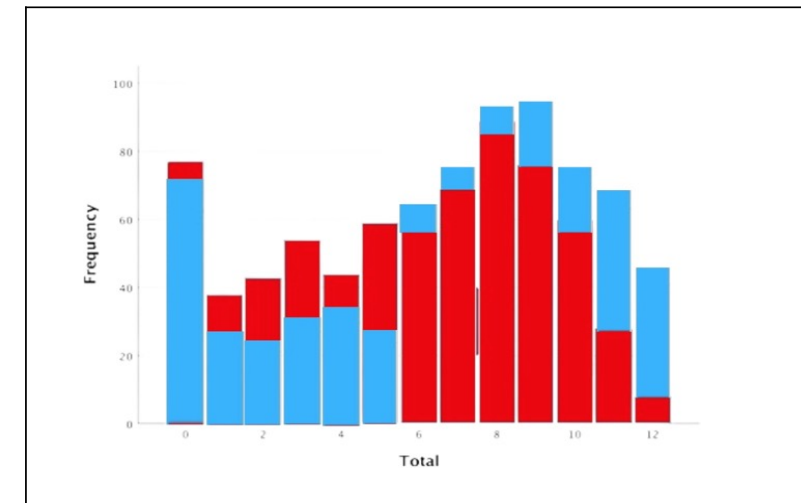
### RESULTS

Data sets were collected one week apart, and it was found that 700 students fully completed the survey at the first timepoint (Week 0). At the second time point one week later (Week 1) this sample size was reduced to 410 who confirmed that they had completed the questionnaire on two occasions. The mean score increased from 5.57 in Week 0 prior to the educational video to 6.68 after watching the educational video. The data were explored using the SPSS software program. ANOVA was then applied to the data, and it was confirmed that the difference in mean scores between the two groups was significant. Hence the education provided through the video made a significant difference in the students' knowledge of anaphylaxis symptoms and treatment. Results are shown in Table 1.

The participants were compared at two different time points: Group 0 represented the scores before watching the video, and Group 1 represented the scores after watching the video. Analysis of the data frequencies showed that the data was not normally distributed (as shown in Graph 1).

**Graph 1**

**Histogram of score comparison for pre (week 1) and post stage (week 2)**



The analysis revealed a statistically significant improvement in knowledge scores ( $p < 0.001$ ), indicating that watching the video had a positive impact on the students' knowledge. This finding was further supported by the F-statistic value of 31.056.

Statistically speaking, the null hypothesis assumes that any observed difference in the means of the pre-video and post-video scores is due to chance alone. The results show that the video did have an impact on the students' knowledge of anaphylaxis.

In the analysis, the ANOVA test was used to determine whether there was a statistically significant difference between the means of the two groups (pre-video and post-video). The resulting p-value of less than 0.001 rejected the null hypothesis, indicating that there was indeed a significant difference in the mean scores before and after watching the video. This suggests that the video had a positive impact on students' knowledge of anaphylaxis.

However, the small effect size of 0.027 suggests that while the video did have a statistically significant impact, the practical significance of this impact might be limited. Despite the statistical significance, the actual mean score difference between the two groups was relatively small. The effect size, measured using eta squared, was calculated to be 0.027. This effect size falls in the small to medium range, which was expected given the context of the study. In the pre-video data (Week 0), there were 78 such participants who answered, 'I don't know' to every question scoring a zero for the questionnaire, and in the post video data (Week 1), there were 56.

The mean scores for students without anaphylaxis had a mean score of 7.32 in Week 0 and 7.04 in Week 1. The 95% confidence interval for the mean score in Week 0 ranged from 6.45 to 8.19, while for Week 1, it ranged from 6.12 to 7.95. These intervals provide insight into the likely range within which the true population mean lies. This cohort displayed a larger standard deviation compared to those without anaphylaxis, indicating a higher level of variability in their scores. The standard deviation for individuals without anaphylaxis ranged from 3.403 to 3.653, suggesting a moderate level of variability. However, for students with anaphylaxis, the standard deviation ranged from 2.950 to 4.159, indicating a wider spread of data points and a greater degree of variability.

