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## An Assessment of Knowledge and Attitude Towards Stock Epinephrine Among Kentucky School Nurses

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Final DNP Project Report

Title: An Assessment of Knowledge and Attitude Towards Stock Epinephrine Among Kentucky School Nurses

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December 1, 2015

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## Acknowledgements

I would like to thank Dr. Leslie Scott, Dr. Diana Inman, and Laura Jackson for their time and devotion to this practice inquiry project and for their support and suggestions throughout the project's development, implementation and analysis. I would like to thank the Kentucky School Nurses Association for their participation in this research study as well. I would also like to thank my family for their support throughout my doctoral studies and especially during the development of this practice inquiry project. Lastly, I would like to thank my classmates for their support over the last three years during our journey to higher education.

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## DNP Practice Inquiry Project Overview

The CDC released a study demonstrating a 50% increase in childhood food allergies between 1997 and 2011 (Food Allergy Research and Education, 2014). With this number continuing to rise with no clear explanation or cure on the horizon, it is important that those who deal directly with these children understand how to best manage and treat a reaction to a food allergen. There has been a great deal of research related to pediatric food allergies and there are now evidence based practices for recognition of a severe reaction and the best line of treatment for those reactions. The following manuscripts will introduce food allergies and their increasing incidence within the United States and review the current literature that relates to pediatric food allergies. Kentucky's current legislation in relation to non-prescribed epinephrine in schools will also be analyzed. It is clear that epinephrine is the first line of treatment if a child is suspected to be having a severe allergic reaction; therefore it would seem appropriate to keep this medication in schools where children spend the majority of their day. Lastly, a cross sectional, pre-post intervention study of Kentucky school nurses will be discussed and the barriers keeping these school nurses from implementing non-prescribed epinephrine into their schools will be analyzed. Future recommendations based on the results of this study will also be discussed.

Manuscript 1: Food Allergies in the Pediatric Population

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## **Abstract**

In the United States it is estimated that 6% of children are affected by food allergies. Some of the most common food allergies seen among children include peanuts, milk, eggs, seafood, soy and wheat. In fact, the prevalence of peanut allergies has doubled in children from 1997 to 2002 (Yu, Day, Connal-Nicolaou, & Enders, 2011). The effects of food allergies on the pediatric population will be explored. The topic will be introduced by providing a description of the problem using supporting data from seven research studies. Each of these articles will then be reviewed individually and their findings will be discussed. The current literature will be analyzed for strengths, weaknesses, and omissions and recommendations for further research will be made. Lastly, the findings of these articles will be synthesized into a cohesive statement and the student author will be able to narrow the direction for further research on the topic.

## **Background**

According to data that was collected by the National Center for Health Statistics there were approximately 317,000 visits to the emergency department or other clinics from 2003 to 2006 due to pediatric food allergies (Yu, 2011). While there is currently no cure for food allergies, there are various treatment options. Some of the current treatments that are being researched will be discussed.

Food allergies can affect a child in many different ways. It can impact their daily lives when preparing food, grocery shopping, and eating out. It is important for children and their families to have an understanding of the allergy and ensure care and safety for themselves at home, at school, or during other extracurricular activities. In cases of severe allergies, the child or caregiver may be required to carry emergency medications with them at all times. Food allergies can affect the nutrition status of the child (Flammarion, Sophie, Santos, Clarisse,

Guimber, Dominique, Jouannic, Lyne, Thumerelle, Caroline, Gottrand, Frédéric, & Deschildre, Antoine, 2011). Research is being done to determine how an allergen can be eliminated from the diet without causing growth delays in children. To reduce the risk of developing severe reactions to food allergens, such as anaphylaxis, the American Academy of Pediatrics set a timeline for the introduction of potential allergenic foods. Cow's milk is to be introduced at 12 months, eggs no earlier than 24 months, and peanuts and fish should be avoided until 36 months (Yu et al., 2011). Predictors of food allergies are also being researched. It is believed that both genetic and environmental factors can contribute to food allergies (Al-Hammadi, Zoubeidi, & Al-Maskari, 2011). A more detailed discussion of perinatal factors and other environmental factors and their effects on pediatric food allergies will be presented later.

### **Findings**

Ten articles were reviewed on various topics related to pediatric food allergy. Main topics of research that are currently being reported in the literature include predicting factors of childhood food allergies, the effects of egg allergy on childhood immunizations, diet and nutrition of children with food allergies, treatments, and school readiness. Each article will be reviewed individually and the findings of each will be discussed (Table 1). Both CINAHL and PubMed were used to search for articles using keywords "pediatric food allergies" and "food allergies in schools". Using CINAHL, 38 results were produced when using the keywords "pediatric food allergies" and 62 results were produced when using the keywords "food allergies in schools". When PubMed was used, 2733 results were produced when using the keywords "pediatric food allergies" and 196 results were produced when using the keywords "food allergies in schools".

## **Predicting Factors**

The first article that was reviewed was a retrospective study that wanted to identify any perinatal factors that could cause or be associated with food allergies. It is thought that gut flora, which is an important immunomodulator, may be disrupted in individuals with atopic conditions such as food allergies. In the first year of life fewer gastrointestinal bifidobacteria are present in those children who are diagnosed with an atopic condition. Probiotic bacteria have even been used as a therapeutic treatment to prevent food allergies. Three possible causes for the disruption of the neonatal gut flora were suggested. Cesarean section delivery, the use of antibiotics and time spent in a neonatal intensive care unit (NICU) were all identified as possible predictors for the likely development of food allergies. It is believed that if one of these three factors was present in the perinatal course that the neonate will be more likely to have a disruption in gut flora, subsequently leading to a childhood food allergy diagnosis (Dowhower Karpa et al., 2012).

Dowhower et al. (2012) performed a retrospective chart review on 192 healthy children and 99 children that had been diagnosed with food allergies. Data such as delivery method, any time spent in the NICU, any evidence of atopy in the mother or child, the status of group B Streptococcus in the mother, if antibiotics were given to the mother during delivery, intent to breastfeed, and age and parity of the mother were reviewed. The data that was collected by Dowhower et al. was unable to show that there was an increase in food allergies with cesarean delivery, time spent in the NICU, or treatment with antibiotics. However, it was found that being of male gender and an increased maternal age both had significant associations with childhood food allergy diagnoses (Dowhower Karpa et al., 2012).

Possible predictors, both genetic and environmental, that could lead to a childhood food allergy were reviewed by Al- Hammadi et al. The researchers believe that food allergies have a

familial tendency. Currently the diagnoses of food allergies are made solely on the presenting symptoms. An IgE mediated allergy will typically present with itching, coughing, wheezing, or vomiting. To confirm the diagnosis either a food challenge or skin prick test is required. Food challenges are not often used due to the fact that they can lead to anaphylaxis and skin prick tests have only been shown to predict the allergy in 50% of cases. The researchers believe that there is a strong association between personal or familial allergy and childhood food allergies (Al-Hammadi et al., 2011).

