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Improving Epilepsy Monitoring Unit Training for Registered Nurses

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by

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Abstract

This quality improvement project was developed to increase the baseline knowledge of a group of registered nurses who work within a highly specialized in-patient healthcare setting, an Epilepsy Monitoring Unit (EMU). The increase in knowledge was trajected to decrease event reporting which would show improvement in this high-risk patient population's safety. The pre-education survey was dispersed to the participants, the registered nurses, to obtain a baseline knowledge level. There was then EMU-specific educational material made available for the participants. After the set time, the participants were then given a post-education survey to determine if their post-test scores could reflect a goal of a 25% increase in their EMU knowledge level. This percent increase would directly impact the number of patient events reported which would improve patient safety within the EMU setting. After the completion of the project's interventions, there was a 3% increase in EMU RNs' baseline knowledge levels and a 100% decrease in patient adverse event reporting during the monitoring phase.

Keywords: epilepsy education, patient safety, epilepsy monitoring unit, registered nurses, and seizure testing.

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Problem Recognition

The Epilepsy Monitoring Unit (EMU) is a specialized nursing care unit that prioritizes two main goals for every patient. Those goals include capturing the patient's events and maintaining the patient's safety. Patients of all ages are brought to the unit for different evaluations. Patients can be brought to the EMU for suspicion of epilepsy (diagnostic), for need of further management of their epilepsy, such as medication changes (Phase I), or for advanced studying of the patient's epilepsy for possible surgical intervention (Phase II). During a stay in the EMU, various efforts are made to induce a seizure, as the patient defines it. These efforts most commonly involve photic therapy, hyperventilation, anti-epileptic drug (AED) tapering, and sleep deprivation.

These tactics are specifically designed to create stress on the patient and induce their seizures for the purpose of gaining a conceptual understanding of how to treat and manage each patient's epilepsy. EMU is a high-risk environment in the hospital setting. Serious adverse events (SAEs) can easily happen in the EMU during the long-term monitoring (LTM) of these epilepsy patients. According to Rheims and Ryvlin (2014), some of the most common SEAs include seizure-related falls, injuries, fractures, and aspiration; postictal psychosis; and cardiorespiratory distress, including sudden unexpected death in epilepsy (SUDEP) and near-SUDEP. Many of these safety concerns relate to AED withdrawal and the physical and emotional stress the patients endure during their stay in the EMU. Maintaining patient safety and avoiding SAEs during their admission is the highest priority and might be jeopardized by suboptimal EMU organizations and a lack of staff education (Rheims & Ryvlin, 2014).

Problem Statement

Maintaining the patient's safety during their admission to the EMU is the staff's number one priority. In order to properly maintain the patient's safety during this high-risk admission, EMU nursing staff need to be proficient in understanding the EMU nurse's priorities, the EMU nurse's responsibilities, and how to promote patient safety. Over the last year, patient safety has been compromised on numerous occasions within the EMU in the facility. The compromise appears to stem from EMU nurses who lack experience and training in the basics of the unit. Medication errors have been made, priority interventions have been delayed, and the implementation of safety protocols has been prolonged. Sadly, every one of these instances has placed the patients at an increased risk for an SAE. Reporting of these event types are shown in Table 1.

Table 1

2022 RL6 Reports

Event Type	Reports
Medication Errors	4
Delayed Interventions	8
Nonadherence to Protocol and Policy	13
Compromise in Patient Safety	3
Miscellaneous	8

Due to the lack of education and training on nursing priorities, nursing responsibilities, and the policies and protocol for patient safety in the Epilepsy Monitoring Unit (EMU), there has been an increase in patient safety events over the last year. In 2022, there were 36 adverse patient events reports filed in relation to the EMU

and the nursing staff. These compromises in patient safety vary but could have all been prevented with the implementation of proper education and training for the registered nurses (RNs) of the EMU.

Literature Review

The purpose of this literature review is to compile a source of evidence-based practice information regarding the promotion of proper education and training for EMU nurses to increase patient safety and advance these implementations to create quality improvement for the unit. Databases such as PubMed, Wolters Kluwer, Science Direct, and ProQuest were utilized to collect 11 scholarly journal articles to support this quality improvement. Keywords searched in these databases include “video EEG monitoring”, “seizures”, “epilepsy”, “injury”, “patient safety”, “epilepsy monitoring unit”, “nursing”, and “education”.