Similarly, the variance for individuals without anaphylaxis ranged from 11.578 to 13.344, while for those with anaphylaxis, it varied from 8.700 to 17.295. These variance values further support the observation of greater variability among students with anaphylaxis. Considering the 5% trimmed means, 7.41 for Week 0 and 7.15 for Week 1. Trimmed means help mitigate the influence of outliers on the overall mean calculation. The skewness values of -0.619 and -0.721 indicate a slight asymmetry in the distribution of scores, with a longer tail on the left side. The negative skew suggests that lower scores were more prevalent among the participants. Lastly, the kurtosis values of -0.682 and -1.007 indicate that the distribution of scores among students with and without anaphylaxis was relatively platykurtic. This means that the distribution had lighter tails and was less peaked compared to a normal distribution.

	No Anaphylaxis		Anaphylaxis confirmed	
	Week 0 (pre)	Week 1 (post)	Week 0 (pre)	Week 1 (post)
Mean	5.57	6.88	7.32	7.04
5% Trimmed Mean	5.57	6.98	7.41	7.15
Median	6	8.00	8.00	9.00
Variance	11.578	13.344	8.700	17.295
Std. Deviation	3.403	3.653	2.950	4.159
Range	12	12	11	12
Interquartile Range	5	6	3	7
Skewness	-.194	-.631	-.619	-.721
Kurtosis	-1.120	-.748	-.682	-1.007

## DISCUSSION

Our study assessed the effectiveness of an educational video on anaphylaxis knowledge among students, with our results echoing the findings of Jones and Chen (2020) who highlighted the value of visual aids in medical education. A comprehensive literature search failed to identify any relevant research specifically aimed at children within a school environment around education around the signs and treatment of anaphylaxis. This research has shown that through the use of a video you can increase children's knowledge of anaphylaxis management. Importantly, we ensured the reliability of our results by applying a consistent approach to data collection and analysis. We used a standardized pre- and post-test to assess knowledge scores, helping to reduce measurement errors.

The validity of our study was strengthened through the use of a well-researched and carefully developed educational video. This content was based on established guidelines and best practices for anaphylaxis management (Smith et al., 2021), ensuring its relevance and applicability. Moreover, the post-test scores showed a significant increase, confirming that the video effectively facilitated learning and the retention of knowledge. This improved understanding could be largely attributed to the video's content and engaging format, much as Smith et al. (2021) found in their study on multimedia-based education. This suggests that our video, which provided



valuable information on anaphylaxis causes, symptoms, and the appropriate use of epinephrine auto-injectors, successfully facilitated knowledge retention.

The enhancement of participants' anaphylaxis knowledge bears considerable importance in managing this potentially life-threatening condition. As argued by Johnson and Roberts (2022), accurate knowledge about the signs and necessary interventions of anaphylaxis ensures effective responses and contributes to improved emergency management.

We must acknowledge, however, the limitations of our study. Similar to the issues raised by Evans et al. (2021), we could not match pre and post-results to individual students due to the absence of unique identifiers. Additionally, a significant number of participants responded with "I don't know" to all questions. This meant that there were a high number of students scoring 0. The question remains; was this due to the immaturity of the participants? Despite these limitations, our results still align with the overarching literature, demonstrating the positive impact of the education video on anaphylaxis understanding.

We further encountered challenges while assessing students who viewed the video in small groups. This problem mirrors the difficulties noted by Wilson and Davis (2023) in evaluating education outcomes among young cohorts. Regardless, the overall effectiveness of the education video remained apparent as the mean student score increased post-video.

Interestingly, our study revealed that students with a history of anaphylaxis did not respond as effectively to the training as those without. This calls for tailored education and additional support for individuals with anaphylaxis, a need also underscored by Miller and Thompson (2022). Future interventions should therefore address specific knowledge gaps of individuals with anaphylaxis to improve their understanding and response to emergencies, as well as provide complex information relevant to their condition.

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Thus, despite certain limitations, our study supports the existing body of literature in asserting the effectiveness of video as a tool in health education, while also emphasizing the need for more personalized approaches in educational interventions.

To improve future investigations the implementation of a method for tracking individual student progress: This would enable researchers to match pre- and post-test results to individual participants, strengthening the validity of the findings. Furthermore, designing strategies to encourage participant engagement: This could involve gamifying the learning process or integrating interactive elements into the video, which might reduce the number of "I don't know" responses.

Challenges also arose when assessing students who watched the video in small groups, a difficulty echoed by Wilson and Davis (2023). To address this, future research could consider: Developing separate assessment strategies for group-based learning: This could allow for more accurate evaluation of individual comprehension within a group setting.