To determine if their hypothesis showed any truth, the researchers developed a cross sectional study. They selected 660 children from the public primary schools in Al-Ain city and presented them with a 35 item questionnaire to be completed by their parents. Of these children, 397 returned the form and were enrolled in the study. Data was analyzed using SPSS and the following results were found. The onset of food allergy was seen as early as the first month of life, but most were not seen until between the ages 6 and 12 months and then again between 1 and 3 years. The most common food allergy was egg, followed by fruits and then fish. Cutaneous symptoms were the most common, such as hives and itching, followed by respiratory symptoms like cough and hoarseness. Other symptoms reported were sneezing, itchy eyes, wheezing, vomiting and others. Of the children surveyed 36% had suffered from anaphylaxis. These symptoms ranged from immediate to up to 4 hours after the ingestion of the food and were treated by either an oral antihistamine or a bronchodilator. The researchers found that there were significant associations between food allergy and personal atopic dermatitis, asthma, and allergic rhino-conjunctivitis. It was also shown that there was a significant association between childhood food allergies and family members who suffered from atopic interactions. However the researchers found that the best predictor of a childhood food allergy was personal atopic

dermatitis, followed by personal history of asthma, paternal atopic dermatitis and lastly paternal allergic rhino-conjunctivitis. By being aware of these predicting factors, proper steps can be taken to prevent severe allergic reactions in the child by adopting certain nutritional guidelines (Al-Hammadi et al., 2011).

### **Egg Allergy**

Egg allergy is one of the most common food allergies among children, affecting about 1-2% of preschoolers. While it is not as likely to cause severe allergic symptoms, like anaphylaxis, compared to a peanut allergy it does pose other problems to the health of the child (Allen, Campbell, & Kemp, 2007).

It is believed that children are likely to grow out of an egg allergy by school age. In a study of 2 year olds the prevalence of egg allergy was 1.6%, but when the same group was tested at 7 years of age the prevalence was only 0.2%. The allergic reaction to eggs is very similar to those stated previously and includes wheezing, urticaria, vomiting, etc. It was found that a child can be sensitized to egg without ever having an exposure, meaning the first egg ingestion can cause allergic symptoms. In the past the MMR vaccine had been contraindicated in children with an egg allergy, but that is no longer the case. However, the influenza vaccine is still contraindicated in those with an egg allergy leaving those children unimmunized against influenza. The other major issue with egg allergy, and all food allergies for that matter, is the decreased quality of life that it can cause for the child and family. These children must follow strict diet restrictions in order to avoid clinical reactions and that can become tolling on the child and the parents that have to care for the child (Allen et al., 2007).

## **Diet and Nutrition**

One of the most commonly used treatment options for children with food allergies is an elimination diet. Recently though, research has begun to assess the nutritional status of those children who are eliminating the allergenic food from their diet. The question posed is whether these diets are affecting the growth and development of these children. The purpose of this specific study was to assess the nutrient intake and nutritional status of a group of children with food allergies after an elimination diet had begun.

This cross sectional study compared 96 children with food allergies to a group of 95 healthy children. They compared the nutritional status of the children by looking at measurements of height and weight and calculating Z scores for the children in the categories of weight-for-age, height-for-age, and weight-for-height. The researchers also wanted to assess the nutrient intake of each child, so they required that they each record a 3 day diet log. In the group with food allergies, 62 completed the diet record and 52 of the non-allergy group completed it. The main food allergies that were recorded for this study were peanuts, cow's milk, soybeans and fish. Of the allergy group 23% were allergic to two foods and 43% were allergic to three or more foods (Flammarion et al., 2011).

It was found that the mean weight-for-age and height-for-age was lower in the children with food allergies than those without. The weight-for-height was similar in both groups. The children that had categorized themselves as being allergic to three or more foods were also found to be smaller than those that were allergic to one or two foods. Energy, protein and calcium intake were similar for both groups, and met the recommendations, even with the 28 children that were allergic to cow's milk receiving some sort of calcium supplement. This study showed that children with food allergies are in a nutritional deficit to some degree and should require

initial and ongoing nutritional counseling as well as regular growth evaluations (Flammarion et al., 2011).

The next article discusses the framework that is to be followed in both infants and children when dietary management due to a food allergy is needed. It covers management for both short-term diagnostic diets and long-term therapeutic diets. Elimination diets are the foundation to both diagnosing a food allergy and treating one on a long term basis as needed. As for the diagnostic portion, a dietary history is taken and clinical symptoms are taken into account in relation to that. The clinician then determines what food may have caused that allergic reaction and the food is eliminated for a period of time. If symptoms subside it is decided that the child indeed has a food allergy and then the elimination diet must become a full time lifestyle for the child. An elimination diet must be carefully monitored to ensure that the child is receiving the recommended daily caloric intake, if not “failure to thrive” may occur (Mofidi, 2003).

There are many dietary needs for a growing child, all of which can be found in published guidelines by the USDA. Whether or not the child is meeting these needs can be assessed in two ways; the first is by taking a 3 day diet history and calculating whether the child fulfills the Recommended Daily Values (RDAs) according to the USDA. The other is to assess if a child is developing at the rate that they should be according to standard growth charts (Mofidi, 2003).

When an elimination diet is prescribed the child and parents will go through extensive teaching about reading labels, substitute foods, and maintaining nutritional needs. Though it is not talked about as often, mothers who are breastfeeding an infant with a food allergy must also adhere to an elimination diet. A breastfeeding mother also requires certain nutrients to be able to produce milk and an elimination diet can make that very difficult. More research on this topic

still needs to be done. For the infant with food allergies, introduction to solid foods must also be altered slightly. A healthy infant usually is introduced to solid foods around 6 months of age. While the same holds true for an infant with known food allergies, they must only be introduced to single ingredient foods and foods should be introduced no less than 5 days apart. Also the guidelines for introducing common allergenic foods differ slightly for children who are at risk for food allergies. Soy and milk are introduced at 1 year of age, eggs at 2 years, and nuts and fish are saved until 3 years of age. While raising a child with a food allergy can be difficult the amount of education that is available for these parents is abundant and it is up to the healthcare provider to see that parents receive and understand the importance of this education (Mofidi, 2003)

## **Treatment**

As stated previously, the most widely used treatment plan for food allergies is an elimination diet. Recently, new research has come about that challenges this treatment plan. According to the Hygiene Hypothesis, exposure to allergens and pathogens is necessary for an effective immune system. This study wanted to determine if early exposure to the allergen could be beneficial (Yu et al., 2011).

In this study there were 258 teenage participants, 67 of which had diagnosed food allergies. A questionnaire was handed out to each participants parent that included questions about food allergies and diet history. The six most common food allergens were listed and the parent was to select if the child has or has ever had an allergy to that food. Then the parent was asked what age the child was introduced to each food. It was seen that those children who had been exposed to the foods early in life did not suffer from food allergies. They found that exposure to eggs before the age of 12 months was most protective against food allergies.