Problem Impact

In 2008, healthcare professionals from the American Epilepsy Society (AES) convened to address the lack of consensus regarding patient care and patient safety in epilepsy monitoring units. The AES conducted a self-report survey to discover the characteristics of a respondent's EMU. The information gathered during this self-report survey included types and frequency of seizure observation, and types of injuries or adverse events that may have occurred as the result of an epileptic or a psychogenic nonepileptic seizure (PNES). During a 12-month period, 70 responses were received and were analyzed for this study. Commonly reported adverse events to include falls, status epilepticus, and postictal psychosis. Infrequently reported adverse events included pneumonia, cardiac arrest, fractures, and death. More than one-third of respondents cited

that patients may pull out or dislodge intracranial electrodes (Phase II). Through this review, it was suggested that these adverse events are related to gaps in the knowledge of protocols and safety precautions for the EMU staff. “Performance improvement projects can be used to track an organization's safety risks and encourage multidisciplinary approaches to enhance patient safety and clinical care” (Shafer et al., 2011, p. 504). The major limitation of this study was that the data utilized could only be from the EMUs that responded to the survey. The data may not be an accurate representation of safety concerns for all EMUs.

Rheims and Ryvlin (2014) conducted an observational review of information to see if a mutual factor could be blamed for SAEs in European, Australian, and epilepsy units across the United States of America (USA). The researchers collected data regarding seizure-related falls, injuries, fractures, and aspiration; postictal psychosis; and cardiorespiratory distress, including sudden unexpected death in epilepsy (SUDEP) and near-SUDEP. It was concluded that suboptimal EMU organization and staff education play the largest roles in the occurrence of SAEs. The most forthcoming limitation this study faces is a lack of high-level evidence for the development and dissemination of appropriate safety guidelines. EMUs create individualized plans of care for almost every patient upon admission. This study indicates there is a lack of current standing recommendations for the optimal organization of EMUs. With the proper guidelines in place, Rheims and Ryvlin (2014) surmise that evidence-based research would decrease SAEs in EMUs.

DeVries-Rizzo (2016) developed a survey that undertook 18 various factors such as EMU locations, types, nursing ratios, nursing roles, and other health resources. This

survey was then made available to nurses, physicians, and administrators in 29 Canadian EMUs. Survey results were collected and analyzed for each question. The survey showed that there was significant variability between the 29 EMUs related to the size of the units, open or closed wards, acceptable patient acuity, nurse-to-patient ratios, required nursing skill level, specialty nursing support, and EEG technician availability. These findings again reiterate the difficulty that lies with creating current standing recommendations for the optimal organization of EMUs. DeVries-Rizzo (2016) concluded that standardized safe care practices seemed dependent on the individual facility. A one-size-fits-all approach cannot apply to such a vast variability of EMUs. DeVries-Rizzo (2016) summarized that the underlying common trend was that nursing education and nursing best practice recommendations need to be developed with baseline EMU nursing competencies, skills, and knowledge in mind.

Atkinson et al. (2012) reviewed medical records and video electroencephalogram (EEG) of patients with epilepsy admitted to the EMU from December 1, 2008, to June 1, 2009. Data was collected on seizure type, onset, length, and frequency. Seizure-related falls, injuries, and adverse events were recorded. Data regarding the physical environment and treatment during seizures were also analyzed. Atkinson et al. (2012) found staff only responded to 40.6% of the events, or 69 out of the 170 events, for several reasons. To improve safety outcomes, protocols with detailed, outlined nursing care and procedures for continuous monitoring of patients by staff needed to be employed (Atkinson et al., 2012). While the researchers reviewed the event videos, it became clear that the education of some of the nursing staff was lacking. There was an obvious lack of knowledge of the EMU protocols seeing how the staff attempted to haphazardly employ

it. After inspection, it was brought to the researchers' attention that no formal training or testing was provided to nursing staff on how to employ the protocol. Some nurses on the unit did not realize there was a seizure protocol. It was concluded staff need to be formally trained and continually tested to ensure competency of standard protocols. Not only do standard protocols need to be set regarding the expected nursing and ancillary staff duties in relation to EMU patients to protect them from injury, but there is also an apparent need for the house staff to be formally trained in routine competency testing. Limitations of this study included the facility working solely with core EMU staffing, and no pediatric patients were a part of this study (Atkinson et al., 2012).

Problem Improvement

Seiler et al. (2012) conducted a quasi-experimental pretest/posttest one-group design that compiled with registered nurses with practice experience that varied from 2 months to 24 years. These nurses completed a pretest on seizure knowledge and the use of continuous EEG monitoring. They then attended a 4-hour education session that was followed by an immediate posttest and was then repeated in 1 month. "Although there was a slight decline in the mean score from the posttest to the 1-month follow-up, posttest scores were significantly better than the pretest score ($t = -15.093$, $p < .001$)" (Seiler et al., 2012, p.111). There was a strong positive correlation between increased years of experience and positive pretest scores, but after the intervention, no such correlation was evident. The overall outcome results demonstrated that an educational program improved the competency of nurses, and that this knowledge was sustained over time. A potential limitation of this study was that it was only conducted on intensive care-trained nurses.

