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Reducing the Incidence of Anaphylaxis Events in School Settings

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Reducing the Incidence of Anaphylaxis Events in School Settings

Sabina L. Muresan

University of San Francisco

Reducing the Incidence of Anaphylaxis Events in School Environment

Clinical Leadership Theme

This project focuses on reducing the incidences of anaphylaxis events, preventing allergic reactions in schools, and improving students' safety. The CNL role is to provide clinical leadership to the point of care, ensuring that care delivery is safe, evidence-based, and has optimal outcomes. The CNL is the clinician who focuses on care from administrative areas to the point of care. (Reid & Dennison, 2011). The CNL improves the quality of care for children, efficiently coordinating the care and acting as an advocate and liaison between children, families, and the healthcare system. Families may not be able to discern when advocacy is needed; the CNL role is significant to advocate in these situations. The CNL is a care coordinator who serves as a "constant face" for families and the administrative or care team. (O'Grady & VanGraafeiland, 2012). Changing the microsystem to a culture of safety requires shifting the team's approach and practices related to patient care. As a CNL, the focus will be to promote a culture of safety in the organization, enhance the safety of care provided to students, and advocate for the students and their families.

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Statement of the Problem

Statistics show in a 2014 nationwide study that a 16% rate of anaphylaxis was reported in over five thousand schools. The anaphylactic reaction occurred between 79-83 % in classrooms and 12-15% in lunchrooms; 19% of the life-threatening reactions occurred on field trips, playgrounds, and other school events. Recent studies identified a knowledge deficit among school personnel when it comes to addressing food allergies.

The incidence of anaphylaxis in schools is not uncommon, and the study showed that 11% of the schools that have epinephrine in stock had an anaphylactic event. Often, the children with an anaphylactic reaction do not receive epinephrine as the 1st line of treatment, with severe repercussions from hospitalization to death. A good training program must be implemented among the school staff to recognize and treat anaphylactic events to prevent negative repercussions. (Hogue et al., 2016).

Food allergies are the leading cause of anaphylaxis reaction, a severe, life-threatening condition, and children are especially at risk. Food allergies are one of the most common conditions that have to be addressed in school settings. Proper management of food allergies in school settings requires a network of people working together from the parent and doctor with providing information and recommendations to the teachers, auxiliary staff, and principals. Excellent patient care is provided by a team working together and not solely by a person. (Barach & Johnson, 2006).

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Project Overview

Implementing anaphylaxis prevention requires identifying the key stakeholders such as nutrition services, classroom teachers, parent/guardian, community medical professionals, students, and collaborate effectively, advocating for the use of evidence-based clinical guidelines regarding the care provided. Other steps to take in improving the quality of services provided to students in the school setting would be identifying and clarifying student-centered goals, embed student health and safety as learning support, identify preferred communication channels between all parties involved in providing care; systematically collecting data on types of allergies, numbers of occurrence and the response to allergen exposure and share all the health-relevant data following HIPPA protocols. School sites need to carry out preventive strategies, and adequate staff training is essential; educating staff members, especially teachers, administrators, food service administrators are imperative measures that need to be implemented with a focus on training on allergen avoidance, recognition of signs of an allergic reaction, and how to provide emergency treatment. (Carlisle et al., 2010).

The improvement theme of this project is based on IHI's triple aim: improving patient care experience, reducing costs, improving the population's health. (IHI). The process recommended by the IHI includes identifying the target population, the definition of aim and measures, development of a strong work portfolio, and rapid testing and scale up to the local needs. (IHI). In the last 20 years, the increase in prevalence and severity of food allergies was well documented and currently affects approximately 8% of the pediatric population in the US, which means that 1 in 13 children or two children per classroom has food allergies. (Cooke et al., 2019).

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This project aims to improve students' safety-related to allergic reactions and anaphylaxis in the ARU School District. The process begins with identifying potential students that might experience such an event. The process ends with staff members trained and prepared to intervene if any of the students in the District experiences such event.

By working on the process, we expect (1) increased awareness among staff regarding anaphylaxis events, (2) an increase in the number of staff trained to be ready to intervene if anaphylaxis occurs in any of the schools in the district, (3) increased knowledge recognizing signs and symptoms of anaphylaxis and triggers (4) preventing as much as possible anaphylaxis events in the School District.