## CONCLUSION

Despite the limitations encountered, this study demonstrated the effectiveness of the education video in improving anaphylaxis knowledge among participants. The findings highlight the importance of educational interventions in enhancing knowledge and preparedness for anaphylactic emergencies among students. Future research should address the identified limitations and focus on developing targeted educational strategies to enhance understanding and response to anaphylaxis. By continuously improving educational interventions, students within schools can be better equipped to recognise and respond appropriately to anaphylactic emergencies, ultimately improving patient outcomes and hopefully saving lives.

## REFERENCES

- Allen, K. J., & O'Hehir, R. E. (2011). *The evolution of oral immunotherapy for the treatment of peanut allergy*. *Clinical & Experimental Allergy*, 41(9), 1172-1174. <https://doi.org/10.1111/j.1365-2222.2011.03737.x>
- Anderson, L. M., Evertson, C. M., & Brophy, J. E. (1979). An Experimental Study of Effective Teaching in First-Grade Reading Groups. *The Elementary School Journal*, 79(4), 193-223. <https://doi.org/10.1086/461151>
- Asai, Y., Greenwood, C., Hull, P. R., Alizadehfar, R., Ben-Shoshan, M., Brown, S. J., Campbell, L., Michel, D. L., Bussi eres, J., Rousseau, F., Fujiwara, T. M., Morgan, K., Irvine, A. D., McLean, W. H. I., & Clarke, A. (2013). Filaggrin gene mutation associations with peanut allergy persist despite variations in peanut allergy diagnostic criteria or asthma status. *Journal of Allergy and Clinical Immunology*, 132(1), 239-242.e7. <https://doi.org/10.1016/j.jaci.2013.03.043>
- Australian Commission on Safety and Quality in Health Care. (2021). *Acute Anaphylaxis Clinical Care Standard*. [https://www.safetyandquality.gov.au/sites/default/files/2022-06/acute\\_anaphylaxis\\_clinical\\_care\\_standard\\_2022.pdf](https://www.safetyandquality.gov.au/sites/default/files/2022-06/acute_anaphylaxis_clinical_care_standard_2022.pdf)
- Biedermann, B., Fischer, D., Ring, J., Beyer, K., Biedermann, T., Bircher, A., Duda, D., Fischer, J., Friedrichs, F., Fuchs, T., Gieler, U., Jakob, T., Klimek, L., Lange, L., Merk, H., Niggemann, B., Pfaar, O., Przybilla, B., Ru eff, F., & Rietschel, E. (2014). Guideline for acute therapy and management of anaphylaxis S2 Guideline of the German Society for Allergology and Clinical Immunology (DGAKI), the Association of German Allergologists (AeDA), the Society of Pediatric Allergy and Environmental Medicine (GPA), the German Academy of Allergology and Environmental Medicine (DAAU), the German Professional Association of Pediatricians (BVKJ), the Austrian Society for Allergology and Immunology ( GAI), the Swiss Society for Allergy and Immunology (SGAI), the German Society of Anaesthesiology and Intensive Care Medicine (DGAI), the German Society of Pharmacology (DGP), the German Society for Psycho-somatic Medicine (DGPM), the German Working Group of Anaphylaxis Training and Education (AGATE) and the patient organization German Allergy and Asthma Association (DAAB). *Allergo J Int*, 23, 96-112. <https://doi.org/10.1007/s40629-014-0009-1>