Seiler et al. (2012) stated that more research is needed to demonstrate this intervention's effectiveness in other settings like the EMU.

Stecker and Stecker (2012) developed a problem improvement study to evaluate the impact of an educational program on the quality of care provided by nurses in an epilepsy monitoring unit by using an investigator-developed assessment tool. There were 25 nursing assessments that were quantified using a criterion-based rating scale with seven primary quality indicators. Pretest and posttest scores were compared, and a significant improvement was noted in the nurses' scores. Pre-education, the mean scores on the rating scale were 14.5 points (SD 2.1). Post-education, there was a statistical difference in scores 16. (SD1.6) ($p < .01$). With education sessions, the researchers were able to reinforce the units' original policies and protocols, and the nurses' epilepsy assessments became more consistent which in turn, improved patient safety. The biggest limitation of this study is the limited data about the quality of nursing care in an epilepsy monitoring unit, so the finding is at best short-sighted.

Perkins and Buchhalter (2006) decided to use the most recent research and focus on optimizing patient care in the EMU setting by creating training for the nurses that focused on nursing education, family education, medication administration, and communication. To improve nursing confidence and consistency, the education program for nurses working in the EMU was expanded. An orientation to the unit was established, a lecture by an epileptologist explaining seizures was offered, expanded education material was provided on the distinct types of epilepsy, the goals of seizure monitoring were clearly defined, the application of seizure monitoring to patient care was established, and an additional epilepsy education manual was provided to the unit's

nurses. Topics in the manual include admission procedures, personnel resources, seizure precautions, monitoring equipment, the ketogenic diet, and administration of medication. A Likert scale questionnaire, approved by the institutional review board, was sent to 84 nurses who worked full- or part-time on the unit. There was a documented 44% participation rate with the questionnaires. Of the respondents, 84% stated that the above interventions were helpful and promoted the nurses' confidence to improve patient safety. Careful attention to detail in the areas of unit design, nurse education, family expectations and education, medication administration, and communication are optimizing patient care in the EMU (Perkins & Buchhalter, 2006). A potential limitation of this study was that these interventions were completed on a pediatric population exclusively, which may not translate to the adult population.

In 2016, Sauro et al. conducted a systematic review to identify quality indicators for EMUs across the country. There were 34 candidate indicators abstracted from 135 studies for the review. The consensus was reached after two modified Delphi rounds for 25 quality indicators identified as "important". "Delivery of inadequate care places patients at risk for undesirable outcomes. Thus, there is a need to develop and examine quality indicators in every health care setting to ensure that patients are getting the best possible health care" (Sauro et al., 2016, p. 1771). However, Sauro et al. (2016) discovered that the development of quality indicators for EMUs is challenging due to a paucity of high-quality evidence and a lack of standards for the care of patients in EMUs. The 25 quality indicators were proposed to be made a priority for the determination of EMU staff in order to conceptually care for this epileptic population. The development of these quality indicators for EMUs is the first step in optimizing the quality and safety of

patient care (Sauro et al., 2016). The limitations of this study included broad reference to EMU staff versus the indicators being directly related to the nursing population. Due to the uniqueness that most EMUs encompass, it was difficult to determine if these indicators would be appropriate for every epilepsy unit.

Drazkowski et al. (2012) found through prospective surveillance that patient safety could be greatly improved by a simple concept of multidisciplinary team rounding. "Multidisciplinary safety rounds were incorporated into the regularly scheduled epilepsy surgery conference which included epilepsy neurology, neurosurgery, neuropsychology, EEG technology, radiology, and nursing" (Drazkowski et al., 2012, p. 1). During the 17-month time frame, there were 345 adults monitored for a total of 1,475 days;17 safety events were identified varying from fall prevention, potential medication errors, technical issues with EEG monitoring, prolonged focal motor seizure requiring IV medication, and issues with nursing seizure assessment. It was concluded that multidisciplinary safety rounds provided an opportunity for interprofessional education for all staff members and a safe, effective environment for the dissemination of information on patient safety. A major limitation of this study was that not all members of the multidisciplinary team would be able to participate in rounding because some members must stay within view of the patient monitoring system (Drazkowski et al., 2012).