Literature Review

This project's literature search was initiated by formulating a population, intervention, outcome (PIO) question. In the School District (P), creating a safe environment for the students at risk for anaphylaxis (I) will reduce the incidence of anaphylactic events (O)? (See Appendix B). Electronic search data was conducted in the CINHALL, Pub Med, MEDLINE using the following terms: anaphylaxis, school setting, epinephrine autoinjector, food allergies. The search criteria were included English only, research that included anaphylaxis in school settings, staff training, and outcomes published between 2010-2020. The search yielded twelve articles, eleven met search criteria, and five articles are selected for the literature review. The selected articles were evaluated using the Johns Hopkins Evidence-based Practice (JHEBP) research evidence appraisal tool.

Carlisle et al. (2010) researched school nurses regarding food allergies and critical areas of knowledge and management of food allergies in school settings, identifying weaknesses in

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plan development, staff education, guidelines. A survey was given to the school nurses to determine their educational needs regarding students at risk for anaphylaxis.

Cooke & Meize-Grochowski (2019) conducted a literature review through internet and database searches and focused on articles published between 2000 and 2018; the primary databases used for the search were CINAHL, PubMed, and MEDLINE. Recent references regarding food allergies were included in the search, while the focus was on managing anaphylaxis in school settings.

Hogue et al. (2016), through an exploratory, cross-sectional, web-based, pilot survey assessed the occurrence and characteristics of anaphylactic events, as well as the training provided to school personnel for the recognition and treatment of anaphylaxis. The study was designed to describe anaphylactic events, and epinephrine autoinjector (EAI) use in U.S. schools enrolled in the EpiPen4Schools program.

Iweala et al. (2018) conducted a literature review on current evidence research regarding the natural history of significant childhood and adult food allergies. They presented an updated summary and report on food allergies and recent advances in potential food allergy treatments. The research included factors associated with more severe allergic reactions, factors leading to the development of specific IgE associated with a food allergy, and research regarding uncommon food allergies.

Gupta et al. (2018) conducted a study about the public health impact of childhood food allergies on a nationally representative sample of U.S. households with children. They provided updated prevalence estimates, associations, and epinephrine use. A survey was administered to U.S. households between 2015 and 2016, obtaining parents' responses. The study concluded that food allergies are a significant concern, affecting 8% of children in the U.S.

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Rationale

The mission statement of the School District is to provide an optimal learning environment that includes providing high-quality health care services and to improve the health of its students and families and the communities it serves. Numerous review articles suggested that the population-level burden of childhood food allergies is growing and maybe historically high. A nearly 200% increase in food-induced anaphylaxis-related emergency department visits from 2005 to 2014 among 5 to 17-year-olds in the U.S. Anaphylaxis due to food allergies could potentially be life-threatening, and with the growing numbers of children population that is affected by this condition, developing treatments and prevention strategies are critical. (Gupta et al., 2018). The potential for events to occur during field trips, before/after school hours, or during extracurricular activities, depending on a limited pool of trained staff, may put children at risk. (Hogue et al., 2016). When increasing awareness and training the staff was analyzed, the following barriers were identified: lack of adequate staffing, resistance to change the current status, misconceptions about the action taken regarding students at risk, lack of education, conflicting priorities, inadequate training materials. (See Appendix D). By expanding the training, the ability to treat anaphylaxis to more personnel, the School District can provide a timely response and, hence, increase the potential for a more favorable outcome and provide a safer environment for the students at risk. The literature review provided convincing evidence supporting creating a safer school environment. Thorough and standardized education for anaphylaxis recognition by school staff is critical. Strengths, weaknesses, opportunities, and threats (SWOT) analysis was done to examine the organization's strengths and weaknesses, looking for opportunities to develop strategies for improvement, and a stakeholder analysis was performed to determine which department and individuals would be impacted by this quality

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improvement project (see Appendix E). A driver diagram is set up to plan the process (see Appendix C). The school personnel became convinced that change is necessary to lower the incidence of anaphylactic events in the School District and the CNL assured strong support from management. A clear understanding of why it is essential that change takes place and a target of raising awareness and training as many staff members as possible was set in place.