Exposure to seeds and nuts before 24 months was most protective against food allergies. Lastly exposure to shellfish before 36 months was most protective against food allergies. In conclusion these researchers have found that there is benefit to exposing certain allergenic foods to children before a certain age in order to prevent food allergies (Yu et al., 2011).

### **School Readiness**

Two descriptive studies were looked at that described ways to manage food allergies based on age and also with ethical principles taken into consideration. The first study was created to assist school health officials in creating food allergy policies that were guided by ethical principles. They provide examples such as eliminating school wide food bans, as this could be burdensome on families that do not have a child with food allergies, and instead focusing on “no food sharing” policies. Also, the authors do not recommend separating children with food allergies during snack or meal times (Behrmann, 2010). Another descriptive study focused on ways to manage food allergies based on the child’s age. They broke down the management styles for preschoolers, school aged, and teenagers. The focus for preschool aged children was a no food sharing policy, as children this age are typically unaware of their food allergy and how to avoid it. Also, proper cleaning of surfaces after meal and snack times was emphasized to reduce the ingestion of allergen particles. For the school ages child, action plans are most important as these children typically know of their food allergies and are able to avoid their allergen. These children, however, are most prone to bullying related to their food allergy and it will be important for school officials to be aware of this. Lastly, teenagers will begin to learn the skills they need for adulthood as it relates to their food allergy, such as food preparation (Mudd & Wood, 2011).

The next article that was reviewed looked to research how schools were preparing themselves for children with food allergies, as this number seems to be on the rise. The researchers wanted to characterize the level of knowledge that school officials had about food allergies and the prevention and treatment policies that individual elementary schools had in place. A questionnaire was sent to 273 public elementary schools and contained 21 multiple choice questions. The questions asked related to food allergy awareness, avoidance measures, and treatment strategies. There were 109 schools that responded to the survey, with 95 of them reporting that they had at least one student with a food allergy in their school. The food-allergic children were identified by school records and the allergies varied greatly with milk and peanuts being the most common. Most schools relied on parents as the source of information about the food allergy or an in service such as a school nurse or principal. As for food avoidance, food substitution and special meal requests were available, a “no food sharing” policy was implemented in some schools and food handlers had certain guidelines that had to be followed. Most schools reported that in the event of a serious reaction they would be required to transport the student to a medical facility due to lack of training. In conclusion, while many schools are aware of food allergies and the best ways in which to avoid exposure, there is a serious lack of treatment education in the case of an emergency (Rhim & McMorris, 2001).

The last article that was reviewed in relation to school readiness aimed to determine the effect that the increase in food allergies was having on the school nurses. The authors conducted a telephone survey among all nurses that were employed at an elementary school in the U.S. The survey was administered to 400 nurses and consisted of 39 questions. The authors found that 94% of nurses had at least one child with a food allergy at their school, 60% of nurses noticed an increase in the prevalence of food allergies and 87% found the issue to be somewhat or very

serious, and 71% of nurses also found the management of food allergies to be somewhat or very much of a burden. Also of note, 90% of the nurses kept epinephrine auto injectors in their office and 78% trained other staff members as a preventative measure (Weiss, Munoz-Furlong, Furlong & Arbit, 2004).

Table 1

Citation	Purpose	Setting	Study Design	Procedure	Findings
<p>Al-Hammadi, S., Zoubeidi, T., &amp; Al-Maskari, F. (2011). Predictors of childhood food allergy: significance and implications. <i>Asian Pac J Allergy Immunol</i>, 29(4), 313-317.</p>	<p>Identify an association between personal or familial allergy and presence of a childhood food allergy</p>	<p>Public primary schools in Al-Ain city</p>	<p>Questionnaire</p>	<p>660 children from the public primary schools in Al-Ain city were presented with a 35 item questionnaire to be completed by their parents. Of these children, 397 returned the form and were enrolled in the study.</p>	<p>The best predictor of a childhood food allergy was personal atopic dermatitis, followed by personal history of asthma, paternal atopic dermatitis and lastly paternal allergic rhino-conjunctivitis</p>
<p>Allen, C. W., Campbell, D. E., &amp; Kemp, A. S. (2007). Egg allergy: are all childhood food allergies the same? <i>Journal of Pediatrics and Child Health</i>, 43(4), 214-218. doi: 10.1111/j.1440-1754.2007.00996.x</p>	<p>Identify if children can grow out of an egg allergy</p>	<p>Population base in Australia</p>	<p>Population based study</p>	<p>The prevalence of IgE-mediated reactions to egg in a population-based study of 2-year-olds was done and then the same group was retested at age 7</p>	<p>The study showed that in 2 year olds the prevalence of egg allergy was 1.6%, but when the same group was tested at 7 years of age the prevalence was only 0.2%.</p>

<p>Behrmann, J., (2010). Ethical principles as a guide in implementing policies for the management of food allergies in schools. <i>The Journal of School Nursing</i>, 26(3), 183-93.</p>	<p>To provide guidance, in terms of ethical principles, for school health officials that are involved in creating food allergy policies.</p>	<p>School health care officials</p>	<p>Descriptive study</p>	<p>Describe ways in which school health officials can create food allergy polices without creating bias or burdens for those children with food allergies.</p>	<p>Examples of ethically sound policies included not separating those children with food allergies from the others during meal or snack times, providing allergen free meals and snacks of the same quality of those with common allergens, and focusing on allergens(eliminate food sharing) versus one (peanut free schools).</p>
<p>Dowhower Karpa, K., Paul, I. M., Leckie, J. A., Shung, S., Carkaci-Salli, N., Vrana, K. E., . . . Poger, J. (2012). A retrospective chart review to identify perinatal factors associated with food allergies. <i>Nutrition Journal</i>, 11, 87.</p>	<p>Identify any perinatal factors that could cause or be associated with food allergies</p>	<p>Penn State Hershey Medical Center</p>	<p>Retrospective study</p>	<p>Chart review on 192 healthy children and 99 children that had been diagnosed with food allergies.</p>	<p>Male gender and an increased maternal age both had significant associations with childhood food allergy diagnoses</p>