Buelow et al. (2009) conducted a study that focused on the emphasis on patient safety during AED withdrawal. Two surveys were developed, one was for the physicians who practiced in the EMU setting and the other was for the nurses who practiced in the EMU setting. The physicians' survey was composed of 17 questions and the other survey included 26 questions for the nurses. Both surveys addressed protocols for medication

withdrawal, rescue procedures, patient observers, and safety issues. Astonishingly, both parties were lacking when it came to the evaluation of patient safety. This questionnaire brought to light the gaps in practicing patient safety, and it also highlighted the direct need for safety implementations that many EMUs are lacking. The survey study showed a wide variation in practice patterns, some of which raise safety concerns to the forefront of our EMU's priorities (Buelow et al., 2009). Again, this study was unit-specific and could potentially not apply to all EMUs.

According to Kwon and Jetté (2020), patient safety is most in jeopardy during the ictal and postictal phases of epilepsy monitoring. This is the most crucial time for EMU staff to implement testing to gain answers while maintaining the patient's safety as the number one priority. "The diagnostic process via the ictal and postictal examination is a refined and interactive process combining patient safety and eliciting information that has clinical significance" (Kwon & Jetté, 2020, p. 95). A consensus procedure was formulated via a modified Delphi approach based on expert opinion and experience of members of the task force. During the study, Kwon and Jetté (2020) identified gaps (redundancies, lack of rigorous postictal testing, not written to prioritize safety) in the staff's standardized EMU ictal and postictal assessment and developed a tool titled 2016 International League Against Epilepsy (ILAE) Consensus Standards. It was found that a generalized education intervention may have been inadequate for the goal of improving staff's competencies (Kwon & Jetté, 2020). The authors noted the importance of catering to every learning style when focusing on multi-interdisciplinary team members. It is vital that educational interventions accommodate different learning styles, include

mechanisms of immediate feedback, use competency-based evaluations to assess performance, and place a larger emphasis on self-directed learning (Kwon & Jetté, 2020).

Through the investigation of the listed journal articles, it is evident that there is a high potential for compromise in EMU patient safety. A common theme discovered in the scholarly articles listed above is there is a lack of knowledge and training for the EMU nurse, which places the EMU patients at a higher risk for an SAE. The research suggests that in order to properly maintain the patient's safety during this high-risk admission, EMU nurses need to be proficient in understanding the EMU nurse's priorities, the EMU nurse's responsibilities, and how to promote patient safety. These articles have indicated that through the proper EMU nurse training, patient safety has improved, and there is a greater potential to avoid SAEs.

Needs Assessment

Target Population

The intended target population of this project was the nurses who work the 6-bed Epilepsy Monitoring Unit located in Winston-Salem, North Carolina. The recent increase of patient safety events in filed Event Reporting System (RL6) forms, and direct observation by the project leader and facility management propelled the need for this quality improvement project implementation. The potential for improved patient safety was directly reflected in the post-education and training test scores.

For the RNs who work in the EMU (P), how did providing EMU-specific education and training (I), compared to no EMU-specific education and training (C), improve the nurses' EMU knowledge and ability to promote patient safety (O), over 3 months (T)?

Available Resources

EMU-specific RN education and training have been defined as a definite need to improve the RN's ability to promote and improve patient safety at the facility where the project was conducted. To provide the EMU RNs with the proper education and training, a pre-survey was conducted using Qualtrics, to gain a baseline of the EMU RN's current knowledge. After the scores were obtained, an educational and interactive PowerPoint was provided to the RNs for review. The educational PowerPoint had various learning styles incorporated for the EMU RNs to ensure that multiple learning styles were accommodated. Reading portions, interactive application sections, and video presentation portions made up the diverse presentation. PowerPoint software was made available to the project leader at no charge by the project leader's university and by the facility where the project was conducted. To allow the EMU RNs to apply their knowledge, a virtual simulation was created for them to walk through various seizure scenarios via a free Google Breakout Room Style Document. The interactive PowerPoint and virtual simulation were sent to all RNs via work email accounts for free and easy access. Any additional training such as Pediatric Advanced Life Support (PALS) or Advanced Cardiovascular Life Support (ACLS) Certification was available to all EMU RNs at no cost at the facility where the project was conducted. This training only required the coordination of the EMU RN's work schedule and the certification class dates. The post-survey was repeated on Qualtrics for data collection and evaluation.

Desired and Expected Outcomes

The desired outcome of this project was to promote specific EMU education and training for the nurses and promote awareness of their priorities and responsibilities. This

promoted increased patient safety and decreased patient events. After a baseline of the RNs' EMU knowledge was obtained, the education was presented to the EMU RNs. The education focused on what the priorities and responsibilities of the EMU RN are. The priorities of the EMU RN include capturing patient's seizure events and maintaining patient safety. Their responsibilities include maintaining the proper workflow of the unit, utilizing proper documentation, attending multidisciplinary rounding, continually revising, and individualizing each patient's plan of care per the EMU providers, performing appropriate seizure testing, and following EMU's policies and procedures.

