# Primary School Health Management & Health Emergency Education: A Quality Improvement Initiative

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**Abstract**

Within the United States, children spend the majority of their day in the school setting. However, budgets have placed limitations on the presence of a school nurse to care for students. In Minnesota, the majority of school's do not have a full-time nurse present for a large part of the school day. This has left the responsibilities of student's health management and emergency response to teachers and secretaries who have received limited training and demonstrated a lack of knowledge, preparation, skill, and readiness to respond to the health concerns of students. In small primary school staff, how effective is an instructional class and simulation-based training in the management of student's daily health needs and health related emergencies? A standardized education program was developed and implemented to improve the knowledge of basic health management and health emergency response. Improving the knowledge and skills of the faculty were expected to improve student's health related outcomes throughout their school day. For this initiative, a program for health management education was provided to 17 teachers, 2 school administrators, 2 school secretaries, and 2 pastors through an evidence-based protocol developed by the project lead. A virtual class and simulation with health management guidelines was offered over the course of four weeks. A pre/post survey was developed and administered to 10 teachers, 2 school administrators, 2 school secretaries, and 1 pastor to evaluate improvement in school health management knowledge. One hundred percent of school faculty reported the education to be helpful and thought it would be useful throughout their school year. Health management education knowledge scores improved from 8.6 to 14.6 , a 40% improvement; meeting the outcome goal of 20% change. Continued education for school faculty should be provided to improve knowledge, preparation, skill, and readiness to respond to health concerns of students.

**Primary School Health Management & Health Emergency Education: A Quality Improvement Initiative**

In the United States, primary school teachers receive minimal training in medical emergencies and common medical conditions that affect their students. However, many teachers and other faculty are expected to manage these medical needs throughout the school day, especially in rural areas and small private schools. Preparing them with the knowledge to manage these health concerns can improve the outcome of student health and prevent delays in the response to medical emergencies. This quality improvement initiative addressed a shortfall of general health and emergency training for Minnesota primary school faculty and improved health outcomes for students. The overall goal is to increase faculty knowledge and confidence in managing student health needs and responding to health-related emergencies when a school nurse is not available.

## Problem Statement and Background

Within the United States, children spend the majority of their day in the school setting. Teachers are the primary contact for children and are faced with the responsibility of managing their medical needs and health related emergencies within the classroom. However, recent studies have demonstrated that teachers have a lack of knowledge, preparation, skill, and readiness to respond to the health concerns of their students throughout the school day (Rodehorst, 2003; Wilks et al., 2016; Wright & Chopak-Foss, 2020). Due to this lack of knowledge and preparation, teachers have expressed a deep concern and anxiety surrounding safe health management of their students.

Minnesota state budget cuts have placed limitations on the presence of a school nurse throughout the school day. Maughan (2009), found the school nurse's availability of each student and their physical presence in the school had a direct influence in the health outcomes of students. In 2006, Minnesota had an average ratio of one nurse to every 1,412 students (Maughan, 2009). In smaller districts across Minnesota, this resulted in the absence of a school nurse for a large part of the school

day, as budget cuts required them to share a nurse across several schools. A part-time presence of a school nurse is even more common in private schools due to their limited student body (Private School Review, 2021). Teachers and school secretaries become responsible for the management of student's health needs and response to health emergencies when the nurse is not available. Faculty in Minnesota schools have expressed great concern and anxiety related to their lack of knowledge, preparation, and skill in responding to the health needs affecting their students.

Across the United States, 84,000 Registered Nurses are employed as school nurses (Bureau of Labor Statistics, 2020). This indicates that only 40% of schools have a full-time registered nurse on staff, and many of them are required to cover multiple schools. It has been reported that 25% of schools across the United States do not have an employed nurse at all (Bureau of Labor Statistics, 2020).

Minnesota has 336 public school districts containing more than 2,400 schools within these districts (MN Department of Education, 2021). More than half of these public schools enroll less than 1400 students, the allotted state budgeted ratio requirements for one full time nurse (Maughan, 2009). This problem is even more common within the 618 Minnesota private schools that limit enrollment towards a focus on smaller class sizes (Private School Review, 2021).

When focusing on the organization, if educating school faculty in health management and emergency response was not addressed – there would continue to be a gap in care for students throughout the school day. Studies have found that 1 in 4 students in primary schools have been diagnosed with a chronic illness (Buttner, 2021). This has led to increased anxiety of faculty as they become responsible for student's health needs when the nurse is not available.

It is apparent that the limitations in health management and emergency response increases student absences. As student absences increase in the public-school setting, federal funding is often affected based on standards not being met (Buttner, 2021). Parents may also contribute to the increased absences as they may be more cautious to send their child to school during an exacerbation.

Health outcomes would be directly affected if proper education is not provided to faculty for health-related emergencies. Quick recognition, response, and notifying emergency services is necessary. Delays in emergency care may result in life altering consequences including death. Some emergencies, including anaphylaxis, may not have clear symptoms and are often overlooked by untrained medical staff (Wilks et al., 2016). Without learning proper technique in administration of epinephrine, medication errors may lead to adverse effects and needle sticks.

Hiring a full-time school nurse without the support of the Minnesota state budget is not financially feasible for many schools both public and private. The added expense of more than 50,000 dollars to an already limited and oftentimes under-budgeted facility, would require other budget cuts that could impact teachers and curriculum. Educating school faculty on managing the health needs of students including emergency response provides them with the knowledge and skill to care for the student.

As a school nurse at a small Minnesota private school, the increased anxiety and concern when a nurse is not present in the building was noticeable. This is demonstrated by increased phone calls to the nurse for direction on various circumstances. The covid-19 pandemic has heightened this concern as navigation is challenging through the MN Department of Health.

A faculty learning needs assessment is necessary to properly plan the curriculum needed to reduce the gap in their knowledge and skills to respond to student's health management requirements and emergency situations. Interviewing participants and stakeholders on specific topics of concern provided areas of concern. Further investigation into school health records provided data in common diagnoses and injuries that occur within the school. The goal is to increase faculty knowledge of the greatest risks and most frequent occurrences that are impacting their need to respond to student's medical needs and emergency response. Another goal is to alleviate anxiety of the facility and increase their confidence in managing these situations when a school nurse is not available.

The proposed solution in response to the gap in health management knowledge within schools is to provide school faculty, including teachers and school secretaries, education on basic school healthcare management and brief emergency response. To compliment this education, participants would be provided a written guideline to reference in the future. Once the education is completed, school faculty had the opportunity to participate in a simulation to practice learned material and skills. With success of the proposed solution, school faculty felt better equipped to manage student's health needs and aid in the response of health-related emergencies.

**PICO or PICOT Question**

In small primary school staff, how effective is an instructional class and simulation-based training in the management of student's daily health needs and health related emergencies compared to no change in the current education affect their knowledge, skills, and confidence?

## Literature Review

**Methods**

An electronic search was completed using the databases Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google Scholar, MEDLINE, and SOLAR. Key terms utilized in the search engine were 'school nurse', 'training', 'education', 'emergency', 'absent', and 'simulation'. Systemic reviews, peer-reviews, and randomized-controlled trials were all utilized. Due to limitations on available sources, studies offering individual survey and expert opinion were utilized world-wide.