It is projected that cost for staff education and hands-on training for this project will be \$ 1,930. The primary benefit of this project decreases in incidence of anaphylactic events in the school setting. The total revenue per year would be \$8,100 based on \$ 45 savings per day per student that stays in school. This project's secondary benefit would be increased awareness and education among school staff regarding food allergies and anaphylaxis. The project is expected to generate an initial annual saving of \$ 6,170. (See Appendix A). The profit is calculated without considering the secondary benefits. The analysis of return on investment (ROI) supports the rationale to approve this project (see Appendix A).

Methodology

The CNL utilized the IHI Model for Improvement (MFI) for this project as a guiding framework for creating a safer environment. The first step in implementing the improvement is the assessment of the microsystem. To assess a microsystem, a framework known as the "5 P's" is used – purpose, patient, professionals, processes, and patterns. They coexist with other microsystems within a larger organization, and they evolve and adapt to the patient's needs and providers. (Barach & Johnson, 2006). The microsystem being assessed is part of a broader educational organization, Alum Rock School District, in San Jose, Ca. The organization serves over 9000 students with diverse backgrounds, rich in ethnic and cultural diversity, with a curriculum designed to meet all the students' needs. Special services are provided for students

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with special needs. Students with medical conditions that need assistance are provided with one-on-one licensed vocational nurses or health assistants who take care of their needs: medication administration or other medical services. Assistive personnel are trained by the District Nurses, which are Credentialed School Nurses, to ensure that all assistive personnel or teachers are trained adequately in an event, emergency, or assist students with medication or other services. In school settings, the number of children with some form of food allergy is increasing and is a health issue that needs to be addressed and managed by the school settings.

Planned change is a sequence of events implemented to achieve a goal to make something different. Lewin's theory change theory depends on driving or resistant forces, and to achieve success, the driving force has to surpass the resistance force. Rogers modified Lewin's change theory and made a 5 stage theory applied to long term change projects. The five stages are awareness, interest, evaluation, implementation, and adoption. (See Appendix F). Rogers's theory of diffusion of innovation refers to the idea that once a person or organization learned about an idea, they will adopt it or reject it. The idea spreads, and more people accept it. (Oguejiofo, 2019).

Further, Rogers change theory suggests that when the ideas that need to be implemented are observable and easily tested, it is adopted faster by the organization's people. Rogers describes five categories of adopters:

- Innovators: risk-takers, change agents
- Early Adopters: opinion leaders, role models
- Early Majority: want proven applications, risk avoidant
- Late Majority: respond to peer pressure, skeptical, require proof

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- Laggards: isolated from opinion leaders, maintain status quo

The goal for Rogers's theory is to meet the needs of all five categories of adopters. Change is a lengthy process that takes time, and long-term goals need to focus on the team and organization. The Diffusion of Innovation theory is a valuable model that also stresses the importance of communication in adopting new ideas. Resistance to change is inevitable, and clear and consistent communication is necessary to implement new ideas.

The plan-do-study-act (PDSA) cycle included educating and training the school staff correctly, identifying the students at risk, obtaining the parents' right documentation, and correctly entering the EHR system's documentation. (see Appendix H). Correctly identifying the students at risk and gathering the right documentation was the first PDSA cycle. This process continued for two weeks to establish standardization in the documentation process. The second PDSA cycle included proper documentation for the students at risk in the electronic health record (EHR) and was monitored and validated by the CNL. The third PDSA cycle was to train the school staff about managing the anaphylactic events in the school setting. The plan was to provide the school staff, office administrators, principals, teachers, and auxiliary personnel involved in the students' direct care with 30 minutes of in-service training on recognizing signs and symptoms of anaphylaxis and actions needed to be taken in case of such an event would occur. The aim is to have trained selected staff members by 70% by the end of 2020. The CNL and the other district nurses observed the trained staff using training devices to administer epinephrine injections and validate their skills. The staff felt confident using the devices, and it resulted in significant improvement in knowledge and confidence regarding managing anaphylactic events in schools.

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The project is moving forward to the standardizing phase of standardize-do-study-act (SDSA) to ensure continuous improvement and create opportunities for employee empowerment. The SDSA cycle starts with determining how the current best practice will be standardized in the unit's daily work. The CNL will develop and present an education session designed to describe the current performance and evidence-based best practices to reduce anaphylaxis complications. Data will be obtained from each school site regarding the number of teachers and staff members trained and ready to manage the students at risk. The next phase of this project will focus on meeting with the staff and coming up with a common goal to use best practice to apply the revised protocol regarding training, increase the number of staff members trained to 70% and above, and as a result, decrease the incidences of anaphylactic events.