The assigned PowerPoint walked the EMU RNs through these priorities and responsibilities in detail and provided directions should they seek additional information. After the education had been studied and the additional training had been received, a post-test was provided to assess if there had been an improvement in the EMU RN's knowledge. With improved knowledge, there should be an increase in patient safety, which leads to fewer RL6 submissions and fewer patient events.

Team Selection

The team for this quality improvement project consists of the project leader who volunteers to dedicate time to the project implementation and receives no compensation for the outcomes. The project chair was available to guide the project leader and provide support. The project partner was the unit manager. The project leader partnered with a high-power, high-interest partner, to assist with guiding the project's goals. The EMU nurses were monitored and consulted for progress during the implementation process and for any feedback from the project leader. The project partner agreed to assist the project

leader with prompting and encouraging the low and high-interest, high-power staff RNs to participate in the project's implementation phase.

Scope of the Project

This project was aimed at improving patient safety within the EMU of the hospital facility. The intended outcome was to enable EMU RNs to score at a proficient level on the post-intervention test. The objective of this project was for current and oncoming EMU RNs to gain a solid foundation in what their priorities and responsibilities are as an EMU RN. The project reveals that nurses' post-intervention test scores reflect an increase in their EMU knowledge of priorities and responsibilities and patient safety. Overall, this project was intended to promote and provide improved patient safety during high-risk admissions to the EMU. This project was not intended to be appropriate for other units outside of the EMU as education is formatted specifically for this unit. This project was not intended to prevent all patient safety events or SAEs unrelated to the EMU nursing staff.

Objectives and Timeline

Objectives

To ensure this project's success, specific, measurable, attainable, relevant, and time-based (SMART) goals and a timeline were composed to assist the project leader with staying on a set course. If the goals of the project can be identified, measurable, reasonably achievable, relevant to the issue at hand, and include a time frame from start to finish, the success of the project is exponentially compounded. Over a 3-month timespan, the EMU RNs were equipped to improve patient safety by decreasing adverse patient events in the EMU by the goal of 25% or by the actual 100% in relation to an

interactive PowerPoint and education simulations that reinforced the EMU nurse's priorities, responsibilities, and focuses on promoting patient safety.

EMU RNs were equipped to promote patient safety by increasing their baseline EMU knowledge by 25% from their initial pre-education survey score. This increase in baseline knowledge would have been evident through the pre-and post-surveys that will be completed through Qualtrics. The pre-education survey demonstrated where the EMU RN's current baseline knowledge lies. The interactive PowerPoint, virtual simulations, and achievement of ACLS and PALS certifications expound their knowledge and allow the RNs an opportunity to apply the information for long-term comprehension. The goal was for the post-education survey to demonstrate a 25% increase in the EMU RN's score, which would equip them to properly promote patient safety and decrease SEAs by 25%.

EMU RNs who participated in the project were prompted to complete all project steps in a timely manner. These prompts were delivered by reminder emails and by word of mouth directed to the individual participants by the project leader and the project partner over the 5 weeks. Receipt of education will be confirmed with all project participants to ensure a minimum of a 90% compliance rate with the project steps. In the event of an interference with the project education, the project leader was available by phone, email, and text to assist the participants in maintaining compliance goals.

Patient events that were targeted for the 25% decrease include all medication administration, seizure-related falls, unsanctioned interventions, actions that contravene the facilities' policies and protocol, and delayed interventions that result in harm reaching the patient. EMU RNs were instructed through educational interventions on how to properly manage or avoid these events. A running report was pulled by the project

partner that reflected the number of reports that were filed in the same time frame from the year prior and in the month, or 4 weeks after the interventions to assess the percent decrease that occurred within the allotted time frame.

Timeline

While SMART goals are essential to the success of the project's completion, a detailed and specific timeline is also imperative. The initial first 2 months were dedicated to establishing problem recognition in the EMU and conducting the needs assessment. The 3rd and 4th months were dedicated to identifying the goal of improving patient safety and the objectives of how to achieve the goal through this project. Months 5 through 7 were for theory, planning, and evaluation. At the end of month 7 through month 8, the Quality Improvement (QI) and Institutional Review Board (IRB) through Gardner-Webb University (GWU) process was initiated and completed. Then at the end of month 8 through month 10 the QI and IRB approval was submitted through the facility Atrium Health Wake Forest Baptist. Once QI and IRB approval had been obtained, the project leader's program interventions were implemented in the EMU over the implementation period.