<p>Flammarion, Sophie, Santos, Clarisse, Guimber, Dominique, Jouannic, Lyne, Thumerelle, Caroline, Gottrand, Frédéric, &amp; Deschildre, Antoine. (2011). Diet and nutritional status of children with food allergies. <i>Pediatric Allergy and Immunology</i>, 22(2), 161-165. doi: 10.1111/j.1399-3038.2010.01028.x</p>	<p>Assess the nutrient intake and nutritional status of a group of children with food allergies after an elimination diet had begun</p>	<p>Pediatric Pulmonology and Allergology Unit of Jeanne de Flandre University Hospital in Lille</p>	<p>Cross sectional study</p>	<p>Compared 96 children with food allergies to a group of 95 healthy children. They compared the nutritional status of the children by looking at measurements of height and weight and calculating Z scores for the children in the categories of weight-for-age, height-for-age, and weight-for-height</p>	<p>It was found that the mean weight-for-age and height-for-age was lower in the children with food allergies than those without.</p>
<p>Mofidi, Shideh. (2003). Nutritional Management of Pediatric Food Hypersensitivity. <i>Pediatrics</i>, 111(Supplement 3), 1645-1653.</p>	<p>Discusses the framework that is to be followed in both infants and children when dietary management due to a food allergy is needed</p>	<p>United States pediatric population</p>	<p>Meta-Analysis</p>	<p>Provided a framework for the dietary management of food allergies for both short-term and long-term diagnostics for infants and children and also provided approaches for maternal dietary restriction for breastfed infants with food allergy</p>	<p>Use 3 day diet history to see if child fulfills the RDA in all food groups. Introduce single ingredient solid foods, one at a time, five days apart.</p>

				and the introduction of solid foods to those infants	
Mudd, K. & Wood, R. (2011). Managing food allergies in schools and camps. <i>Pediatric Clinics of North America</i> , 58 (2), 471-480.	Describes the best ways to manage food allergies based on the age of the children	Preschool, school age and teenage individuals with food allergies	Descriptive Study	Guidance was given for managing food allergies based on the child's age, separated into preschool, school age and teenagers	For preschool aged children a no food sharing policy is important, proper cleaning after meal and snack times and having an action plan for anaphylaxis. For school aged children most are able to understand their food allergies and follow simple rules, so many schools choose to lift food bans at this age. However many food-allergic children are more prone to bullying, so it is important to discuss. Action plans are still important at this age For teenagers, it is important to emphasize safety

					among times of peer pressure. Teens may not want to carry epinephrine due to differing from the social norms. At this point teens also need to begin learning the skills they will need to know about their food allergy for adulthood.
Rhim, G. S., & McMorris, M. S. (2001). School readiness for children with food allergies. <i>Ann Allergy Asthma Immunol</i> , 86(2), 172-176. doi: 10.1016/s1081-1206(10)62687-7	Research how schools were preparing themselves for children with food allergies	Schools in Michigan	Questionnaire	A questionnaire was sent to 273 public elementary schools and contained 21 multiple choice questions.	Most schools reported that in the event of a serious reaction they would be required to transport the student to a medical facility due to lack of training
Weiss, C., Munoz-Furlong, A., Furlong, T. & Arbit, J. (2004). Impact of food allergies on school nursing practice. <i>The Journal of School Nursing</i> , 20	To determine the effects that increasing food allergies are having on school nurses	All nurses employed at elementary schools were eligible	Descriptive study	A telephone survey that consisted of 39 questions was administered to 400 randomly selected elementary school nurses across the US	It was reported that 94% of nurses had at least one student with a food allergy, 60% noted that food allergies had become more prevalent in the past 5 years. 87% found

(5), 268-278.					<p>food allergies to be a somewhat or very serious issue and 71% found the management to be somewhat or very much of a burden. 90% kept epinephrine auto injectors in their office and 78% used staff training as a preventative measure.</p>
<p>Yu, Zizi, Day, Deborah A., Connal-Nicolaou, Andreas, &amp; Enders, Felicity T. (2011). Early Food Allergen Exposure May Be Protective Against Food Allergies: An Extension Of The Hygiene Hypothesis. <i>Internet Journal of Epidemiology</i>, 10(1), 1-1.</p>	<p>Determine if early exposure to the allergen could be beneficial</p>	<p>Regional high school in New England</p>	<p>Questionnaire</p>	<p>In this study there were 258 teenage participants, 67 of which had diagnosed food allergies. A questionnaire was handed out to each participant's parent that included questions about food allergies and diet history.</p>	<p>They found that exposure to eggs before the age of 12 months was most protective against food allergies. Exposure to seeds and nuts before 24 months was most protective against food allergies. Lastly exposure to shellfish before 36 months was most protective against food allergies.</p>

## **Nursing Implications**

According to the National School Board Association, 1 in every 25 school aged children has a food allergy. As stated earlier, many schools are not equipped to handle a serious allergic reaction; this lack of preparedness could lead to the injury or death of a child. Nurses, especially school nurses, can play an important role in educating school leaders on how to handle such an event. If a school nurse does not exist, then a nurse from the community should be allowed to educate the principal or other lead figures in the school on the basic use of an Epi Pen. School nurses can also assist in developing procedures and policies related to epinephrine in schools and assist in the training of school personnel to ensure the safety of students with known food allergies. With this nursing involvement and school preparedness a child who is in anaphylactic shock can be treated immediately and then sent to the hospital for follow up care, decreasing the chances of a fatal event.

## **Limitations and Recommendations**

While each of these studies provided relevant information and research, each is subject to limitations. Likewise, the overall research on food allergies among the pediatric population is still under researched and many recommendations for further research can be made. Most all of the studies presented in this literature review were limited by a small sample size. This means that the findings are not as accurate as they would be with a larger sample size. Another limitation of some of the studies was that environmental factors were not always taken into consideration when researching food allergies. For example, in the study by Yu et al., environmental factors were not taken into consideration at all, meaning that those children who were exposed to foods later in life and had a food allergy may have had an environmental or genetic factor that influenced the allergy that is unknown to the researcher. Lastly, two of the

articles (Al-Hammadi et al. and Flammarion et al.) were performed outside of the United States. While this information may be useful to a certain degree the findings may not be generalizable to the United States due to differences in environmental conditions.

As for future research on this topic, there are two main research points that would be most valuable. The first is treatment options other than the elimination diet. This paper presented one article based on the Hygiene Hypothesis that looked at early exposure as an alternative treatment to food allergies, but further research with larger sample sizes needs to be conducted before any conclusions can be drawn. Secondly, education on elimination diets should be researched further in order to decide what type of education seems to work best. From the articles in this paper it is known that children with food allergies are not growing at the same rate as those without allergies, due to a possible nutritional deficit. Therefore, it is important that both children and parents be informed on how to eliminate the allergen from the diet, but maintain an adequate and balanced diet for proper growth and development.

### **Conclusion**

After reviewing the literature that has been presented in this paper, there are four key points that should be taken into consideration. The first is that there are both genetic and environmental factors that seem to predispose a child to food allergies. Second, children that suffer from food allergies are not receiving the proper nutrition and it may be contributing to poor growth. Proper education and nutrition therapy is the key to resolving this problem. Third, new treatment options are being explored and findings should be followed closely by healthcare providers as treatment options that do not impair quality of life may soon become available. Lastly, school systems need to become more prepared to treat children with food allergies in the case of an emergency. While most schools are taking steps to become knowledgeable about food

allergies and are helping children avoid exposure to allergens, most schools would not be able to treat an exposure.