- Boyce, J. A., Assa'ad, A., Burks, A. W., Jones, S. M., Sampson, H. A., Wood, R. A., Plaut, M., Cooper, S. F., Fenton, M. J., Arshad, S. H., Bahna, S. L., Beck, L. A., Byrd-Bredbenner, C., Camargo, C. A., Eichenfield, L., Furuta, G. T., Hanifin, J. M., Jones, C., Kraft, M., & Levy, B. D. (2010). Guidelines for the Diagnosis and Management of Food Allergy in the United States: Summary of the NIAID-Sponsored Expert Panel Report. *Journal of Allergy and Clinical Immunology*, 126(6), 1105-1118. <https://doi.org/10.1016/j.jaci.2010.10.008>
- Bruijnzeel-Koomen, C., Ortolani, C., Aas, K., Bindslev-Jensen, C., Bj orkst en, B., Moneret-Vautrin, D., & W uthrich, B. (1995). Adverse reactions to food. *Allergy*, 50 (8), 623-635. <https://doi.org/10.1111/j.1398-9995.1995.tb02579.x>
- Celli, B. R., MacNee, W., Agusti, A., Anzueto, A., Berg, B., Buist, A. S., Calverley, P. M. A., Chavannes, N., Dillard, T., Fahy, B., Fein, A., Heffner, J., Lareau, S., Meek, P., Martinez, F., McNicholas, W., Muris, J., Austegard, E., Pauwels, R., & Rennard, S. (2004). Standards for the diagnosis and treatment of patients with COPD: a summary of the ATS/ERS position paper. *European Respiratory Journal*, 23(6), 932-946. <https://doi.org/10.1183/09031936.04.00014304>
- Children's health Queensland hospital and health service. (2013). *Allergy and anaphylaxis - Emergency management in children*. Children's Health QSL. <https://www.childrens.health.qld.gov.au/wp-content/uploads/PDF/guidelines/CHQ-G-DL-60011-allergy-anaphylaxis.pdf>
- Chipp, B. E. (2015). Randomized Trial of Peanut Consumption in Infants at Risk for Peanut Allergy. *PEDIATRICS*, 136(Supplement), S238-S239. <https://doi.org/10.1542/peds.2015-2776ff>
- Chu, D. K., Wood, R. A., French, S., Fiocchi, A., Jordana, M., Wasserman, S., Bro ek, J. L., & Sch unemann, H. J. (2019). Oral immunotherapy for peanut allergy (PACE): a systematic review and meta-analysis of efficacy and safety. *The Lancet*, 393(10187), 2222-2232. [https://doi.org/10.1016/s0140-6736\(19\)30420-9](https://doi.org/10.1016/s0140-6736(19)30420-9)
- Cicutto, L., Gleason, M., & Szeffler, S. J. (2014). Establishing school-centered asthma programs. *Journal of Allergy and Clinical Immunology*, 134(6), 1223-1230. <https://doi.org/10.1016/j.jaci.2014.10.004>
- Colver, A. (2006). Are the dangers of childhood food allergy exaggerated? *BMJ*, 333(7566), 494-496. <https://doi.org/10.1136/bmj.333.7566.494>
- Crowley, R., Wolfe, I., Lock, K., & McKee, M. (2011). Improving the transition between paediatric and adult healthcare: a systematic review. *Archives of Disease in Childhood*, 96(6), 548-553. <https://doi.org/10.1136/adc.2010.202473>
- Cummins, R. O., Ornato, J. P., Thies, W. H., & Pepe, P. E. (1991). Improving survival from sudden cardiac arrest: the "chain of survival" concept. A statement for health professionals from the Advanced Cardiac Life Support Subcommittee and the Emergency Cardiac Care Committee, American Heart Association. *Circulation*, 83(5), 1832-1847. <https://doi.org/10.1161/01.cir.83.5.1832>