All neurology staff RNs were asked to voluntarily participate in this project intervention. An instructional email was sent to staff explaining the process and intent of the project. The participants received informed consent and the pre-education survey through Qualtrics, and completion of the survey remained anonymous. Once their scores had been obtained, the project leader sent the interactive education PowerPoint to the participants at their work email addresses. The participants were given 1 week to complete the informed consent and the pre-education survey. After the first week, the

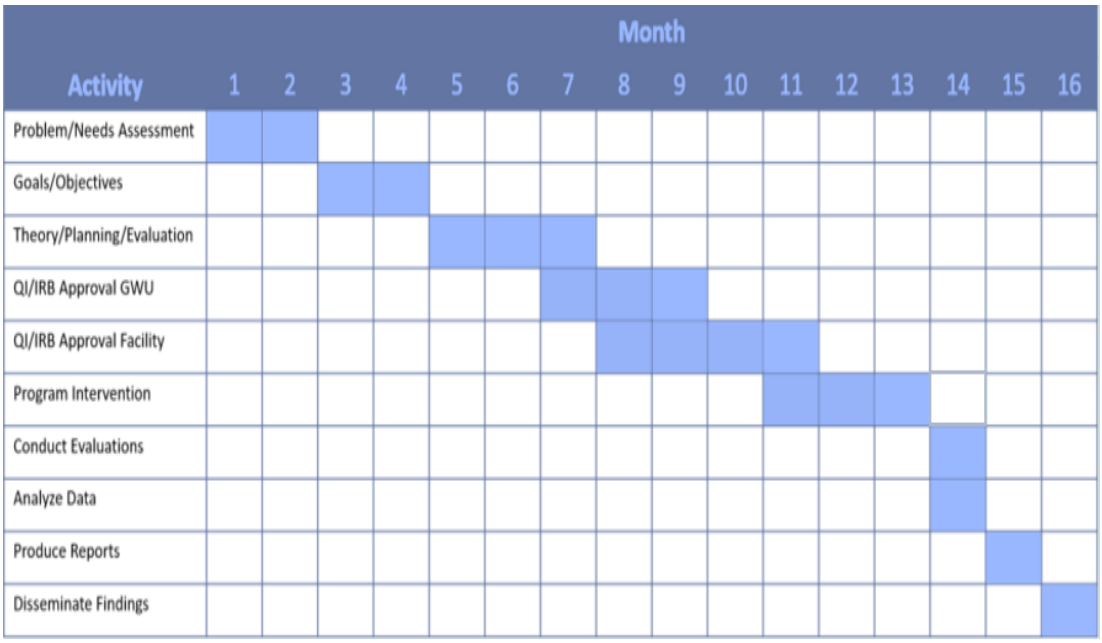
participants had 4 weeks to review the contents of the interactive presentation and the virtual simulations, which were sent to the participants' work email addresses. The simulation was not graded but was an opportunity for the application of the participant's knowledge. A debrief was added to the simulation that instructed the participant on the proper simulation interventions and the medical reasoning supporting the proper interventions. The participants were also asked during this time to obtain any certifications that they did not currently possess, such as ACLS and or PALS certification. The training days for these certifications were made easily accessible for the participants and reminders were sent to their email. During these 4 weeks, the participants then anonymously completed the post-education survey through Qualtrics.

The project leader allowed a total of 5 weeks for the pre-education survey, the various educational interventions, and the post-education survey. The remaining 4 weeks of the implementation phase were used to monitor for a percent decrease in SEAs. The data related to the occurrence of SEAs or lack of occurring SEAs during the last 1 ½ months was obtained from the project partner at the end of the time period.

The project leader then conducted an evaluation and analysis of the data collected from the project implementation phase. During month 15, the final project reports were produced and reviewed. At the end of the 16-month timeframe, all findings were disseminated through written and oral presentations by the project leader to the stakeholders. Figure 1.

Figure 1

Project Timeline



Theoretical Underpinning

To invoke quality improvement, a change must be made in an area that is currently deficient in comparison to the standard of care. Jean Watson is a nursing theorist who developed a grand theory of nursing titled, The Theory of Human Caring. Watson's nursing model emphasizes promoting health, preventing illness, caring for the sick, and restoring health. It focuses on health promotion, as well as the treatment of diseases. Watson believed that holistic health care is central to the practice of caring in nursing. She defines nursing as "a human science of persons and human health-illness experiences that are mediated by professional, personal, scientific, esthetic and ethical human transactions" (Gunawan et al., 2022. para 9). In the EMU, staff seek to promote the patient's best health and restore their quality of life by capturing the patient's events and utilizing evidence-based interventions such as surgery and medication therapy to