Literature Matrix Table

This review of literature was collected to formulate this quality improvement initiative pre-proposal plan to make healthcare changes within this school. Inclusion data included studies prior to 2011 focusing on primary schools throughout the United States. Exclusion data included articles not peer reviewed. The literature was summarized and placed into a literature matrix table in Appendix A.

**Literature Review Synthesis**

After completing a literature review, it has been determined there is a direct relationship in improved health outcomes of students, increased attendance, and decreased anxiety of staff when an individual trained in health management is available throughout the school day. Rodehorst (2003) determined that teachers contain a limited understanding of childhood asthma. Even though teachers in the study displayed a strong intention to help their students with asthma, their skill and understanding of how to respond was significantly low. Similarly, Wright and Chopak-Foss (2000) concluded teachers also lack the knowledge to recognize and respond to a diabetic child, even after state legislation provided school districts the ability to obtain training. It was further determined that these teachers had not participated in training offered.

Providing basic health management and emergency response education to teachers had a positive impact on students. Wilks et al., (2016) found a significant increase in confidence and emergency skills after providing a one-day basic life support training class within schools. These skills were further found to have been retained for eight-weeks after their class. Lia-Hoagberg, Nelson, and Chase (1997), also made an impact on increasing the knowledge of student's behavior, mental health, resilience, and crisis intervention through multiple days of simulation and instructional classes. As a result of this, teachers verbalized an increase in confidence while working with their students. In a study conducted by Wyman (2005), students were more than twice as likely to be dismissed from school due to illness or injury from untrained staff than when a trained nurse was present in the health office. Teachers have verbalized the need for further education in the health of their students, supported by a survey conducted by Biag et al. (2015). Through education, faculty in primary schools gained the skills and confidence to support student's health needs throughout the school day.

**Organizational Project Information**

This health program took place in a small Christian based private school, located in the Northwest suburbs of Minneapolis. This school provides education to less than 200 students, preschool through eighth grade. Minnesota state funding allows for this school to have a school nurse present only 25% of the school day due to their limited enrollment. When their nurse is not present, the student's health needs and potential health related emergencies are responded to by teachers, administrators, and school secretaries. The school has previously provided minimal health related training including basic CPR certification. The school provides high level education with a focus on nurturing student's faith in Jesus.

***Inclusion and Exclusion Criteria***

This quality improvement initiative focused on faculty that were individually giving direct supervision of students throughout the school day. This included seventeen teachers, two school administrators, two school secretaries, and two pastors. The project leader had a combined role as the school nurse. Inclusion criteria included faculty that took on the role of the school nurse when the nurse was not present in the building. This faculty directly supervises students throughout the school day. These include teachers, pastors, school administrators, and school secretaries. Exclusion criteria included any faculty who miss the instructional class or simulation, after-school program staff, and lunch room staff as teachers are present while students eat lunch.

***Interprofessional Team***

Utilizing an interdisciplinary team throughout the intervention of the quality improvement initiative is key to its success. This team included the school's Board of Education panel along with the school's lead administrator. Upon receiving permission from the College of St Scholastica's Institutional Review Board, gaining approval from the interprofessional team is necessary before moving onto the

next step. This should not be a problem as the interprofessional team has recognized this concern throughout past communication.

The stakeholders involved in the quality improvement initiative are school administration, school teachers, parents of children attending primary school, school nurses, and school budget leaders. Secondary stakeholders included children attending primary schools who indirectly benefit from the initiative if it goes as intended.

***Gap Analysis and Needs Assessment***

The rising national nursing shortage impacted the limitations schools have to provide a full time school nurse. The income gap in annual wages of school nurses versus their peers employed by hospitals is significant resulting in rural schools having difficulty finding nurses to employee (Buttner, 2021). Even if nurses were employable, the added expense in school budgets is impractical to the small budgets of rural schools and private community schools. A study conducted by Wyman (2005) found that 57% fewer students left school early with appropriate treatment by the school nurse. Approximately half of Minnesota primary schools do not have a full time nurse available to students, therefore educating faculty in health management is essential.

The agency would benefit from the quality improvement initiative to ensure their students are properly managed in their health office when their nurse is not present. Minnesota has 336 public school districts containing more than 2,400 schools within these districts (MN Department of Education, 2021). There are also 618 Minnesota private schools that often focus on smaller class sizes indirectly limiting their state funding (Private School Review, 2021). More than half of these public schools enroll less than 1400 students, the allotted state budgeted ratio requirements for one full time nurse (Maughan, 2009).

The agency focused in the quality improvement initiative is a private Christian school located in the Minneapolis area that serves 109 families. It includes 174 enrolled preschool through eighth grade

students. The student population is made up of 93% white individuals, 6% Asian individuals, 1% black or African American individuals, with two or more races making up a smaller percentage. The organization employs 35 individuals. The Board of Education is made up of ten volunteer members. The surrounding area has an average growth rate of nearly 8% annually. This high growth rate has a direct relation to the growth of families seeking enrollment at the school. The median household income in the surrounding area is well above the poverty line.

**Strengths, Weaknesses, Opportunities, and Threats Analysis**

This organization had many strengths as related to this project. The preschool program has met requirements to be licensed by the state through the Department of Human Services. These requirements included multiple policies and procedures that support the health and safety needs of the preschoolers including further education for staff that directly care for the preschool students. It is important to note that not all agency staff went through this training, just the staff that directly care for preschool students. Another strength of the organization is the aspiration to learn and improve the school to better serve our families. Employees are highly motivated to compassionately care for each individual student and help them achieve their highest level of academics. The organization is family centered and has an environment that worships together, eats together, and celebrates together. A weakness of this organization is its thoughtful limited budget, indirectly to maintain low tuition rates for students. With less than 1400 students and a budget that does not provide funds for a full time school nurse, educating faculty through this quality improvement initiative is fundamental to the safety of the students. This program is a great opportunity for the organization to ensure proper training for healthcare management and potential health related emergencies of their students. Finally, a threat for this initiative is the attitudes and limited medical experience of the participants. If a participant finds the educational topics irrelevant, the outcome would be impacted.

**Theoretical Framework and Change Theory**

***Just In Time Learning Model***

One theoretical framework that fits well with the interventions of this quality improvement initiative is Just in Time Learning Model (Tine, 2017). This learning theory is utilized in many professions including healthcare (Tine, 2017). Just-in-time learning model through the use of quick references provides the benefit of learning small amounts at the time material is desired, provides easy accessibility to content, and has shown a greater retention of learned material (Tine, 2017). Faculty were provided reference material to refer to in the future as a guide for the management of a specific circumstances. Before the intervention of educating school faculty takes place, it is important to determine a plan.