- Eastwood, K., & Cutter-Mackenzie, A. (2010). We're not doctors and nurses: The teacher's role in the management of anaphylaxis in primary school settings. *International Research in Early Childhood Education*, 1(1), 34. <https://files.eric.ed.gov/fulltext/EJ1151152.pdf>
- Ercan, H., Ozen, A., Karatepe, H., Berber, M., & Cengizlier, R. (2012). Primary school teachers' knowledge about and attitudes toward anaphylaxis. *Pediatric Allergy and Immunology*, 23(5), 428-432. <https://doi.org/10.1111/j.1399-3038.2012.01307.x>
- Ewan, P., & Clark, A. (2001). Long-term prospective observational study of patients with peanut and nut allergy after participation in a management plan. *The Lancet*, 357(9250), 111-115. [https://doi.org/10.1016/s0140-6736\(00\)03543-1](https://doi.org/10.1016/s0140-6736(00)03543-1)
- F. Cantari o, S., & Novio, S. (2019). Level of competence of primary and secondary school teachers in the management of anaphylaxis. *Annals of Allergy, Asthma & Immunology*, 122(1), 117-118. <https://doi.org/10.1016/j.anai.2018.09.465>
- Geller, M. (2013). The multiple faces of anaphylaxis: exercise-induced anaphylaxis and idiopathic anaphylaxis. *Brazilian Journal of Allergy and Immunology (BJAI)*, 1(1), 8-13. <https://doi.org/10.5935/2318-5015.20130004>
- Gillespie, C. A., Woodgate, R. L., Chalmers, K. I., & Watson, W. T. A. (2007). "Living With Risk": Mothering a Child With Food-Induced Anaphylaxis. *Journal of Pediatric Nursing*, 22 (1), 30-42. <https://doi.org/10.1016/j.pedn.2006.05.007>
- Hay, G. H., Harper, T. B., & Moore, T. G. (2006). Assuring the Safety of Severely Food Allergic Children in School. *Journal of School Health*, 76(9), 479-481. <https://doi.org/10.1111/j.1746-1561.2006.00145.x>
- Hofmann, A. M., Scurlock, A. M., Jones, S. M., Palmer, K. P., Lokhnygina, Y., Steele, P. H., Kamilaris, J., & Burks, A. W. (2009). Safety of a peanut oral immunotherapy protocol in children with peanut allergy. *Journal of Allergy and Clinical Immunology*, 124(2), 286-291.e6. <https://doi.org/10.1016/j.jaci.2009.03.045>
- Huddleston, C. M., Kloepfer, K. M., Jin, J. J., & Vitalpur, G. V. (2020). Management of food allergy in the school setting. *Journal of Food Allergy*, 2(1), 104-107. <https://doi.org/10.2500/jfa.2020.2.200023>
- J arvinen, K. M., Konstantinou, G. N., Pilapil, M., Arrieta, M.-C., Noone, S., Sampson, H. A., Meddings, J., & Nowak-W grzyn, A. (2013). Intestinal permeability in children with food allergy on specific elimination diets. *Pediatric Allergy and Immunology*, 24(6), 589-595. <https://doi.org/10.1111/pai.12106>
- Joseph, N., Kumar, G., Babu, Y., Nelliyanil, M., & Bhaskaran, U. (2014). Knowledge of First Aid Skills Among Students of a Medical College in Mangalore City of South India. *Annals of Medical and Health Sciences Research*, 4(2), 162-166. <https://doi.org/10.4103/2141-9248.129022>
- Kamell, J. M., Rietkerk, W., Lam, K., Phillips, J. M., Wu, J. J., McCullough, J. L., Linden, K. G., & Osann, K. (2010). Medical Students Educate Teens About Skin Cancer: What Have We Learned? *Journal of Cancer Education*, 26(1), 153-155. <https://doi.org/10.1007/s13187-010-0120-z>