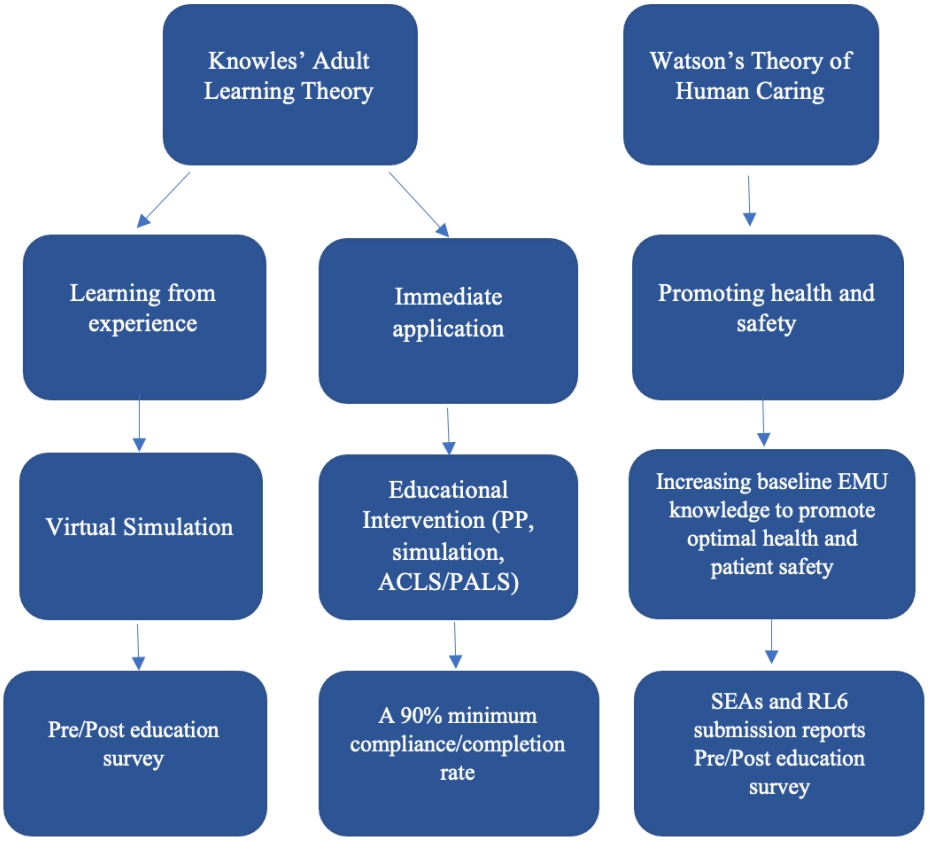
promote holistic care. With the recent increase in the SEAs, the project leader began to explore a quality improvement process that enables the EMU RNs to prevent harm from reaching the patient while making this holistic health promotion.

With Watson's theory at the heart of this quality improvement project, the intervention will also incorporate Malcolm Knowles' Adult Learning Theory to guide the framework for this process. "Educational philosophy and learning theory underpin all educational practices because they provide the conceptual frameworks describing an individual's acquisition of knowledge, skills, and attitudes to achieve changes in behavior, performance, or potential" (Mukhalalati & Taylor, 2019, p. 1). The foundation of Knowles' theory rests on Andragogy. According to Bouchrika (2023), "andragogy is an approach to learning that is focused on adult learners. The term was first coined by educator Alexander Kapp in 1833, and it has since been used to describe a variety of educational philosophies and methods" (para. 1). Knowles' theory promotes creative and effective approaches to learning for the adult participant.

Educational theories are an essential part of evidence-based educational practice because they allow the project leader to utilize and effectively implement proven interventions into their QI. Effective implementation comes from a conceptual understanding of different learning theories that can assist the project leader with the proper selection of the best strategies, learning objectives, assessment, and evaluation approaches, based on the goals of the project and environment for learning. The project leader should be able to integrate the participant's understanding and see improvement in their learning outcomes through the various interventions (Mukhalalati & Taylor, 2019). Figure 2 displays the C-T-E Diagram used for this project.

Figure 2

Conceptual-Theory-Empirical Diagram



Knowles' theory has six principles and the basic andragogical principles. The first is the principle of self-concept. Adult learners, unlike children, have a self-concept. This means that they are autonomous, independent, and self-directed. While working in the EMU, the RNs are often in an environment that has a certain level of autonomy and self-directed nursing judgment. In the EMU there is most often only one RN who assumes care for up to six EMU patients while operating and maintaining the flow of the unit. While the providers and EEG technicians frequent the unit, they are not held responsible for the timely and appropriate patient interventions as the EMU RNs are. This level of

independence requires a great level of responsibility and dedication to holistic health promotion.