Manuscript 2: An Analysis of the Current Policies Related to School Access to Epinephrine

Brandi Duran

University of Kentucky

## **Statement of the Issue**

Food allergies are a growing health risk in the United States (U.S.) today. Approximately 6 million children have a food allergy. This number can account for around 2 children in every US classroom. It has been shown that 16-18% of children with food allergies have had a reaction at school. Also of concern, 25% of reactions that have occurred in the school were first time reactions, with no previous food allergy diagnosis (Food Allergy Research and Education, 2014).

To assist schools in preparing for the possibility of these reactions the Centers for Disease Control and Prevention (CDC) released the first national comprehensive guidelines for school food allergy management in 2013 titled “Voluntary Guidelines for Managing Food Allergies in Schools and Early Care and Education Programs.” However, only 15 states have adopted guidelines for food allergy management in schools. Each state’s guidelines vary slightly, but most include care plans for children with a food allergy diagnosis, signs of anaphylactic shock and how to use the emergency medication. Few states have additional emergency medications available in the school in case of anaphylactic shock in an undiagnosed child. This is where the problem begins and where the policy needs to be changed. While it is important that all states have a food allergy guideline in place, it is especially crucial that this guideline includes the school having at least one un-prescribed EpiPen or other epinephrine auto injector and at least two unlicensed school personnel who are trained to use the EpiPen present in the school (Food Allergy Research and Education, 2014).

## **Background and Significance of the Issue**

Almost 15 million Americans have a food allergy, with over a third being children. The CDC released a study demonstrating a 50% increase in childhood food allergies between 1997 and 2011 (Food Allergy Research and Education, 2014).

. Researchers do not currently understand why this number is rising so rapidly, but they are working hard to find an answer. In the meantime, many policies and protocols are being implemented in schools, restaurants, and work places to help protect those with food allergies. With over 200,000 emergency department visits and 300,000 ambulatory care visits due to food allergy reactions, the national cost for children's food allergies is almost \$25 billion annually (Food Allergy Research and Education, 2014).

The eight most common food allergens are milk, eggs, peanuts, tree nuts, soy, wheat, fish and shellfish. Approximately 90% of all reactions are due to one of these common food allergens. The first line of treatment for a severe reaction, such as anaphylaxis, is to administer epinephrine. There are currently three types of epinephrine auto injectors available, including the popular EpiPen (Food Allergy Research and Education, 2014). The Food Allergy Research and Education center (FARE) states the following about epinephrine,

“Epinephrine is a safe drug, with the risks of anaphylaxis outweighing any risks of administering the medication. Extra caution is only needed for elderly patients or those with known heart disease where an increased heart rate could be problematic. Nonetheless, epinephrine should be used to treat anaphylaxis in these individuals. Patients should proceed to the emergency room after epinephrine is administered in case additional medication or treatment is needed to manage the

reaction, not because epinephrine is a dangerous drug (Food Allergy Research and Education, 2014)”

It is important for schools to realize the epinephrine is a safe drug and that its benefits do greatly outweigh any associated risks when administering during anaphylactic shock (Food Allergy Research and Education, 2014).

FARE introduced the need for National legislation over three years ago that allows for un-prescribed, epinephrine auto injector(s) in the school setting. It was eventually passed by the U.S. House of Representatives on July 30, 2013. It was then sponsored by Rep. Phil Roe (R-TN) and Steny Hoyer (D-MD) and the Senate on October 31, 2013 with sponsorship by Senators Dick Durbin (D-IL) and Mark Kirk (R-IL). The national law passed on November 13, 2013 encouraging states to adopt laws that require schools to have un-prescribed, epinephrine auto injector(s) (Food Allergy Research and Education, 2014).

Before this law was passed, every state required a child diagnosed with food allergies to carry, or have at the school, an epinephrine auto injector only with the proper documentation and prescription. Currently nine states have passed laws that require schools to have un-prescribed epinephrine, also known as stock epinephrine. Michigan, for example, requires at least two epinephrine auto injectors be available in every school. These can be administered by a licensed nurse or an unlicensed, trained employee (Food Allergy Research and Education, 2014). Also, 38 other states have either guidelines or laws that allow schools to have stock epinephrine placed in the school. These states typically let county officials decide whether they would keep stock epinephrine in the schools. For example, Kentucky is one of the states that allows schools to have stock epinephrine. Currently, 29 of the 120 counties have decided to stock non-prescribed epinephrine. All of the other counties have no plans to allow stock epinephrine into the school.

The other states in the U.S. have pending laws or guidelines or no legislation at this time (Food Allergy Research and Education, 2014).

### **Analysis of the Issue**

The current group that has been active in promoting stock epinephrine in Kentucky includes Myron Thompson, FCPS Health and Wellness Coordinator, Laura Jackson, Kentucky Families with Food Allergies, and Dr. Priya Warriar, Allergist with Family Allergy and Asthma. Other key stakeholders like school nurses, primary care physicians or pediatric nurse practitioners, parents, teachers and even pharmacists will be needed to change the Kentucky law to require that all schools carry stock epinephrine and have trained, unlicensed personnel available to administer epinephrine if an allergen exposure occurred.

There are many political factors that may be faced when implementing a state wide policy. Religious or cultural factors could come into play, as some individuals or parents do not believe in medicine. Other parents may be weary of someone else giving their child medication, especially if it is an unlicensed, but trained, person. Education about epinephrine can help to ease the minds of some, but may not be enough for everyone. States that have passed similar laws may be able to provide some insight for the Kentucky political (advocacy) group about how to overcome such issues. Again, with education about epinephrine and its life-saving value, many concerns will be outweighed by the powerful benefits of epinephrine use during an anaphylactic event.

The economic issues that evolve with implementing this law may be the hardest to overcome. Various possible opportunities should be explored to minimize the economic impact of implementing such a law. For example, community stakeholders such as local pharmacists may be able to find pharmacy's that are willing to donate epinephrine auto injectors to the

schools. State grant funds might be available that will help put at least one epinephrine auto injector into each school. Again, other states who have implemented similar laws may have insight into other opportunities available to assist in implementing such a law.

As for practical considerations, a state policy is the best option for this issue. While the current policy does allow for individual schools systems to decide whether they would stock epinephrine in their schools, only 29 counties have made the decision to do so. By changing the policy to require all schools to stock epinephrine, the schools would be better prepared to handle a severe allergic reaction if it were to occur at their school. The current strategy in Kentucky allows each county to individually decide if they would like to have stock epinephrine in their schools. While this is better than having no policy at all, it is still more beneficial to require schools to stock epinephrine as it will leave schools better prepared for an emergency and, most importantly, may save student lives. Other states that have required schools to stock epinephrine seem to be succeeding, showing that this policy is the best option (Food Allergy Research and Education, 2014).

Nine states have already implemented such a policy with no issues. As long as parents are made aware of the school policy and the epinephrine auto injectors are coming from a valid source and are monitored for expiration dates and kept in a cool dry place as to not damage the medication, there is minimal risk any legal issues would arise.