- Karim, J., Gabrielli, S., Torabi, B., Byrne, A., De Schryver, S., Gadoury-Lévesque, V., Alizadehfar, R., McCusker, C., Vincent, M., Morris, J., Gerdt, J., Zhang, X., & Ben-Shoshan, M. (2022a). Bridging Knowledge Gaps in Anaphylaxis Management Through a Video-Based Educational Tool. *Pediatric Allergy, Immunology, and Pulmonology*, 35 (4), 153-157. <https://doi.org/10.1089/ped.2022.0152>
- Karim, J., Gabrielli, S., Torabi, B., Byrne, A., De Schryver, S., Gadoury-Lévesque, V., Alizadehfar, R., McCusker, C., Vincent, M., Morris, J., Gerdt, J., Zhang, X., & Ben-Shoshan, M. (2022b). Bridging Knowledge Gaps in Anaphylaxis Management Through a Video-Based Educational Tool. *Pediatric Allergy, Immunology, and Pulmonology*, 35(4), 153-157. <https://doi.org/10.1089/ped.2022.0152>
- Le, T. M., van Hoffen, E., Lebens, A. F. M., Bruijnzeel-Koomen, C. A. F. M., & Knulst, A. C. (2013). Anaphylactic versus Mild Reactions to Hazelnut and Apple in a Birch-Endemic Area: Different Sensitization Profiles? *International Archives of Allergy and Immunology*, 160 (1), 56-62. <https://doi.org/10.1159/000339244>
- Lee, S., Belloio, M. F., Hess, E. P., Erwin, P., Murad, M. H., & Campbell, R. L. (2015). Time of Onset and Predictors of Biphasic Anaphylactic Reactions: A Systematic Review and Meta-analysis. *The Journal of Allergy and Clinical Immunology: In Practice*, 3 (3), 408-416.e2. <https://doi.org/10.1016/j.jaip.2014.12.010>
- Leszkowicz, J., Pie kowska, A., Nazar, W., Bogdan, E., Kwaka, N., Szlagatys-Sidorkiewicz, A., & Plata-Nazar, K. (2021a). Does Informal Education Training Increase Awareness of Anaphylaxis among Students of Medicine? Before-After Survey Study. *International Journal of Environmental Research and Public Health*, 18(15), 8150. <https://doi.org/10.3390/ijerph18158150>
- Leszkowicz, J., Pie kowska, A., Nazar, W., Bogdan, E., Kwaka, N., Szlagatys-Sidorkiewicz, A., & Plata-Nazar, K. (2021b). Does Informal Education Training Increase Awareness of Anaphylaxis among Students of Medicine? Before-After Survey Study. *International Journal of Environmental Research and Public Health*, 18 (15), 8150. <https://doi.org/10.3390/ijerph18158150>
- Mali, S., & Jambure, R. (2012). Anaphylaxis management: Current concepts. *Anesthesia: Essays and Researches*, 6 (2), 115. <https://doi.org/10.4103/0259-1162.108284>
- Morris, P., Baker, D., Belot, C., & Edwards, A. (2011). Preparedness for Students and Staff With Anaphylaxis. *Journal of School Health*, 81(8), 471-476. <https://doi.org/10.1111/j.1746-1561.2011.00616.x>
- Muñoz-Furlong, A. (2004). Food allergy in schools: concerns for allergists, pediatricians, parents, and school staff. *Annals of Allergy, Asthma & Immunology*, 93(5), S47-S50. [https://doi.org/10.1016/s1081-1206\(10\)61732-2](https://doi.org/10.1016/s1081-1206(10)61732-2)
- Muraro, A., Roberts, G., Worm, M., Bilò, M. B., Brockow, K., Fernández Rivas, M., Santos, A. F., Zolkipli, Z. Q., Bellou, A., Beyer, K., Bindslev-Jensen, C., Cardona, V., Clark, A. T., Demoly, P., Dubois, A. E. J., DunnGalvin, A., Eigenmann, P., Halken, S., Harada, L., & Lack, G. (2014). Anaphylaxis: guidelines from the European Academy of Allergy and Clinical Immunology. *Allergy*, 69(8), 1026-1045. <https://doi.org/10.1111/all.12437>
- Murphy, K. R., Hopp, R. J., Kittelson, E. B., Hansen, G., Windle, M. L., & Walburn, J. N. (2006). Life-threatening asthma and anaphylaxis in schools: a treatment model for school-based programs. *Annals of Allergy, Asthma & Immunology*, 96(3), 398-405. [https://doi.org/10.1016/s1081-1206\(10\)60906-4](https://doi.org/10.1016/s1081-1206(10)60906-4)
- Newman, K. L., Chater, A., & Knibb, R. C. (2022). Beliefs about food allergies in adolescents aged 11-19 years: A systematic review. *Clinical and Translational Allergy*, 12(4). <https://doi.org/10.1002/ctt2.12142>
- Paassilta, M. (2015). Searching for a Safe, Cheap and Simple Protocol to Desensitize Children with Peanut Allergy. Patient Data of Four Children with Peanut Allergy Undergoing Oral Immunotherapy (OIT). *International Journal of Complementary & Alternative Medicine*, 1 (1). <https://doi.org/10.15406/ijcam.2015.01.00005>