***Plan-Do-Study-Act Cycle (PDSA)***

Within this initiative, utilizing the PDSA model – plan, do, study, act – to conduct this program kept the initiative organized (Sollecito & Johnson, 2013). This quality improvement initiative supports all four steps of this model to improve the outcome. The first step in the PDSA cycle model is plan (Sollecito & Johnson, 2013). With educating school faculty on healthcare management and health related emergencies, the goal is to increase health management knowledge and decrease anxiety of faculty when the school nurse is not present. In turn this improved the health outcomes of students. The second step, do, is when the education would take place. Participants were provided an educational class through a prerecorded link supported by reference material. They would then practice this knowledge through simulations. The third step, study, is through an analysis of data collected by surveys. The last step, act, is utilizing improvements through this quality improvement initiative to make adjustments to the schools annual continuing education. The PDSA cycle can be repeated as necessary until the goal is met.

**Goals and Objectives**

**Goal**

The goal of this health program was to create standardized processes for the faculty to use in regards to daily healthcare management and response to health-related emergencies of the students.

***Objective 1***

By week three, the project leader developed an educational program and reference guide that addresses daily healthcare management and health-related emergencies of students.

***Objective 2***

By week five, school faculty participants completed a pre survey (appendix B) regarding their personal anxiety and knowledge in regards to daily healthcare management and health-related emergencies of students.

***Objective 3***

By week seven, school faculty participants had viewed a previously recorded education class on standardized processes for managing student's daily healthcare and health-related emergencies.

***Objective 4***

By week ten, 75% school faculty participants participated in simulations of potential student health-related emergencies.

***Objective 5***

By week twelve, 75% school faculty participants completed a postsurvey regarding personal anxiety and knowledge in regards to daily healthcare management and health-related emergencies of students (appendix C).

***Objective 6***

By the end of this health program, school faculty participants increased daily health management knowledge and appropriate response to health-related emergencies of students by 20%.

By the end of this health program, school faculty participants verbalized a decrease in anxiety and concern in regards to managing student's daily health needs and emergencies when the school nurse is absent.

**Logic Model**

Several assumptions were made for this quality improvement project, including: improving faculty knowledge of school health management would lead to improved student health outcomes. Another assumption made was that improving knowledge of school faculty would decrease anxiety when a school nurse was not available to attend to students. The quality improvement project was designed through the input of board members at the specific site, three school nurse's from neighboring schools, and five school faculty staff members. The project included development of health management content given in the virtual class and simulation, development of pre surveys and post surveys (appendix B, appendix C), development of virtual class video, and education provided during simulations. The outcome of the quality improvement project improved school faculty knowledge of health management and emergency response, and improved anxiety of school faculty when the school nurse was not present. Logic model is further reviewed in appendix D.

## Methodology and Analysis

**Objective 1 Implementation**

To implement this objective, the project leader gained the input from lead stakeholders to determine desired subject matters for this educational program. This included specific acute and chronic health conditions that faculty may have to manage and potential emergency situations that can threaten students while they are in school. After identifying specific health management needs of this program, the project leader developed content to be used within the health program. Content was obtained through the opinion and guidance of expert professional organizations including: the American Heart Association, HEADS up training through the Centers for Disease Control and Prevention, American Red

Cross, and American Academy of Pediatrics as many of these organizations have instructional content for schools on a variety of topics. This data was gathered through these sources and constructed to be delivered to school faculty in a variety of ways. A pre-recorded instructional class, reference materials, and interactive simulations was prepared by the health program leader.

***Evaluation***

To measure the success of this objective, the project leader would have successfully developed each part of the education health program including the instructional pre-recorded class, quick reference material, and an outline for simulations by week three.

***Objective 2 Implementation***

The presurvey included content questions and personal questions related to their level of anxiety when a school nurse is not present. The content questions included information that was presented during the health program and frequently affect students; such as head injuries, medication administration, asthma management, and allergy management. Questions were formatted in multiple choice, free text, and the rating of personal feelings using a 1-5 Likert scale. A printed presurvey and directions was distributed to the faculty by week three. They were instructed to not research databases for answers and only use personal knowledge.

***Evaluation***

To measure the success of this objective, the project leader received a presurvey from 100% of participants by week five (appendix B).

**Objective 3 Implementation**

The instructional class was provided by a previously recorded video that can be accessed online. School staff would be able to access the video at a time that is convenient for them. This followed the school's covid-19 social distancing protocols. The instructional video referred them to the quick

reference three-ring-binder. School faculty were notified to have their quick reference binder available throughout their video viewing.

***Evaluation***

To measure the success of this objective, school faculty notified the project lead of completion of the instructional class on a check list located in St John's Lutheran School's front office. At the time staff check off they completed the video instruction viewing, they signed up for their chosen simulation date.

**Objective 4 Implementation**

The benefits of simulation-based education are widely documented within literature (Jansen, 2015). Within the health program, school faculty would be able to apply learning content and processes in a safe, risk-free environment through small groups of three to five participants. The specific subject of the simulations were designed with input from the lead stakeholder. However, the simulations were designed towards high anxiety subjects including health related emergencies. School faculty were encouraged to apply content learned throughout the instructional video and through use of the quick reference three-ring-binder. After each simulation, the small group debriefed the simulation regarding what went well, what didn't go well, and lessons learned (Jansen, 2015).

***Evaluation***

To measure the success of this objective, 75% of participants participated in the simulation experience provided in small groups at St. John's Lutheran School.

**Objective 5 Implementation**

The postsurvey included similar content questions and personal questions related to their anxiety when a school nurse is not present. The content questions asked the same questions as the presurvey to eliminate variables. A printed postsurvey was distributed to them after their scheduled simulation.

***Evaluation***

To measure the success of this objective, the project leader received a postsurvey from 100% of participants by week twelve.

**Objective 6 Implementation**

Individual's presurvey and postsurvey was carefully analyzed to determine any changes in an individual's answers, to look for trends and potential additional educational opportunities.

***Evaluation***

The success of the outcome measurement was determined by a 20% increase in content questions answered correctly from presurvey to postsurvey. Faculty verbalized a decrease in anxiety and concerns after knowledge gained through the health program.

**IRB/Ethical Considerations**

The Institutional Review Board (IRB) served to assure that the appropriate steps were taken to protect the rights and welfare of human participants within this quality improvement study. The project was approved by the IRB prior to implementation.

This health initiative did not handle any confidential student academic or health data, Health Insurance Protection and Portability Act (HIPPA) was not breached. This project was reviewed by the College of St. Scholastica's Internal Review Board and the school's Board of Education. It followed the American Nurses Association Code of Ethics. The only personal data collected throughout the study is the participants names to ensure attendance of the virtual class and simulation. Presurvey data was kept secure in a locked location and were not to be reviewed by individuals other than the project leader. The curriculum used for the virtual class and simulations were created by real-life examples gathered by literature review. Student experiences at the agency were not used. The simulation outline was created in accordance with the International Nursing Association for Clinical Simulation and Learning guidelines

(INACSL, 2021). Simulation was maintained judgment free with instruction to keep events during simulation private.

Post-surveys were kept confidential in the same manner as the presurvey. Participant's identification was utilized on surveys to compare knowledge gained through analysis. Analysis took place utilizing Intellectus Statistics provided by the College of St. Scholastica. A t-test was utilized to compare knowledge and confidence gained throughout the intervention. All surveys were destroyed one month following completion of data analysis.