### **Potential Unintended Consequences of Recommended Policy**

Unintended consequences from this policy are minimal. Appropriate training of unlicensed personnel, either by a school nurse or through online training programs will help ensure the presence of individuals who are in the schools available to administer epinephrine safely when needed. Appropriate storage of the epinephrine in a cool, dry

location and allocating a designated person to monitor expiration dates on the epinephrine will also offer safety and reduce the risk of any unintended consequences. Finally, parents will also need to be updated on the policy and made aware that in the case of an emergency the epinephrine will be used on their child.

### **Conclusion**

It is important that schools are aware that the occurrence of childhood food allergies is increasing and that they are preparing in case a severe reaction were to occur. National legislation is available to help guide schools in their preparations, but laws do vary by state. Currently in Kentucky, each county can decide to stock epinephrine for use during a severe anaphylactic reaction. With only 29 of the 120 counties currently using stock epinephrine, advocacy groups are now assuming responsibility of educating the remaining counties on the importance of this issue.

Manuscript 3: An Assessment of Knowledge and Attitude Towards Stock Epinephrine Among

Kentucky School Nurses

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## **Abstract**

This cross-sectional, pre-post intervention study was designed to gather information on Kentucky School Nurses attitude and knowledge toward non-prescribed epinephrine auto injectors in Kentucky Schools. All 500 members of the Kentucky Schools Nurses Association received a link to the pretest, educational intervention and posttest via email. Of those, 75 nurses responded and 72 were eligible to participate in the study. The data was analyzed through a paired t-test using SPSS. The results showed an increase in level of comfort with epinephrine, although it was not statistically significant. There was a statistical significance between the pretest and posttest when school nurses were asked about legal obligations when administering epinephrine. There was also an increase in knowledge with one question related to hospitalizations showing statistical significance between the pretest and posttest.

## **Introduction**

Food allergies are on the rise and are one of the most common medical conditions among students addressed in the school setting (Weiss, Munoz-Furlong, Furlong, & Arbit, 2004). “Anaphylaxis is a systemic allergic reaction resulting in extreme cardiac and respiratory impairment and is typically fatal if medical attention is not sought immediately (Behrman, 2010).” One study that was conducted in a school study showed that of 124 reactions to peanuts or tree nuts, the mean time for onset of symptoms was 9.8 minutes after exposure (Weiss, et. al., 2004). There is no cure for food allergies at this time; however epinephrine has been demonstrated to be the best treatment option if a severe allergic reaction does occur (Food Allergy Research and Education, 2014). Current data has shown that most fatalities occur because epinephrine was not used or its use was delayed. One study that was conducted in school age children looked at food-induced anaphylactic reactions that resulted in six fatalities

and 7 near-fatalities. Of the fatal cases, only two of the children had received epinephrine within one hour of the onset of symptoms and six of the seven children who survived received epinephrine within thirty minutes (Weiss, et. al., 2004). A survey of school nurses in Indianapolis showed that only 19% of the schools that responded had an allergy plan in place and none of those had access to epinephrine. A similar study in Michigan showed that 55% of the schools studied had ten or more students with a food allergy and only 16% of those students had written action plans and a small percentage had epinephrine immediately accessible (Weiss, et. al., 2004). Most of these studies focus on students who have a known food allergy, and do not include the 25% of reactions in schools that were first time reactions (Food Allergy Research and Education, 2014). These students would not have a prescription for an epinephrine auto injector. Therefore in schools that allow children to carry their own epinephrine, first time reactions are not even covered. Currently, 29 of the 120 counties in Kentucky, about 25%, have stocked non-prescribed epinephrine auto injectors in their schools located in places like the office or cafeteria to be used for first time reactions or for students who have not brought their own epinephrine auto injector from home.

### **Methods**

This was a cross-sectional, pre-post intervention study in which a pretest, educational intervention, and posttest was delivered to the subjects via internet. An email was sent to all members of the Kentucky School Nurses Association that contained a cover letter, a link to the pretest, educational intervention and posttest. Permission was gained from Masconomet School Districts in Massachusetts to utilize their “EpiPen Training Quiz” as the survey tool for this study. The tool was modified to include additional demographic questions and questions that would assess the nurse’s level of comfort with epinephrine and anaphylaxis. The questions were

reviewed by Laura Jackson, the coordinator of Kentucky Families with Food Allergies, and Patti Boggs, a Fayette County school nurse and validity was ensured.

Demographic data was collected by the subject's responses to nine questions and included data such as age, gender, ethnicity, degree, years of experience as a nurse and as a school nurse, hours worked per week, number of schools they serve, and current epinephrine protocols within their school(s). Data regarding attitude toward epinephrine in schools was collected by the responses to five questions and data regarding knowledge was gathered by the responses to eleven questions.

The educational intervention was presented in the form of a PowerPoint and included information on the current legislature in Kentucky, success stories from counties that have implemented the non-prescribed epinephrine auto injectors, facts about food allergies, symptoms and treatment of anaphylaxis, how to use the various types of epinephrine auto injectors, and how school nurses can get non-prescribed epinephrine auto injectors in their schools. After this, participants were directed toward the posttest, which included identical questions from the pretest.

All responses to the pretest and posttest were scored and recorded using REDCap, a secure web application for building and managing online surveys and databases, which is provided by the University of Kentucky. REDCap also exported all data obtained into a Data Analysis Statistical Package for the Social Sciences (SPSS) software, which was used in the compilation and analysis of the data. A paired t-test was used to compare responses from the pretest and posttest.

## Sample

An email containing information about the study and a link to access the pretest, posttest, and educational intervention was sent to the 500 members on the Kentucky School Nurses Association listserve by Sharyl Iden, the organization's President. All members had an equal opportunity to participate. In order to be eligible for the study the subject had to be a member of the Kentucky School Nurses Association, currently practice nursing in a Kentucky school system, and have internet access. Nurses who serve an administrative role in the Kentucky school system and do not provide direct care to the students were not included.

There were 75 respondents out of the 500 who received an invitation to participate, a 15% response rate, and of those 72 were eligible to be included in the study. Three of the participants were no longer practicing as a school nurse in the Kentucky School system and therefore could not be included. 7% were between 20 and 30 years old, 22% were 31-40, 35% were 41-50, 32% were 51-60, and 4% were 61+. A trend was found that nurses who were 41 years of age or older tended to be less comfortable with non-prescribed epinephrine auto injectors, regardless of the educational intervention. 2% were males and 98% were females. 100% were White/Caucasian. 54% percent received their ADN, 42% were BSN prepared and 3% had received an MSN. Another trend that was found was that there was no difference between those nurses that were AND prepared or BSN prepared in terms of level of comfort or knowledge about epinephrine and anaphylaxis. However, MSN prepared nurses were far more comfortable with and knowledgeable about epinephrine and anaphylaxis. 7% had less than 1 year experience as a school nurse, 26% had 1-5 years, 25% had 6-10 years, 28% had 11-15 years, 4% had 16-20 years, and 8% had 20+ years. 49% were the nurse for one school. Of those that were a school nurse for more than one school 35% served two schools, 22% served three

schools, 22% served four schools, and 22% served five or more schools. 46% had a current protocol for epinephrine auto injectors in place at their school and 54% did not. There was no noticeable trend in the level of comfort among nurses that only cared for one school versus those that cared for more than one school.