This project's current goal consists of identifying all children with food allergies, opening a communication link between the district nurses, parents, doctor, and school staff, implementing care plans for all children with food allergies, and educating all personnel involved in the process of care. Using educational resources and raising awareness among school personnel of food allergies being potentially life-threatening would decrease food allergies incidences in school settings. An essential aspect of this project was training the staff regarding HIPPA and ensuring confidentiality for students and families.

Timeline

The project was initialized in August 2020 in all the schools within the School District. The project is in the standardizing and stabilizing stage, emphasizing early staff education on prevention and making it as a part of new health assistants and other new staff members onboarding checklist. It is expected to be measured and completed by December 2020 (see Appendix G).

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Expected Results

This project is expected to increase awareness among school staff, teachers, health assistants, and other auxiliary staff members. By the current date, over 50% of the selected staff got trained regarding anaphylaxis signs and symptoms and action steps needed in case of an event. It is expected that by the end of 2020, over 70% of the selected staff will have completed the planned training.

Nursing Relevance

As it is becoming more common to encounter students with severe allergies, putting them at risk for anaphylaxis. It is essential to have a clear understanding of allergies mechanism and effectively manage students in the school setting. To ensure students' safety in schools, it is essential to exist effective communication between families, health care providers, faculty, staff, and students for developing care plans specific to the students.

Creating and implementing a program to reduce the incidence of anaphylactic events within the School District improves students' safety and the quality of care provided. By expanding the training to the school staff and the health assistants will positively impact schools will be better able to provide a timely response if such events occur, and increase the potential for a much better outcome.

In summary, the literature review supports the benefits of increasing awareness among school staff related to signs and symptoms of anaphylaxis and the necessary actions that need to be taken regarding the occurrence of anaphylactic reactions in school settings. The school staff must know the dangers of anaphylaxis, the importance of recognizing the signs and symptoms of anaphylaxis, the steps needed to be taken to prevent, and the necessary interventions and the

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effects on the students and their families. This project reinforces the importance of the CNL in a microsystem of an organization as an outcome manager leading quality improvement initiatives and interventions to increase students` safety in schools and an educator by using the principles and information to educate the school staff raise awareness regarding anaphylaxis. The CNL has an essential role in the microsystem as an interdisciplinary care team manager by understanding human interaction, problem-solving, communication, and advancing care delivery through teamwork. As a patient advocate in the microsystem, the CNL leads the efforts to create and manage a healthcare environment that serves diverse communities and families, addressing the health disparities. (Stavrianopoulos, 2012).

Summary

During this project, my objective was to decrease and prevent incidences of anaphylaxis in the school settings within the School District. Another objective was to raise awareness among the school staff regarding allergies and anaphylactic reaction and the danger of such an event and educate better the selected staff about the importance of recognizing signs and symptoms and what needs to be done in case of an anaphylactic event.

Food allergies are the leading cause of anaphylaxis reaction, a severe, life-threatening condition, and food allergies are among the most common conditions that have to be addressed in school settings. Proper management of food allergies in school settings requires a network of people working together from the parent and doctor with providing information and recommendations to the teachers, auxiliary staff, and principals. Excellent patient care is provided by a team working together and not solely by a person. (Barach & Johnson, 2006).

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The organization serves over 9000 students with diverse backgrounds, rich in ethnic and cultural diversity, with a curriculum designed to meet all the students' needs. Special services are provided for students with special needs. Students with medical conditions that need assistance are provided with one-on-one licensed vocational nurses or health assistants who take care of their needs: medication administration or other medical services.

The methods I used started with assessing educational needs and identifying the staff members to be trained. The primary research was done on CINAHAL and Wiley, and Google Scholar to find articles for supporting the project and implementing the needed changes.

For this project, I referred to Roger's theory of change; Rogers's theory modified Lewin's change theory and made a 5 stage theory applied to long term change projects. Rogers's theory of diffusion of innovation refers to the idea that once a person or organization learned about an idea, they will adopt it or reject it. Change is a lengthy process that takes time, and long-term goals need to focus on the team and organization. The Diffusion of Innovation theory is a valuable model that also stresses the importance of communication in adopting new ideas.