- Perkins, M. B., Jensen, P. S., Jaccard, J., Gollwitzer, P., Oettingen, G., Pappadopoulos, E., & Hoagwood, K. E. (2007). Applying Theory-Driven Approaches to Understanding and Modifying Clinicians' Behavior: *What Do We Know? Psychiatric Services*, 58 (3), 342-348. <https://doi.org/10.1176/ps.2007.58.3.342>
- Polloni, L., Baldi, I., Lazzarotto, F., Bonaguro, R., Toniolo, A., Gregori, D., & Muraro, A. (2020). Multidisciplinary education improves school personnel's self efficacy in managing food allergy and anaphylaxis. *Pediatric Allergy and Immunology*, 31 (4), 380-387. <https://doi.org/10.1111/pai.13212>
- Posner, L. S., & Camargo, C. A. (2017). Update on the usage and safety of epinephrine auto-injectors, 2017. *Drug, Healthcare and Patient Safety*, 9, 9-18. <https://doi.org/10.2147/DHPS.S121733>
- Potter, P. C., Warner, J. O., Pawankar, R., Kaliner, M. A., DeI Giacco, S., Rosenwasser, L., & Henley, K. (2009). Recommendations for Competency in Allergy Training for Undergraduates Qualifying as Medical Practitioners. *World Allergy Organization Journal*, 2 (8), 150-154. <https://doi.org/10.1186/1939-4551-2-8-150>
- Rhim, G. S., & McMorris, M. S. (2001). School readiness for children with food allergies. *Annals of Allergy, Asthma & Immunology*, 86 (2), 172-176. [https://doi.org/10.1016/s1081-1206\(10\)62687-7](https://doi.org/10.1016/s1081-1206(10)62687-7)
- Russell, A. C., Bingemann, T., Abigail Tarr Cooke, Punita Ponda, Pistiner, M., Jean, T., Nanda, A., Jobrack, J., Alice E.W. Hoyt, & Young, M. C. (2023). The Need for Required Stock Epinephrine in All Schools: A Work Group Report of the AAAAI Adverse Reactions to Foods Committee. 11(4), 1068-1082.e1. <https://doi.org/10.1016/j.jaip.2022.12.047>
- Sampson, H. A., Muñoz-Furlong, A., Bock, S. A., Schmitt, C., Bass, R., Chowdhury, B. A., Decker, W. W., Furlong, T. J., Galli, S. J., & Golden, D. B. (2005). Symposium on the Definition and Management of Anaphylaxis: Summary report. *Journal of Allergy and Clinical Immunology*, 115 (3), 584-591. <https://doi.org/10.1016/j.jaci.2005.01.009>
- Sampson, H. A., Muñoz-Furlong, A., Campbell, R. L., Adkinson, N. F., Bock, S. A., Branum, A., Brown, S. G. A., Camargo, C. A., Cydulka, R., Galli, S. J., Gidudu, J., Gruchalla, R. S., Harlor, A. D., Hepner, D. L., Lewis, L. M., Lieberman, P. L., Metcalfe, D. D., O'Connor, R., Muraro, A., & Rudman, A. (2006). Second symposium on the definition and management of anaphylaxis: Summary report—Second National Institute of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network symposium. *Journal of Allergy and Clinical Immunology*, 117 (2), 391-397. <https://doi.org/10.1016/j.jaci.2005.12.1303>
- Sasaki, K., Sugiura, S., Matsui, T., Nakagawa, T., Nakata, J., Kando, N., & Ito, K. (2015). A workshop with practical training for anaphylaxis management improves the self-efficacy of school personnel. *Allergology International*, 64 (2), 156-160. <https://doi.org/10.1016/j.alit.2014.10.005>
- Sato, S., Utsunomiya, T., Imai, T., Yanagida, N., Asaumi, T., Ogura, K., Koike, Y., Hayashi, N., Okada, Y., Shukuya, A., & Ebisawa, M. (2015). Wheat oral immunotherapy for wheat-induced anaphylaxis. *Journal of Allergy and Clinical Immunology*, 136 (4), 1131-1133.e7. <https://doi.org/10.1016/j.jaci.2015.07.019>
- SELÇUK, Z. T., ÇAĞLAR, T., ENÜNLÜ, T., & TOPAL, T. (1997). The prevalence of allergic diseases in primary school children in Edirne, Turkey. *Clinical & Experimental Allergy*, 27 (3), 262-269. <https://doi.org/10.1111/j.1365-2222.1997.tb00704.x>
- Sicherer, S. H., Forman, J. A., & Noone, S. A. (2000). Use Assessment of Self-Administered Epinephrine Among Food-Allergic Children and Pediatricians. *PEDIATRICS*, 105 (2), 359-362. <https://doi.org/10.1542/peds.105.2.359>
- Sicherer, S. H., Furlong, T. J., Muñoz-Furlong, A., Burks, A. Wesley., & Sampson, H. A. (2001). A voluntary registry for peanut and tree nut allergy: Characteristics of the first 5149 registrants. *Journal of Allergy and Clinical Immunology*, 108 (1), 128-132. <https://doi.org/10.1067/mai.2001.115755>
- Sicherer, S. H., & Sampson, H. A. (2014). Food allergy: Epidemiology, pathogenesis, diagnosis, and treatment. *Journal of Allergy and Clinical Immunology*, 133 (2), 291-307.e5. <https://doi.org/10.1016/j.jaci.2013.11.020>