## **Results**

To begin, the school nurses were asked to rate their level of comfort on a sliding scale from 0% to 100% with epinephrine auto injectors, their administration, training personnel on their administration, and recognizing anaphylaxis. When the school nurses were asked to rate their level of comfort with having non-prescribed epinephrine auto injectors in their schools, the mean score was 65.62%. After the educational intervention the mean answer increased to 78.24%. When asked about their level of comfort with administering epinephrine auto injectors, the mean answer was 85.46% prior the the education intervention and 88.22% after. The mean level of comfort was 88.59% for training licensed personnel on administering epinephrine auto injectors and 75.78% for training unlicensed personnel, prior to the educational intervention. After completing the intervention the mean level of comfort was 89.04% for licensed personnel and 79.32% for unlicensed personnel. Lastly, the mean level of comfort with recognizing anaphylaxis was 78.7% prior to the educational intervention and 84.62% after.

The school nurses answered seven knowledge based questions before and after completing the educational intervention. According to the pretest, 58% of participants thought that they were legally responsible if they administered epinephrine for signs of anaphylaxis, but that was not actually the problem. After completing the educational intervention only 12.5% felt they were legally responsible. 55% of participants were able to correctly answer how many children in the US have food allergies on the pretest and 100% answered correctly on the post

test. 95% of participants correctly answered that the initial symptoms of anaphylaxis could occur seconds to hours after exposure on the pretest and 96% answered correctly on the posttest. On the pretest 31% of participants were able to correctly identify how often a food allergy reaction sends someone to the hospital, and 88% answered correctly on the post test. 100% of participants knew that failure to promptly treat anaphylaxis with epinephrine could lead to death on the pretest, while only 98% correctly answered this question on the posttest. All participants were able to correctly answer that epinephrine is to be administered in the outer thigh on both the pretest and posttest. Also, all participants were able to correctly answer that 911 should be called immediately after epinephrine is administered on both the pretest and posttest. These results were summarized into a table (Table 2) that can be found at the end of this document.

### **Data Analysis**

A paired t-test was used to compare responses from the pretest and posttest and was analyzed using SPSS. The author found that when comparing the data for the level of comfort among school nurses for having non prescribed epinephrine auto-injectors the educational intervention did not make a statistically significant difference (p-value of .422). The school nurses level of comfort with administering epinephrine was not statistically significant either with the educational intervention (p-value of .288). There was no statistical significance between the pretest and post on recognition of symptoms of anaphylaxis (p-value of .400).

There was a statistical significance between the pretest and posttest when school nurses were asked if they felt legally responsible if they gave epinephrine and anaphylaxis was not occurring (p-value of <.001). There was also a statistical significance between the pretest and posttest when school nurses were asked how often food allergy reaction send a child to the

hospital (p-value of  $<.001$ ). There was no statistical significance between the pretest and posttest when asked how many children in the US had a food allergy (p-value of  $.103$ ).

### **Discussion**

The first limitation to the study design is that active members of the Kentucky School Nurses Association must be an RN. Anyone that is not an RN, like LPNs, can only join as an associate member. Many of the Kentucky school nurses are LPNs, not RNs. Therefore, the participants of my study may not fully represent the Kentucky school nurse population. Also, according to their scope of practice, LPNs cannot delegate. Therefore, they cannot train unlicensed personnel to administer epinephrine, which may have also impacted some of the survey responses. Another limitation was that the pretest and posttest questions were identical. This could lead to subjects memorizing information that they learned from the educational intervention in order to correctly answer the questions that were presented. A third limitation to this study was the small sample size in comparison to the number of school nurses that were invited to participate. There was only a 15% response rate, which could lead to unreliable data. Lastly, since this was a convenience sample there was not a large variety among the demographic data. A large majority of those that responded were white females. The few male responses also responded as being white when asked about their ethnicity. The research findings could also be considered unreliable due to the limited variability in demographic data.

Despite these limitations, the findings from this study are still significant in relation to placing non-prescribed epinephrine in Kentucky schools. The aim of this study was to better understand the barriers to placing non-prescribed epinephrine into Kentucky schools. In particular, the authors wanted to assess both the attitude that Kentucky schools nurses had toward epinephrine auto-injectors and their knowledge related to epinephrine and anaphylaxis.

Through the educational intervention the author hoped to increase the comfort level with and knowledge about epinephrine auto-injectors and anaphylaxis. Based on the results from the pre and posttest the author identified four barriers as reasons why school nurses are not comfortable implementing non-prescribed epinephrine auto-injectors into their schools. These barriers are 1.) Knowledge deficits in relation to the legal obligations of the nurse administering epinephrine, 2.) Knowledge deficits in relation to the increasing incidence of food allergies, 3.) School nurses are not comfortable recognizing anaphylaxis; and 4.) School nurses are not comfortable training on epinephrine administration, especially to unlicensed personnel. Another goal of this research study was to increase the school nurses comfort with non-prescribed epinephrine auto-injectors. Based on the results of the surveys there was an increase in the nurse's level of comfort, however it was not enough of an increase to be considered statistically significant.

### **Conclusion and Recommendations**

Based on the results of the surveys we can conclude that there are four distinct reasons that school nurses are resisting non-prescribed epinephrine auto-injectors in their schools. These reasons are 1.) The nurses fear they will be liable if epinephrine is given and anaphylaxis is not occurring, 2.) School nurses do not realize how quickly the incidence of food allergies in children is, 3.) School nurses are not comfortable recognizing anaphylaxis; and 4.) School nurses are not comfortable training on epinephrine administration, especially to unlicensed personnel.

Therefore, I would recommend finding new ways to present the information that was included in the educational intervention for this research study, so that it is available to all Kentucky school nurses. The educational intervention that was a part of this research study reached a very small portion of the Kentucky school nurses, therefore the next steps need to include ways to educate all Kentucky school nurses. Some ways in which this could be achieved

would be by presenting the PowerPoint at a Kentucky School Nurses Association conference, presenting to the faculty and staff at individual school meetings, or to place educational posters in every school, whether they have non-prescribed epinephrine auto-injectors or not, which would include the signs and symptoms of anaphylaxis and how to administer an EpiPen.

Another recommendation would be to add an additional nurse that could train licensed and unlicensed personnel on the administration of epinephrine so that this responsibility was not left to the school nurses. It is unclear why the school nurses were not comfortable with teaching epinephrine administration, but having an additional nurse to do this could relieve that fear.