The process included educating and training the school staff correctly, identifying the students at risk, obtaining the parents' right documentation, and teaching the staff to correctly enter the EHR system's documentation. The staff was relatively receptive and helpful by understanding the importance of this project, implementing the change, and working as a team, ensuring that the students are adequately evaluated.

The evaluation process included feedback from the staff selected for this process. The conclusion and the recommendation are that we correctly identify the students at risk and provide necessary training to staff to intervene if an anaphylactic event would occur in schools. Training

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continues throughout the year to maintain the skills and awareness regarding anaphylaxis in school settings.

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Appendix A

Table A1 Return of investment (ROI)

Description	Calculation per month	Calculation per year
Decrease anaphylactic incidence	By 65%	By 85%
Improvement cost	Cost of staff education and training: No. of staff x time x rate per hour. 96×0.5 (30 min.) x \$ 35= \$ 1,680	Cost of staff education and training in a year: \$ 1,680
	Cost for handout material: \$250.00 T	Total cost for handout material: \$250.00
		Total annual cost: \$1,680+\$250= \$ 1,930
Calculated revenue (saving per day \$ 45 if a student stay in school)	Saving per day \$ 45	Total revenue: No. of day in a year x cost per day $180(\text{school days}) \times \$ 45 = \$ 8,100$
Calculated Return of Investment (ROI)		Total revenue – Total cost: $\$8,100 - \$1,930 = 6,170$
		Initial Annual Saving of \$ 6,170

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Appendix B

Evaluation Table

PICO question: In the School District (P), creating a safe environment for the students at risk for anaphylaxis (I), will reduce the incidence of anaphylactic events (O)?

Citation	Conceptual Framework	Design/Method	Sample/Setting	Variable studied and their definition	Measurement	Data analysis	Findings	Appraisal: worth to practice
Carlisle et al.,(2010)	None	Qualitative study	The study was conducted among 199 school nurses regarding the knowledge of food allergies, anaphylaxis, management of condition in school settings.	The research questions were based on allergy self-reported proficiency for critical areas of food knowledge and management	This analysis focused primarily on nurses' attribution of responsibility regarding managing anaphylaxis in schools.	Grounded dimensional analysis which combines the key concepts of allergic reactions, safety and management was used	Result of this study suggest that weaknesses were identified particularly for emergency plan development, staff education, delegation, developing guidelines for banning foods	This study is rated as L III B using the John Hopkins Evidence Based Practice (JHEBP) appraisal tool.
Cooke A.T. & Meize-Grohowski (2019).	None	Systematic Review (Meta-analysis)	Published literature was searched between 200-2018 in CINHALL, MEDLINE, PUBMED to identify studies regarding anaphylactic reactions in schools	Independent variable: anaphylactic trainings. Dependent variable: training outcomes	Studies included review with following criteria: (a)students at risk for anaphylaxis (b) school settings/protocols regarding the interventions (c) Epinephrine in schools	The review was performed according to PRISMA guidelines.	Studies showed training reduced anaphylactic incidences in schools	Strength: 6 RCT's, 1 prospective observational study and 1 retrospective observational study
Hogue et al., (2016)	None	An exploratory, cross-sectional, web-based, pilot survey	The survey assessed the occurrence and characteristics of anaphylactic events, as well as training provided to school personnel	Survey data were parsed by US Census Bureau region and state and were evaluated using descriptive statistics.	Descriptive statistics were used to report the characteristics of participating school's anaphylactic events, and staff training. Most	Schools from all 50 states and the District of Columbia participated in the survey (N=6,019) In response to the question,	The results of this descriptive pilot study show that schools' preparedness for managing anaphylaxis	By training additional staff for recognizing and treat anaphylaxis, schools are better able to provide a