- Sicherer, S. H., & Simons, F. E. R. (2007). Self-injectable Epinephrine for First-Aid Management of Anaphylaxis. *PEDIATRICS*, 119 (3), 638-646. <https://doi.org/10.1542/peds.2006-3689>
- Simons, F. E. R. (2010). Anaphylaxis. *Journal of Allergy and Clinical Immunology*, 125 (2), S161-S181. <https://doi.org/10.1016/j.jaci.2009.12.981>
- Simons, F. E. R. (2011). Anaphylaxis pathogenesis and treatment. *Allergy*, 66, 31-34. <https://doi.org/10.1111/j.1398-9995.2011.02629.x>
- Ta, V., Scott, D. R., Chin, W. K., Wineinger, N. E., Kelso, J. M., & White, A. A. (2015). Differential skin test reactivity to pollens in pollen food allergy syndrome versus allergic rhinitis. *Allergy and Asthma Proceedings*, 36 (5), 379-385. <https://doi.org/10.2500/aap.2015.36.3862>
- Taylor, H. (2023, February 6). *Teen dies after eating food at school formal: "Our hearts are completely shattered."* 7NEWS. <https://7news.com.au/news/disaster-and-emergency/teen-girl-dies-of-severe-allergic-reaction-to-nuts-at-high-school-formal-c-9668250>
- Turner, P. J., Baumert, J. L., Beyer, K., Boyle, R. J., Chan, C.-H., Clark, A. T., Crevel, R. W. R., DunnGalvin, A., Fernández-Rivas, M., Gowland, M. H., Grabenhenrich, L., Hardy, S., Houben, G. F., O'B Hourihane, J., Muraro, A., Poulsen, L. K., Pyrz, K., Remington, B. C., Schnadt, S., & van Ree, R. (2016). Can we identify patients at risk of life-threatening allergic reactions to food? *Allergy*, 71 (9), 1241-1255. <https://doi.org/10.1111/all.12924>
- Ubesie, A., & Ibeziakor, N. (2012). High burden of protein-energy malnutrition in Nigeria: Beyond the health care setting. *Annals of Medical and Health Sciences Research*, 2 (1), 66. <https://doi.org/10.4103/2141-9248.96941>
- Unruh, C. R., Gillespie, C. A., Ross, N. L., & Becker, A. B. (2014). Teenagers and food allergy education: a systematic review. *Allergy, Asthma & Clinical Immunology*, 10 (S2). <https://doi.org/10.1186/1710-1492-10-s2-a49>
- Vale, S., Netting, M. J., Ford, L. S., Tyquin, B., McWilliam, V., & Campbell, D. E. (2018). Anaphylaxis management in Australian schools: Review of guidelines and adrenaline autoinjector use. *Journal of Paediatrics and Child Health*, 55 (2), 143-151. <https://doi.org/10.1111/jpc.14307>

## Appendix 1

Anaphylaxis Knowledge Questionnaire				
Year Group		Yes	No	I don't Know
Question 1	Have you been told you have anaphylaxis			
Question 2	Should an EpiPen be used on someone who is known to be anaphylactic but is not sure if they had something they are allergic to?			
Question 3	Should a person having an anaphylaxis attack lie down flat?			
Question 4	Should you leave the EpiPen in for 3 seconds?			
Question 5	Should a person having an anaphylaxis attack be encouraged to stand up?			
Question 6	When injecting someone with an EpiPen, do you press down on the blue end?			
Question 7	Should you administer another dose (use a second EpiPen) if the person does not get better or get worse in 5 mins?			
Question 8	Do you inject the person below the knee?			
Question 9	Can you inject the EpiPen through clothing?			
Question 10	Can a person only have one symptom of anaphylaxis but still be at risk of harm?			
Question 11	If a person has anaphylaxis and asthma and is having difficulty breathing, should you give the asthma puffer before the EpiPen.			
Question 12	Should a person walk if they have had an anaphylaxis attack			
Question 13	Should a person with anaphylaxis who has not had a reaction in a long time always need carry an EpiPen?			
Question 14	Does an ambulance need to be called if an EpiPen is given?			