Overall, the barriers that were found in this research study can guide the next steps by providing direction for continuing education for all Kentucky school nurses and guiding new research, like why school nurses are not comfortable teaching epinephrine administration.

## DNP Practice Inquiry Project Conclusion

The current literature shows that the occurrence of pediatric food allergies is on the rise with no signs of slowing down and no cure at this time. However, it is clear that epinephrine should be the first line treatment for an anaphylactic, or life threatening reaction. Also, the literature shows that many schools are not equipped to handle a severe food allergy reaction, especially in children that are not diagnosed with a known food allergy. While many schools allow children to have their prescribed epinephrine auto-injectors located at school, very few have taken into account the possibility of a first time reaction occurring at school. Currently, Kentucky allows individual counties to decide if they would like to carry non-prescribed epinephrine auto-injectors in their schools. The goal of the research study was to determine why the Kentucky school nurses in the various Kentucky counties did not want non-prescribed epinephrine auto-injectors in their schools. It was found that 1.) The nurses fear they will be liable if epinephrine is given and anaphylaxis is not occurring, 2.) School nurses do not realize how quickly the incidence of food allergies in children is, 3.) School nurses are not comfortable recognizing anaphylaxis; and 4.) School nurses are not comfortable training on epinephrine administration, especially to unlicensed personnel. Therefore, it was recommended to continue educating all Kentucky school nurses on the signs and symptoms of anaphylaxis and the Kentucky's current legislation that states they are not liable for administering epinephrine if they believe a child is in anaphylactic shock. Also an additional nurse to train personnel on the use of epinephrine auto-injectors was also discussed to alleviate school nurses from taking on this responsibility. The study also hoped to educate school nurses on anaphylaxis and epinephrine administration so that they might become comfortable enough to support non-prescribed epinephrine auto-injectors in their schools.

Table 2: Results

Survey Question	Pretest	Posttest
Comfort level with non-prescribed epinephrine	65.62	78.24
Comfort level with administering epinephrine	85.46	88.22
Comfort level with training licensed personnel	88.59	89.04
Comfort level with training unlicensed personnel	75.78	79.32
Comfort level with recognizing anaphylaxis	78.7	84.62
Nurse felt legally responsible if epinephrine is administered and not needed	58	12.5
How many children in the US have food allergies	55	100
Initial symptoms of anaphylaxis could occur in seconds to hours after exposure	95	96
How often does a food allergy reaction send a child to the hospital	31	88
Failure to treat anaphylaxis with epinephrine could lead to death	100	98
Epinephrine is to be administered in the outer thigh	100	100
911 should be called immediately after epinephrine administration	100	100

Table 3: Data Analysis

Survey Question	P-Value
Comfort level with administering epinephrine	0.288
Comfort level with non-prescribed epinephrine	0.422
Comfort level with recognizing anaphylaxis	0.4
Legally responsible if epinephrine is administered and not needed	0.000
How many children in the US have food allergies	0.103
How often does a food allergy reaction send a child to the hospital	0.000

## Appendix A

For questions 1-13, please choose the most appropriate statement as it relates to you:

1. What is your age?
  - a. 20-30
  - b. 31-40
  - c. 41-50
  - d. 51-60
  - e. 61+
  
2. What is your gender?
  - a. Male
  - b. Female
  
3. What is your ethnicity?
  - a. White/Caucasian
  - b. Black/African American
  - c. Asian
  - d. Hispanic/Latino
  - e. American Indian/Alaskan Native
  - f. Native Hawaiian/Pacific Islander
  - g. Other
  
4. What type of degree did you receive in nursing?
  - a. ADN
  - b. BSN
  - c. MSN
  - d. DNP
  
5. How many years of experience do you have as a nurse?
  - a. Less than 1 year
  - b. 1-5 years
  - c. 6-10 years
  - d. 11-15 years
  - e. 16-20 years
  - f. 20+ years
  
6. Are you currently a school nurse?
  - a. Yes
  - b. No
  
7. Will you remain a school nurse for your county for the upcoming 2015-2016 school year?
  - a. Yes
  - b. No

8. Were you hired by the school board or health department?
  - a. School board
  - b. Health Department
  
9. How many years of experience have you had as a **school** nurse?
  - a. Less than 1 year
  - b. 1-5 years
  - c. 6-10 years
  - d. 11-15 years
  - e. 16-20 years
  - f. 20+ years
  
10. How many hours a week do you work as a school nurse?
  - a. 10-20 hours
  - b. 20-30 hours
  - c. 30-40 hours
  - d. 40+ hours
  
11. Do you work at one school or more than one school?
  - a. One
  - b. More than one
  
12. If you answered “more than one” to question 7, how many schools do you visit per week/month?
  - a. Two
  - b. Three
  - c. Four
  - d. Five or more
  
13. Is there current a protocol for epinephrine auto injector (such as Epi Pen, Auvi-Q, or Adrenaclick) use in your school county?
  - a. Yes
  - b. No

For questions 14-18, please choose the answer on a scale of 1 to 5 (1 representing “Not Comfortable” and 5 representing “Very Comfortable”) that best represents your comfort level with the following.

14. How comfortable are you with having non-prescribed epinephrine auto injectors in your school?

Not comfortable		Neutral		Very comfortable
1	2	3	4	5

15. How comfortable are you with administering epinephrine auto injectors in your school?

Not comfortable		Neutral		Very comfortable
1	2	3	4	5

16. How comfortable are you with training **licensed** personnel (such as an LPN or RN) to administer epinephrine auto injectors in your school?

Not comfortable		Neutral		Very comfortable
1	2	3	4	5

17. How comfortable are you with training **unlicensed** personnel (such as teachers, teaching aids, or secretaries) to administer epinephrine auto injectors in your school?

Not comfortable		Neutral		Very comfortable
1	2	3	4	5

18. How comfortable are you with recognizing anaphylaxis?

Not comfortable		Neutral		Very comfortable
1	2	3	4	5

For questions 19-25 please choose the statement that you think best answers the question:

19. Do you believe that you are legally responsible if you administer epinephrine for signs of anaphylaxis, but that was not actually the problem?
- Yes
  - No
20. Food allergies affect how many children in the US?
- 1 in 7
  - 1 in 13
  - 1 in 32
  - 1 in 58
21. The initial symptoms of anaphylaxis may occur within a few seconds or hours after exposure.
- True
  - False
22. How often does a food allergy reaction send someone to the emergency room?
- Every 3 minutes
  - Every 10 minutes
  - Every day
  - Once a week
23. Failure to promptly (within minutes) treat anaphylaxis with epinephrine can lead to death:
- True
  - False
24. Epinephrine should be administered:
- In the buttocks
  - In the arm
  - In the outer thigh
25. After administering epinephrine for anaphylaxis the school nurse should then:
- Send the student back to class
  - Observe the student for an hour
  - Call 911
  - Call the student's parent to come pick them up from school

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