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					questions responses had missing data, and the percentage calculated for descriptive statistics were derived using the total number of responses per question	“Who in your school is trained to recognize the signs and symptoms of anaphylaxis?”, the most common answer was the school nurse and select personnel, less than 1/3 of schools all trained staff.	varies substantially. In the majority of cases (54%), only the school nurse and select staff members were allowed to administer epinephrine	timely response and, hence, increase the potential for a more favorable outcome. Interpretation of the survey was subject to inherent limitations such as reporting bias, respondent recall, variance related to interpretation of meaning.
Iweala et al. (2018)	None	Systematic Review Purpose: To provide a review of literature related to the natural history of major childhood and adult food allergies and the latest potential treatments.	The literature search included the following wording : Food allergy, Specific IgE, Peanut allergy, Adult food allergy, Food immunotherapy, and published literature between 2009-2018 was searched in PubMed	55 studies were researched about food allergies and latest treatments for food allergies	The review was done on studies that met following criteria: (1) empirical research that included a report of outcomes for food allergies treatments (2) published in peer review journals between 2009-2018 (3) written in English and (4) whose population consisted of both adults and children	The studies were evaluated by the authors for methodological quality relative to study design, sample size, measurement, and statistical analysis.	The various studies covered major childhood and adult food allergies and report recent advances in potential treatments for food allergy	Heterogeneity of samples including patients from different age categories and multiple different approaches being tried as possible treatments for food allergy.
Gupta et al. (2018)	None	The study aimed to describe the public health impact of childhood food allergies by studying a large, nationally representative sample of US households with children. A population-based survey was administered between October 2015 and September 2016	The parent-report survey was based on a previous survey, which was developed by pediatricians, pediatric allergists, and survey methodologists with support from an expert panel. Additional questions were added to assess emerging research issues	The authors collected parent proxy-report data on food allergies prevalence, symptomatology, and health care use, both overall and for many specific FAs.	A descriptive, analysis of data gathered explored the prevalence, associations, severity, epinephrine use and emergency department visits.	The survey was given to U.S. households between 2016-2016 and a total of responses for for 41 341 children; 2933 children were excluded because of incomplete data on food allergies outcomes. Prevalence was estimated via	The found data suggest that childhood food allergies is a significant public health issue resulting in high rates of severe allergic reactions and ED use.	This study is rated as L III B using the John Hopkins Evidence Based Practice (JHEBP) appraisal tool.

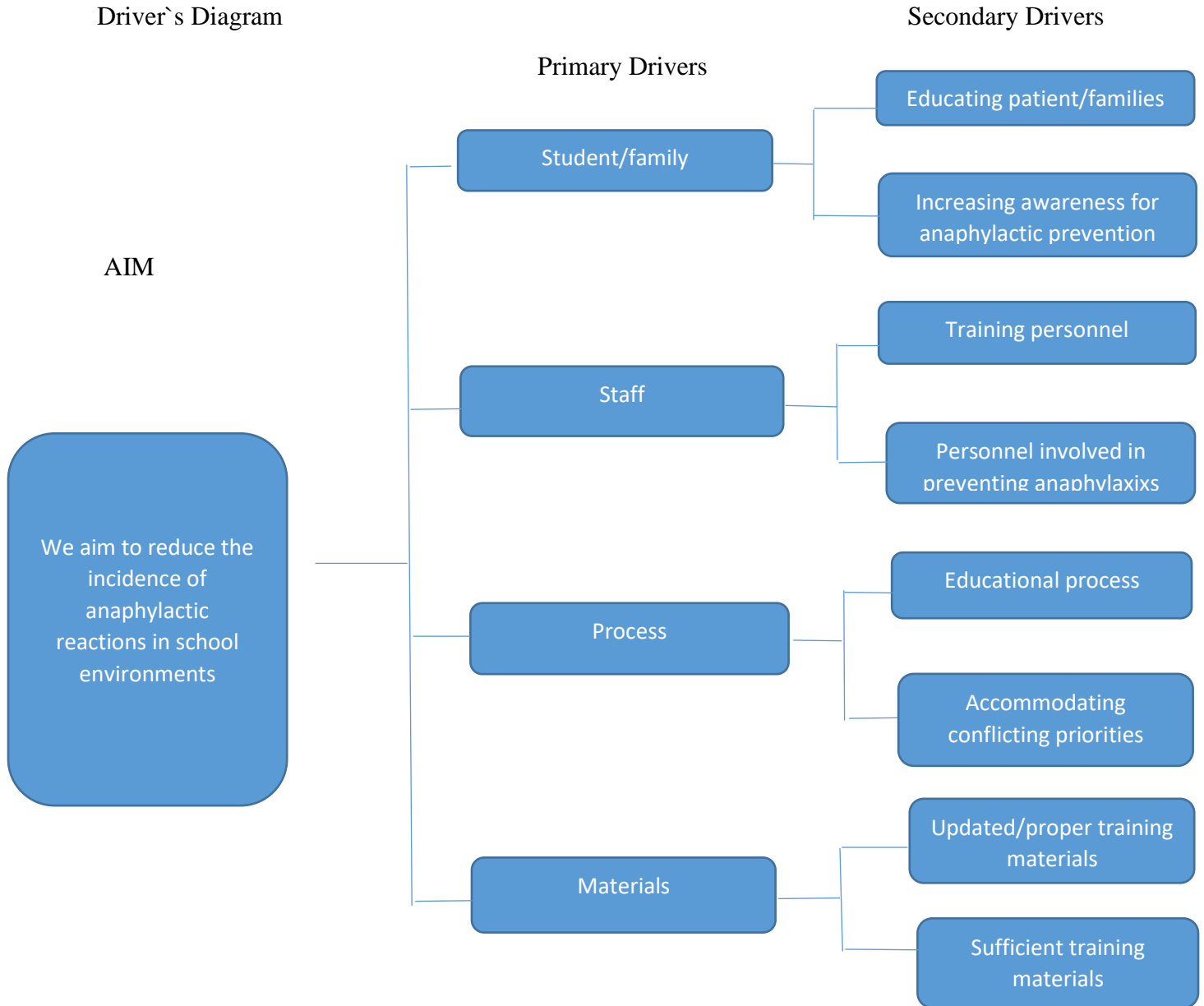
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		to a sample of US households.	relating to the etiology and management of food allergies.			weighted proportions. Multiple logistic regression models were used to evaluate food allergies predictors.		