**Implementation**

**Results from Data Collection**

A two-tailed paired samples *t*-test was initially conducted to examine whether the mean difference of Pre Survey and Post Survey results for the fifteen participants was statistically significant. Additionally, presurvey and post survey Likert-style questions administered to participants were also analyzed. Statistical assumptions of normality and homogeneity of variance tests were not met when tested with a Shapiro-Wilk test and Levene's test. The data were therefore evaluated nonparametrically using a Wilcoxon signed rank test. The analysis of Likert items can be used appropriately for ordinal data such as Likert-style questions and was considered appropriate to this analysis (de Winter and Dodou, 2010).

## *Results*

The result of the two-tailed paired samples t-test was significant based on an alpha value of .05, $t(14) = -16.36$, $p < .001$, indicating the null hypothesis can be rejected. This finding suggests the difference in the mean of Pre_Survey and the mean of Post_Survey was significantly different from zero. The mean of Pre_Survey was significantly lower than the mean of Post_Survey. The results are presented

in Table 1. A bar plot of the means is presented in Figure 1. This represents a 40% improvement in test score across participants.

**Table 1**

*MEAN AND STANDARD DEVIATION FOR PRE VS POST SURVEY SCORES*

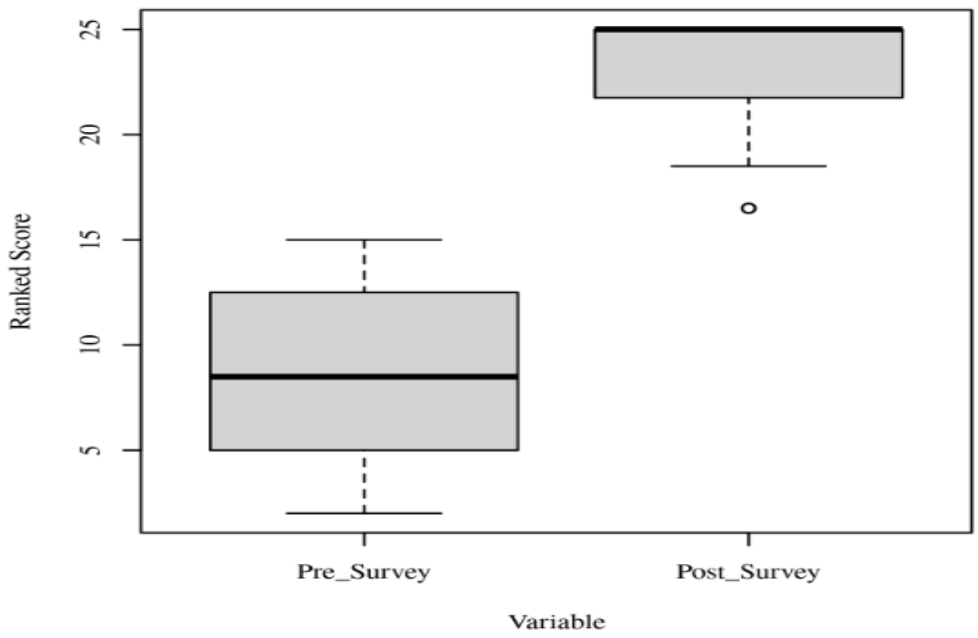
| Pre-survey | | Post-Survey | |
|---|---|---|---|
| *M* | *SD* | *M* | *SD* |
| 8.80 | 1.26 | 14.60 | 0.74 |

A two-tailed Wilcoxon signed rank test was conducted to examine whether there was a significant difference between Pre_Survey and Post_Survey. The two-tailed Wilcoxon signed rank test is a non-parametric alternative to the paired samples *t*-test and does not share its distributional assumptions (Conover & Iman, 1981).

The results of the two-tailed Wilcoxon signed rank test were significant based on an alpha value of .05, V = 0.00, z = -3.44, p < .001. This indicates that the differences between Pre_Survey and Post_Survey are not likely due to random variation. The median of Pre_Survey (Mdn = 9.00) was significantly lower than the median of Post_Survey (Mdn = 15.00). Figure 1 presents a boxplot of the ranked values of Pre_Survey and Post_Survey.

**Figure 1**

*Ranked values of Pre_Survey and Post_Survey*




A two-tailed Wilcoxon signed rank test was conducted to examine whether there was a significant difference between pre-survey and post survey results. The mean and standard deviations for each individual survey question are reported below in Table 2. Pre survey and post survey can be found in appendix B and appendix C.

**Table 2**

*RESULTS FOR LIKERT-STYLE QUESTIONS*

*Mean and Standard Deviation Difference Between PRE_Q_16 and POST_Q_16*

| PRE_Q_16 | | POST_Q_16 | | | | |
|---|---|---|---|---|---|---|
| *M* | *SD* | *M* | *SD* | *t* | *p* | *d* |
| 2.43 | 1.22 | 1.43 | 0.51 | 3.18 | .007 | 0.85 |

*Mean and Standard Deviation Difference Between PRE_Q_17 and POST_Q_17*

| PRE_Q_17 | | POST_Q_17 | | | | |
|---|---|---|---|---|---|---|
| *M* | *SD* | *M* | *SD* | *t* | *p* | *d* |
| 2.86 | 1.41 | 4.21 | 1.12 | -3.09 | .009 | 0.82 |

*Mean and Standard Deviation Difference Between PRE_Q_18 and POST_Q_18*

| PRE_Q_18 | | POST_Q_18 | | | | |
|---|---|---|---|---|---|---|
| *M* | *SD* | *M* | *SD* | *t* | *p* | *d* |
| 2.21 | 1.19 | 1.36 | 0.63 | 2.60 | .022 | 0.70 |

*Mean and Standard Deviation Difference Between PRE_Q_19 and POST_Q_19*

| PRE_Q_19 | | POST_Q_19 | | | | |
|---|---|---|---|---|---|---|
| *M* | *SD* | *M* | *SD* | *t* | *p* | *d* |
| 4.21 | 1.12 | 1.07 | 0.27 | 10.07 | < .001 | 2.69 |

A two-tailed Wilcoxon signed rank test was conducted to examine whether there was a significant difference between questions 16, through 19 as it was noted there was what appeared to be a potential change in the average answer. A two-tailed Wilcoxon signed rank test is a non-parametric alternative to the paired samples t-test and does not share its distributional assumptions (Conover & Iman, 1981). The results of the two-tailed Wilcoxon signed rank test were significant based these four questions: Q16 alpha value of .05, V = 36.00, z = -2.56, p = .010, Q 17 alpha value of .05, V = 8.00, z = -2.49, p = .013, Q18 alpha value of .05, V = 49.00, z = -2.24, p = .025, and Q 19 alpha value of .05, V = 105.00, z = -3.37, p < .001.. **Figure 2**