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Appendix C

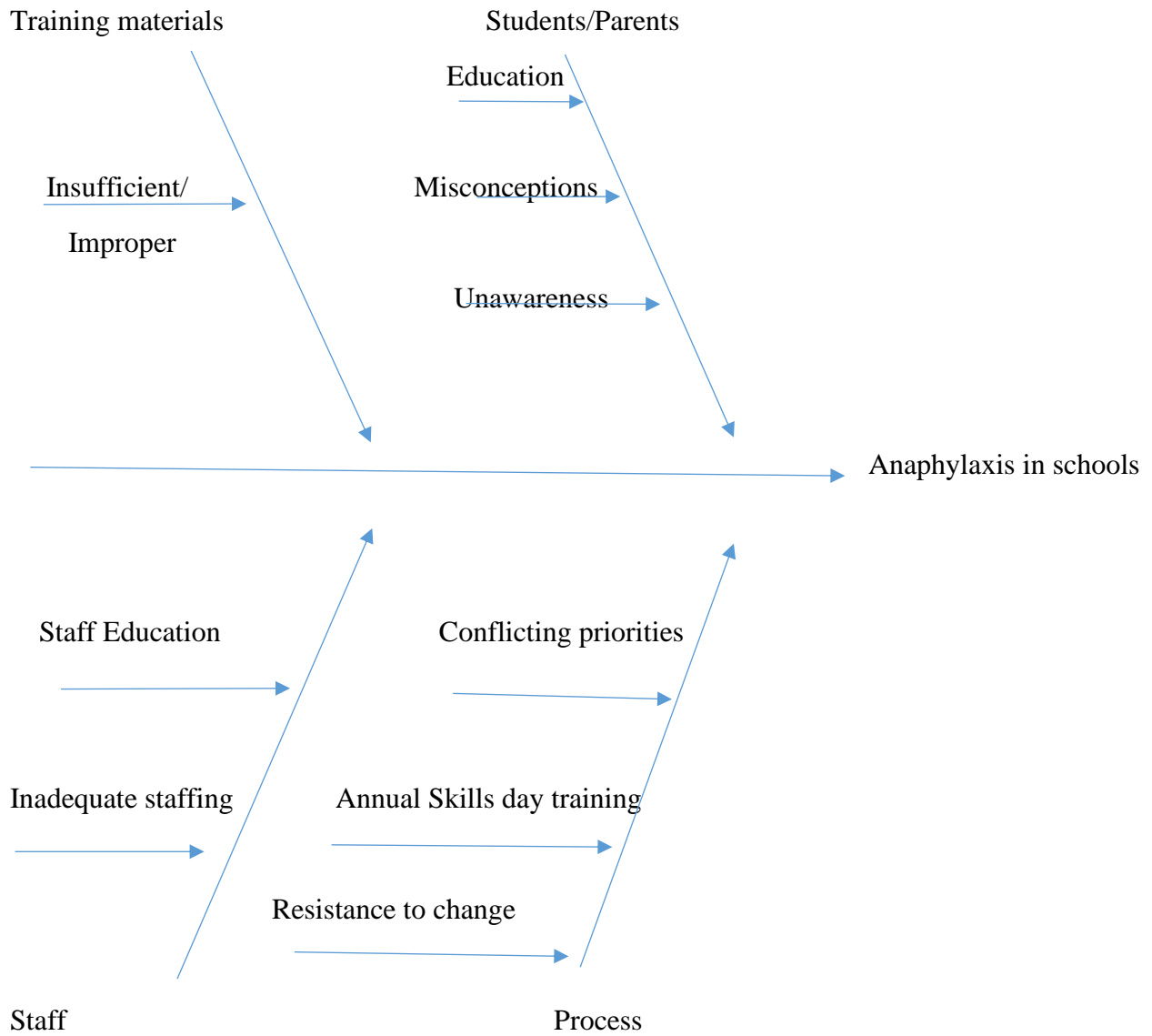
Driver's Diagram



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Appendix D

Fishbone Diagram: Cause and Effect



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Appendix E

Figure 1 Strengths, weaknesses, opportunities, and threats (SWOT) Analysis

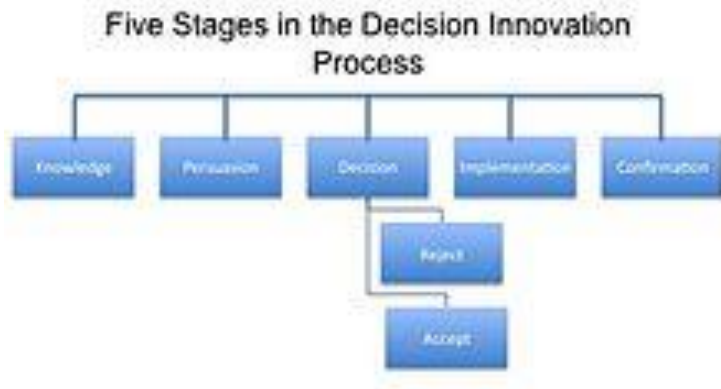
<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> • Teamwork and collaboration between school personnel, parents and teachers. • Willingness to get trained • Result trained staff • Support from student services • Materials ready for training 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> • Staff shortage at some on the school sites • Unwillingness of some staff to participate due to work overload • Parents and staff misconception regarding food allergies and resistance •
<p style="text-align: center;">OPPORTUNITIES</p> <ul style="list-style-type: none"> • Personnel education • Bringing awareness • Increased accountability and responsibility among school staff • Making safety the organization`s culture • Increased satisfaction for services provided 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> • Noncompliance • Student`s allergic reactions • Parents misconceptions about not needing and special accommodations for students at risk

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Appendix F

Figure Roger`s Change Theory

Stages of Adoption:



Source: https://en.wikipedia.org/wiki/File:DoI_Stages.jpg

Knowledge:

- Exposed to information
- Lacks information

Persuasion

- Interested
- Actively seeking details

Decision

- Evaluate concept
- Advantages/disadvantages

Implementation

- Employ innovation

Confirmation

- Decision to continue

ANAPHYLAXIS IN SCHOOL SETTINGS

Appendix G

Project Timeline for 2020

Description	August	September	October	November	December
Microsystem Assess.					
Define topic					
Aim Statement					
Background					
Measurement Strategy					
Unit presentation					
Changes to test					
Driver Diagram					
Start Charter					
Collect Data					
Finalize Charter					
Final Presentation					

ANAPHYLAXIS IN SCHOOL SETTINGS

Appendix H

PSDA Cycle

Aim: To have trained the selected staff by 70% by the end of the year.