*Ranked values of PRE_Q_16 and POST_Q_16*

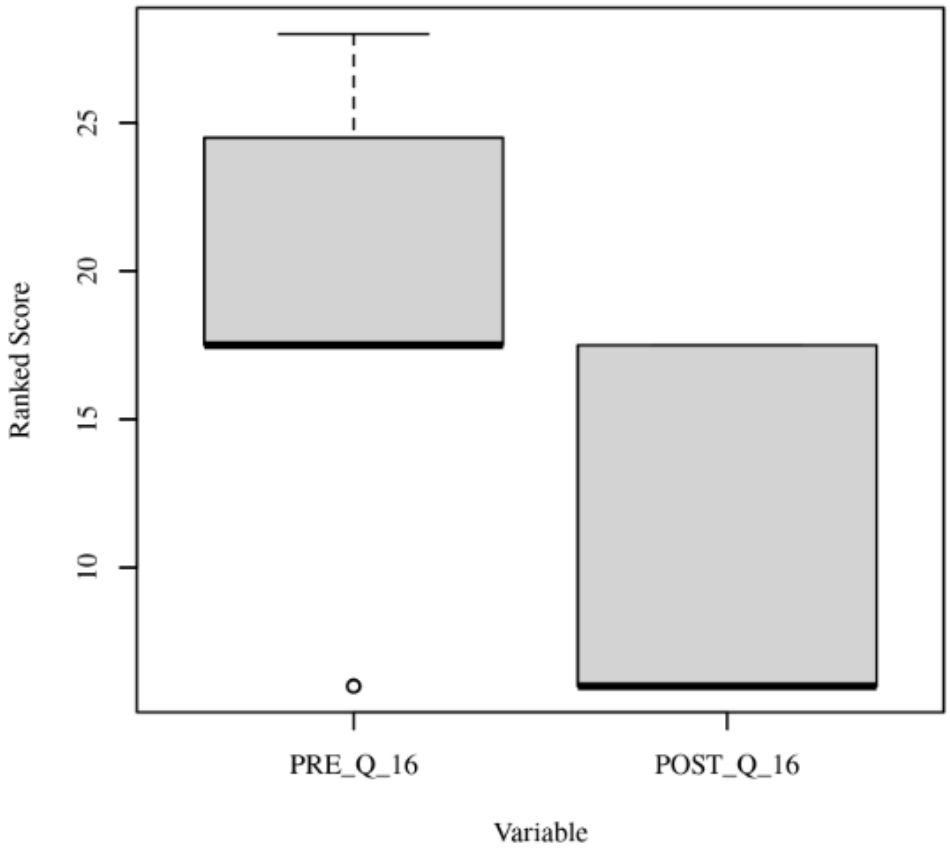



**Figure 3**

*Ranked values of PRE_Q_17 and POST_Q_17*

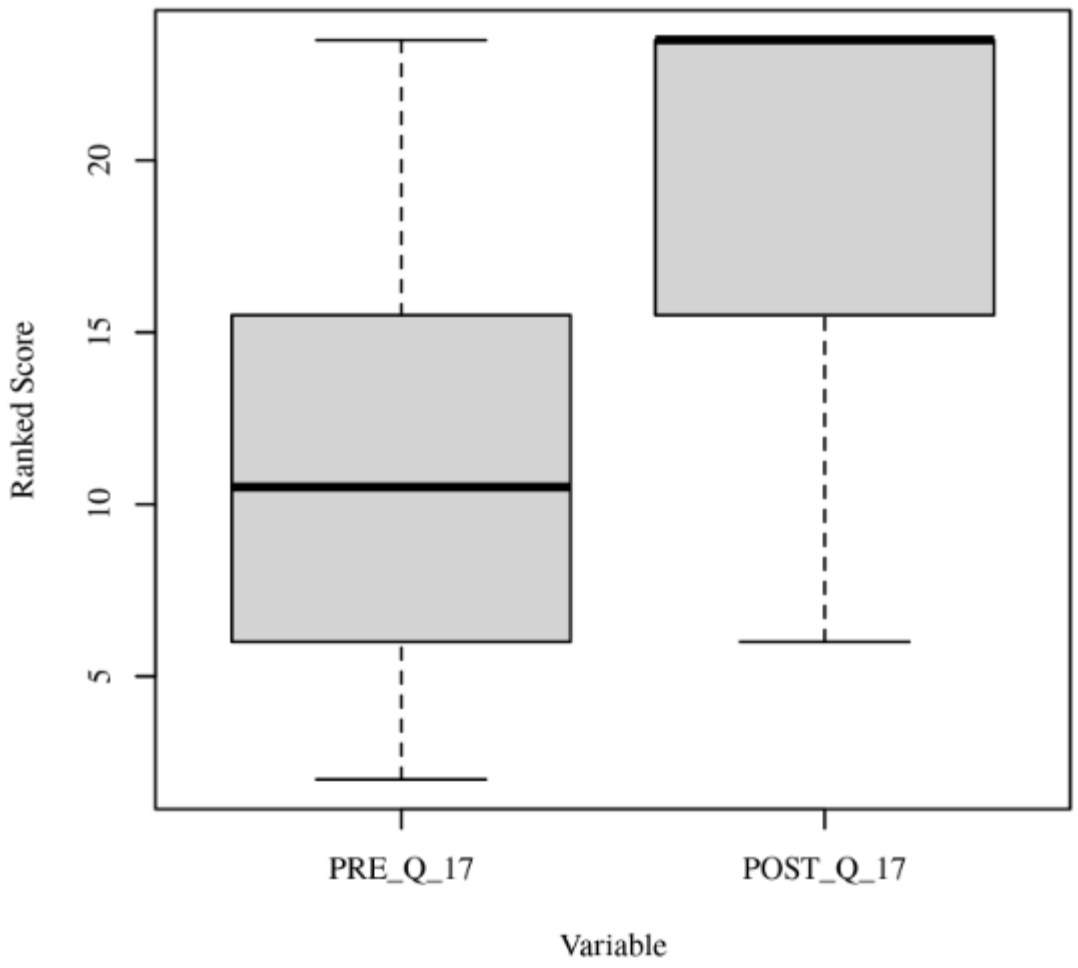



**Figure 4**

*Ranked values of PRE_Q_18 and POST_Q_18*

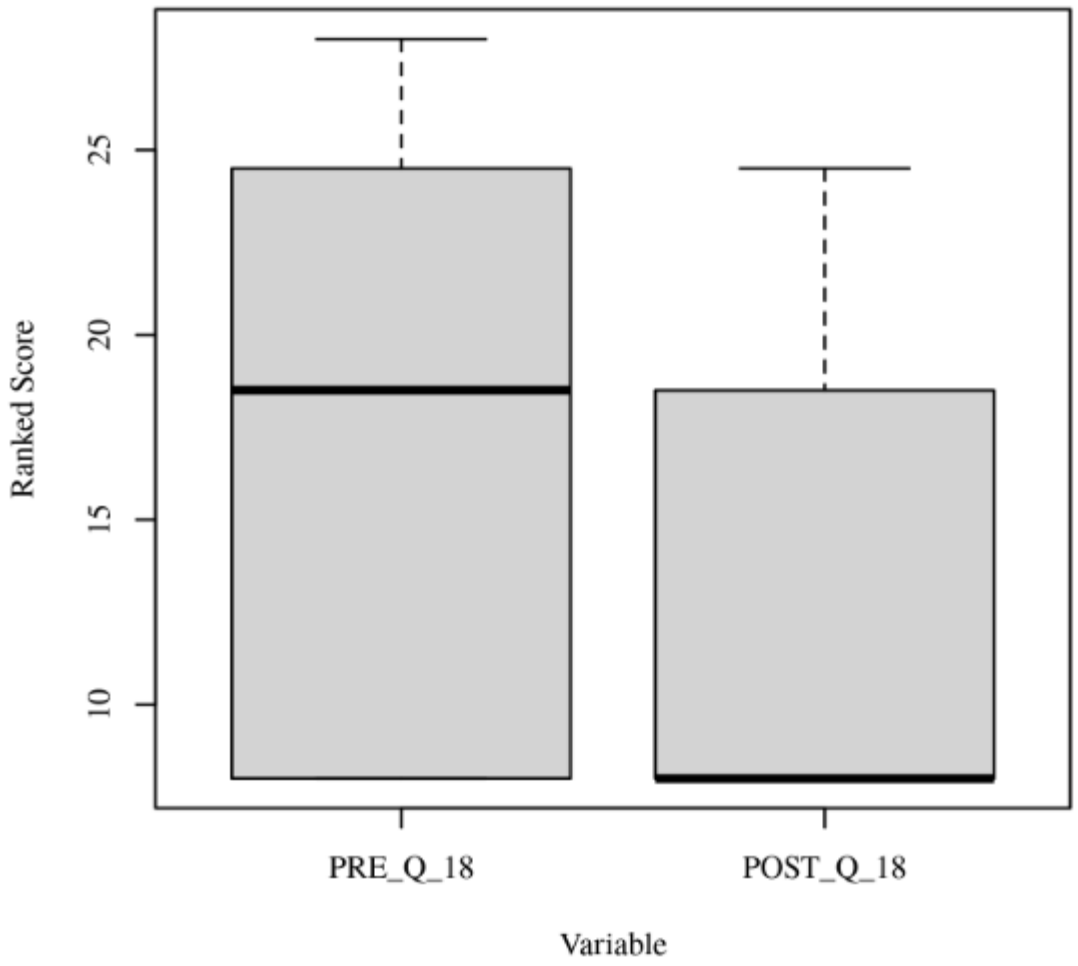
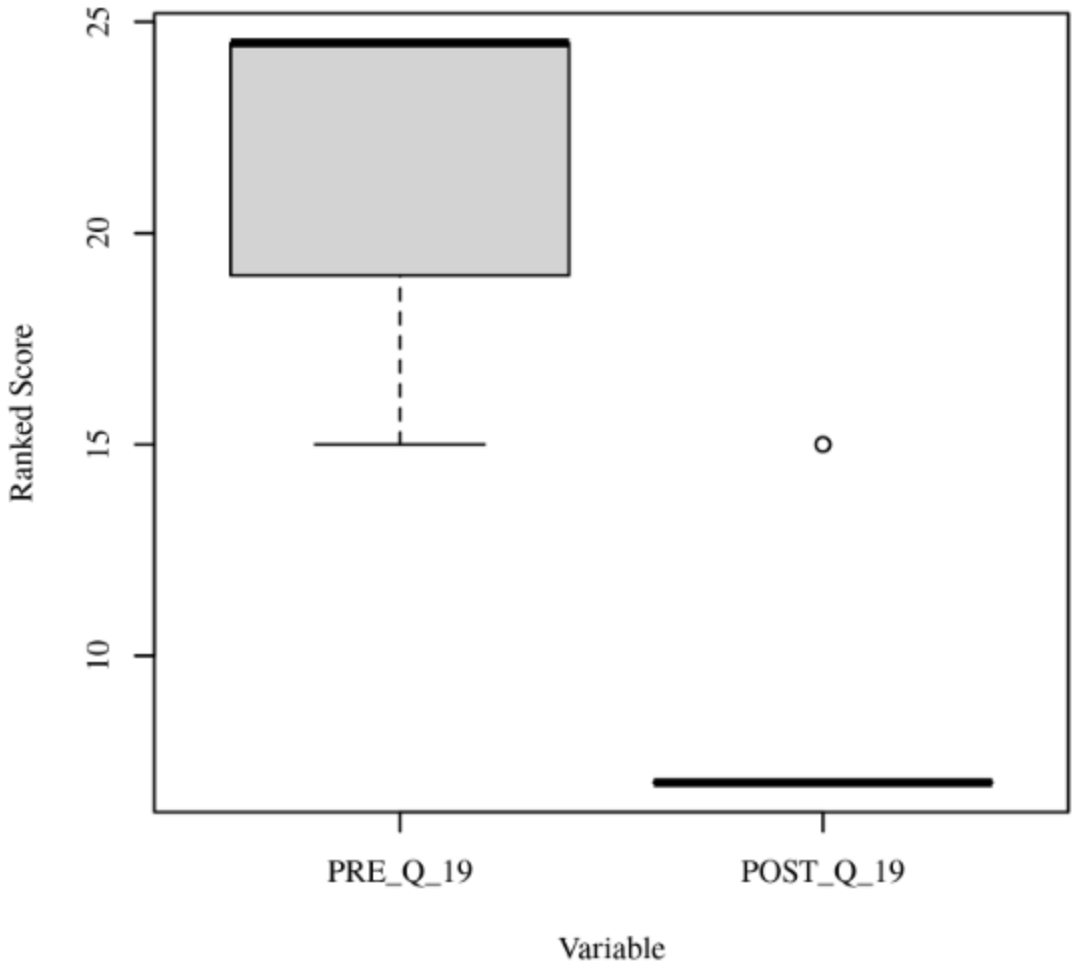



**Figure 5**

*Ranked values of PRE_Q_19 and POST_Q_19*




**Discussion of Data/Outcomes Interpretation**

***RN Knowledge Pre- and Post- Intervention***

There was a statistically significant ($p < 0.025$) improvement in school faculty knowledge through the implementation of this initiative. This statistical significance indicates that the results are likely not due to chance, but are in fact a result of the intervention. Based on this finding, the intervention proved to be an effective intervention in the improvement of elementary school staff's education on managing students' health needs and responding to health related emergencies.

***Provision of Elementary School Staff Education***

More than 60% of elementary schools within Minnesota require faculty including teachers and secretaries to provide daily health related needs to students when the school does not have a full time nurse available (Bureau of Labor Statistics, 2020). Education must be provided to elementary school faculty on safely implementing this care. This would indirectly improve the health outcomes of students requiring health related needs at school. As a result of this project, school health management knowledge improved from 8.6 pre-initiative to 14.6 post-initiative, a 40% improvement; surpassing the outcome goal of 20%.

***Provision of Elementary School Staff Anxiety***

The majority of elementary school faculty expressed increased anxiety in responding to student's health needs when a school nurse was not available. By providing education to faculty on health management and emergency response, this initiative presumed faculty anxiety would decrease. As a result of this project, elementary school faculty expressed a decrease in anxiety related to medical management of students of 27% after education was provided; meeting the goal to decrease faculty's anxiety when the nurse is not available to care for students.

***Faculty Opinion of Intervention***

A majority of school staff found the education to be helpful and relevant to be used throughout the school day. One participant expressed that they "appreciated the expanded teaching about medical issues involved as a case specific simulation, especially the focus on who we would be working with, scared younger students and how to minimize a traumatic situation". Another participant verbalized that "simulation on playground injuries was helpful". Many expressed a desire for further topics to be educated on in the future, including "lacerations" and childhood "anxieties". The use of a virtual class along with simulation can be served as a useful way to educate school faculty on health management.

**Dissemination**

The results of this project were presented to the board of education. Based on the effectiveness of this project, the faculty continued to educate teachers and secretaries on health management and emergency response of students, utilizing the knowledge of the school nurse. The school nurse remains available to answer questions on health management of enrolled students.

## Conclusion

Many schools across Minnesota are faced with supplementing the care a school nurse provides with other faculty. It is imperative that these faculty receive adequate training to intervene in the health needs of students. The quality improvement initiative proposed created a standardized educational process to educate staff within schools that do not have a full time nurse available. Through knowledge, practice, and skill the health outcomes of students improved within schools.

Implementation of the initiative was successful, including creation of education provided, administration of pre/post-surveys, and educating through a virtual class and simulation. With the significant increase in faculty knowledge and confidence in managing the needs of students, including emergencies, staff gained confidence decreasing anxiety when the nurse is not present throughout the school day. Continued education provided to elementary school staff could be a helpful way to improve the health outcomes of students throughout the school year.

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**Appendix A: Literature Matrix Table**

| Reference | Purpose<br>Question | Design | Sample | Interventions | Results |
|---|---|---|---|---|---|
| Biag, M, Srivastava, A., Landau, M., & Rodriguez, E. (2015). Teachers' perception of full- and part-time nursing at school. *Journal of School Nursing, 31*(3), 183-195. https://doi.org/10.1177/1059840514561863 | What are teachers' perception of the school nurse role? | Survey | 129 teachers | Survey was conducted with questions to determine teacher's perception on the school nurse job performances | Multiple teacher's requester educating them on the medical health needs of their students. This included their request for recommended treatment, prevention of illness and injuries through infection control. They also requester background on common illnesses including ADHD. Classroom first aid kit. |

| | | | | | |
|---|---|---|---|---|---|
| Buttner, A. (2021). Diagnosing the School Nurse Shortage. *School Health.* Retrieved from https://www.frontlineeducation.com/blog/school-nurse-shortage/ | Why is there a school nurse shortage in the United States? | N/A Educational Piece | N/A Educational Piece | N/A: Educational Piece | Multiple reasons including nurse shortage across country, benefits, and salary. |
| Knutson, A., Park, N., Smith, D., Tracy, K., Reed, D., & Olsen, S. (2014). Just-in-time training: A novel approach to quality improvement education. *Neonatal Network, 34*(1), 6-9. http://dx.doi.org/10.1891/0730-0832.34.1.6 | What is the just-in-time training model? | N/A: Educational Piece | N/A: Educational Piece | N/A: Educational Piece | Just-in-time learning model through the use of quick references provides the benefit of learning small amounts at the time material is desired, provides easy accessibility to content, and has shown a greater retention of learned material |

| | | | | | |
|---|---|---|---|---|---|
| Lia-Hoagberg, B., Nelson, P., & Chase, R. (1997). An interdisciplinary health team training program for school staff in Minnesota. *Journal of School Health, 67*(3), 1-5. https://link.gale.com/apps.dog/A19240745/HRCA?u=mnacstsch&sid=bookmark-HRCA&xid=856f57f4 | What is the school based interdisciplinary health training program in a school? | Quality Improvement, Quantitative | 25 school health staff | Two full day sessions consisting of team effectiveness/development, communication and problem-solving skills. Nine three-hour educational sessions to improve knowledge, skill, and intervention. | Increased knowledge behavior, mental health, resilience, and violence. Most helpful strategies were stories, examples and simulation. |
| Maughan, E. (2009). Factors associated with school ratios: An analysis of state data. *The Journal of School Nursing, 25*(3), 214-221. https://doi.org/10.1177/1059840509336058 | What factors influence school nurse ratios in the United States? | Data Analysis | 50 states | Data was gathered to determine the correlation between nurse-to-student ratios. | Large variance throughout the United States based on state budgets and laws. |

| | | | | | |
|---|---|---|---|---|---|
| Rodehorst, T (2003). Rural elementary school teachers' intent to manage children with asthma symptoms. *Pediatric Nursing, 29*(3), 184-194. | How much knowledge do primary school teachers have in asthma? | Prospective, exploratory design. Survey | 212 teachers | Data was gathered through survey to determine the participants knowledge about asthma and attitude towards asthma. | Intention on helping children's in their classroom was high although knowledge about asthma and how to respond was significantly low. |
| Wilks, J., Kanasa, H., Pendergast, D., & Clark, K. (2016). Emergency response readiness for primary school children. *Australian Health Review, 40*(1), 357-363. https://doi.org/10.1071/AH15072 | Can basic life support training increase emergency response in primary schools? | Quantitative sampling | 170 | Survey on confidence and knowledge after a one day BLS course was provided | Significant increase in confidence and skill in basic life support with one day class. Retained after 8-week follow-up. |

| | | | | | |
|---|---|---|---|---|---|
| Wright, A. & Chopak-Foss, J. (2020). School personnel knowledge and perceived skill in diabetic emergencies in Georgia public schools. *The Journal of School Nursing, 36*(4), 304-312. https://doi.org/10.1177/1059840518820106 | How much knowledge do primary school teachers have with diabetes? | Quantitative sampling design | 809 teachers | Data was gathered through survey to determine the participants knowledge about diabetes and treatment throughout school. | Despite state legislation enacted to assist children with diabetes in schools and provide training for school districts, this study found that school personnel are not well trained and lack confidence in basic diabetic management of a student. |
| Wyman, L. (2005). Comparing the number of ill or injured students who are released early from school by school nursing and nonnursing personnel. *The Journal of School Nursing, 21*(6), 350-355. https://doi.org/10.1177/10598405050210060901 | Are more students sent home due to illness or injury when a school nurse is not present? | Quantitate | 4120 students | Data analysis using descriptive and correlational statistical methods. No attempt to control or manipulate which students were seen by the nurse or not were made. | Slightly more than twice as many students were dismissed ill or injured when a nurse was not available. |

**Appendix B: Pre-Survey**

1. A child's brain is particularly at risk for long-term medical complications following a concussion due to:

    a. soft bone tissue.

    b. increased risk of chemical changes in the developing brain.

    c. inability to communicate symptoms.

2. A student fell into a patch of ice, hitting his head, while sledding at recess. How long should an assigned staff member sit with the student to monitor symptoms before returning to class?

    a. 5 minutes

    b. 15 minutes

    c. 30 minutes

    d. Until the student says they feel ready to return to class.

3. Which student should be sent home from school due to their head injury?

    a. student who was bumped with a basketball – no appearance of an injury – however complains of a headache.

    b. student who collided with their friend at recess and has a visual bump and bruising on their head – no other symptoms.

    c. student who collided with door frame and has a small manageable scrap on forehead – no other symptoms.

4. What percentage of students have trouble with their schoolwork after a concussion?

    a. 2%

    b. 10%

    c. 30%

    d. 80%

5. After a concussion, school faculty can support a student's recovery by understanding

a. A student may need short rest periods while at school

b. A student may need extended time to complete homework assignments and tests

c. Ongoing concussion symptoms may need to be communicated to parents

d. All of the above.

6. What are the five rights of medication administration?

a. Right _____

b. Right _____

c. Right _____

d. Right _____

e. Right _____

7. True/False? STJL requires written medication administration directions with a doctor's signature for all medications, including over-the-counter medications, to be given to students at STJL.

8. A preschool student, Joe, is outside playing on the playground when you hear him crying. You rush over to him and see a swarm of bees coming from a disruptive nest. Joe's mother has previously warned you about Joe's bee allergy. How do you respond first?

a. Alert the office to call 911.

b. Check the scene and remove Joe from contact with the bees.

c. Check Joe for signs and symptoms.

d. Give Joe a hug and comfort him.

9. Joe is crying complaining his arm hurts. He has developed a rash and his breathing appears noisy. Which symptoms suggest an anaphylactic reaction?

a. Arm pain

b. Rash

c. Noisy breathing

d. All of the above

e. B & C

10. Before administering Epinephrine autoinjector, what should you do?
    a. Check the expiration date.
    b. Shake the auto-injector to active the medication.
    c. Remove the child's clothing.
11. Where should you administer the Epinephrine autoinjector?
    a. Into the side of the arm
    b. Into the outer thigh
    c. Into the front of the thigh
12. How long should you hold the Epinephrine auto-injector in place to dispense the medication?
    a. 3-5 seconds
    b. 5-10 seconds
    c. 15-20 seconds
    d. 20-30 seconds
13. After administering the Epinephrine auto-injection
    a. Prepare to administer the second dose
    b. Have the child lay down
    c. Massage the injection site
    d. Throw the Epinephrine auto-injector in the classroom garbage can.
14. Sam Splint is used to
    a. Immobilize an injured area
    b. Promote bone alignment
    c. Protect injured area from motion or use
    d. All of the above
15. Sally fell from the top of the playground at recess. When you arrive to her side, you note her left upper leg is positioned abnormal or displaced. What is your next action?
    a. Help Sally inside to the nurse's office.

b. Call Sally's parent to pick her up.

c. Call 911

16. I feel prepared to respond to a playground emergency

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly agree | | | | Strongly disagree |

17. I feel anxious a medical emergency might happen when the nurse is not available

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly agree | | | | Strongly disagree |

18. I feel confident administering medications and epinephrine auto-injection to a student

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly agree | | | | Strongly disagree |

19. I can apply a Sam Splint when needed to a noncomplex fracture.

| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| Strongly agree | | | | Strongly disagree |

**Appendix C: Post Survey**

1. A child's brain is particularly at risk for long-term medical complications following a concussion due to:
    a. soft bone tissue.
    b. increased risk of chemical changes in the developing brain.
    c. inability to communicate symptoms.
2. A student fell into a patch of ice, hitting his head, while sledding at recess. How long should an assigned staff member sit with the student to monitor symptoms before returning to class?
    a. 5 minutes
    b. 15 minutes
    c. 30 minutes
    d. Until the student says they feel ready to return to class.
3. Which student should be sent home from school due to their head injury?
    a. student who was bumped with a basketball – no appearance of an injury – however complains of a headache.
    b. student who collided with their friend at recess and has a visual bump and bruising on their head – no other symptoms.
    c. student who collided with door frame and has a small manageable scrap on forehead – no other symptoms.
4. What percentage of students have trouble with their schoolwork after a concussion?
    a. 2%
    b. 10%
    c. 30%
    d. 80%
5. After a concussion, school faculty can support a student's recovery by understanding
    a. A student may need short rest periods while at school

b. A student may need extended time to complete homework assignments and tests

c. Ongoing concussion symptoms may need to be communicated to parents

d. All of the above.

6. What are the five rights of medication administration?

a. Right _____

b. Right _____

c. Right _____

d. Right _____

e. Right _____

7. True/False? STJL requires written medication administration directions with a doctor's signature for all medications, including over-the-counter medications, to be given to students at STJL.

8. A preschool student, Joe, is outside playing on the playground when you hear him crying. You rush over to him and see a swarm of bees coming from a disruptive nest. Joe's mother has previously warned you about Joe's bee allergy. How do you respond first?

a. Alert the office to call 911.

b. Check the scene and remove Joe from contact with the bees.

c. Check Joe for signs and symptoms.

d. Give Joe a hug and comfort him.

9. Joe is crying complaining his arm hurts. He has developed a rash and his breathing appears noisy. Which symptoms suggest an anaphylactic reaction?

a. Arm pain

b. Rash

c. Noisy breathing

d. All of the above

e. B & C

10. Before administering Epinephrine autoinjector, what should you do?

a. Check the expiration date.

b. Shake the auto-injector to active the medication.

c. Remove the child's clothing.

11. Where should you administer the Epinephrine autoinjector?

a. Into the side of the arm

b. Into the outer thigh

c. Into the front of the thigh

12. How long should you hold the Epinephrine auto-injector in place to dispense the medication?

a. 3-5 seconds

b. 5-10 seconds

c. 15-20 seconds

d. 20-30 seconds

13. After administering the Epinephrine auto-injection

a. Prepare to administer the second dose

b. Have the child lay down

c. Massage the injection site

d. Throw the Epinephrine auto-injector in the classroom garbage can.

14. Sam Splint is used to

a. Immobilize an injured area

b. Promote bone alignment

c. Protect injured area from motion or use

d. All of the above

15. Sally fell from the top of the playground at recess. When you arrive to her side, you note her left upper leg is positioned abnormal or displaced. What is your next action?

a. Help Sally inside to the nurse's office.

b. Call Sally's parent to pick her up.

c. Call 911

16. I feel prepared to respond to a playground emergency

1 2 3 4 5

Strongly agree Strongly disagree

17. I feel anxious a medical emergency might happen when the nurse is not available

1 2 3 4 5

Strongly agree Strongly disagree

18. I feel confident administering medications and epinephrine auto-injection to a student

1 2 3 4 5

Strongly agree Strongly disagree

19. I can apply a Sam Splint when needed to a noncomplex fracture.

1 2 3 4 5

Strongly agree Strongly disagree

20. I felt the health management classes were valuable at STJL

1 2 3 4 5

Strongly agree Strongly disagree

21. I have the following suggestions for future classes:

22. Questions/Comments

**Appendix D: Logic Model**

| Assumptions | Inputs | Activities | Outputs | Outcomes |
|---|---|---|---|---|
| - Improving faculty knowledge of school health management lead to improved student health outcomes<br>- Improving knowledge decreased anxiety | - Board of Education<br>- 3 school nurses from neighboring schools<br>- 5 school faculty staff | - Developed health management content material and simulation<br>- Developed pre and post survey<br>- Developed handout material for staff<br>- Developed virtual class<br>- Education provided during simulation | - School faculty pre and post survey administered<br>- Virtual class implemented<br>- Simulations administered | - Improved school faculty knowledge of health management and emergency response<br>- Improved anxiety of school faculty when school nurse was not present |