The second principle is the principle of learning from experience. While experience is a rich resource for learning, the EMU RNs must be prepared for the often-critical situations that arise in the EMU. However, each patient's experience can be used as a teaching tool to guide the RNs in future situations. Adult participants learn from their previous EMU experiences. Thus, it is a good repository for learning. Each EMU RN can recall a patient situation where they were not prepared for the event at hand, but it is in these moments that the RNs realize their inadequacies and develop a willingness to improve their baseline knowledge to promote EMU patient safety.

It was these unpleasant experiences that sparked the EMU RN's readiness to learn. Readiness to learn is the third principle that Knowles presents. Bouchrika stated, "Adults tend to gravitate towards learning matters that matter to them" (Bouchrika, 2023, para. 13). Their readiness to learn things is highly correlated with Jean Watson's Theory of Human Caring. It is for the health promotion and holistic care of the patients that the EMU RNs strive to improve their baseline knowledge and decrease the number of SEAs and RL6 submissions related to the EMU.

While a readiness to learn is imperative, the adult participant could lose this knowledge over time if the newfound knowledge is not followed with an immediate application, which alludes to the fourth principle of immediate application. The interventions for the participants learning are for immediate applications rather than future uses. The problem-centric learning orientation of the adult participants will be put to the test through a timely application of their new baseline knowledge through the

virtual simulation that the project chair will create and deliver to the project participants. This will allow the adult participants to apply their knowledge and store the information for long-term use.

Bouchrika (2023) indicated that adults tend to be more motivated by internal personal factors rather than external coaxes and pressures. While the looming fear and dread of management write-ups, SEA reports, and RL6 submissions frequent the EMU RN's mind, it is the strong correlation to Watson's theory that is the true motivator for those who have the patient's well-being at the forefront of their work. The last principle that Knowles believes to be crucial to adult participant learning is the aspect of need-to-know. "Adult learners have the need to know the value of what they are learning and know the whys behind the need to learn them" (Bouchrika, 2023, para. 13). The EMU RN participants have become aware of the value that gaining a more proficient baseline knowledge holds. This is what satisfies their need-to-know assumption and enables their readiness and willingness to learn. Without this key factor, the project chair would expect to see a lack of participation and low interest from this predominantly high-interest high-power group of RNs. "In this view, it is by fiat that the learner is the real center of education. Hence, it is prescribed that educators accept and operate within this premise. Thus, educators should not really 'teach'. Instead, they should facilitate learning" (Bouchrika, 2023, para. 14).

Work Planning

Work planning is an essential part of any project no matter the scale of the project. Proper work planning allows the project leader to see the full picture of the project. It allows the leader to see the larger aspects all the way down to the detailed time

constraints that could impact the success of the project. There are many ways to organize a project to ensure its success, but for this project, it was determined that a Work Breakdown Structure would be the most beneficial for the development, management, and completion of this quality improvement.

Project Management Tool

The Work Breakdown Structure (Figure 3) is a project management tool that allows the leader to organize and break down the project in a step-by-step approach. The overall goal of the project was to improve Epilepsy Monitoring Unit training for the EMU nurses. To do this, there must be a focus on the subgoals that will promote the success of the overall goal. The subgoals included promoting patient safety, increasing EMU RNs' baseline knowledge levels by 25%, and decreasing SAEs and RLs submission rates by 25%.

Figure 3

Work Breakdown Structure

To obtain these three subgoals, there was a detailed process that had many time constraints to consider. Once the project received university and facility approval, the pre-education survey was sent out to the EMU nursing staff in January. A reminder email was sent to all the participants a few days after the survey had been sent. The responses were collected in 1 week, so that then the educational PowerPoint, Virtual Simulations,

and Post-Education Survey could be disbursed to provide training. Four days after the project leader had sent the educational PowerPoint, Virtual Simulations, and Post-Education survey another reminder email was sent out to all the participants. The staff was given 4 weeks to review the contents of this educational intervention. The project leader sent out a reminder email 1 week after the dispersing of the materials to remind participants of the timeline. The post-education survey was sent to the EMU nursing staff to be completed within the same 4 weeks dedicated to the educational PowerPoint and virtual simulations opportunity. The post-education survey was made available after the completion of the education material and closed at the end of week 4 to allow sufficient time for the monitoring phase. The monitoring phase took place the following 4 weeks after the last phase of the intervention period closed. Following the monitoring phase, the project leader collected the remaining data and began the analysis process and organization for the dissemination of the project's findings during the spring semester.

Cost/Benefit Analysis

To promote facility approval and limit potential barriers to this project, the project leader sought to avoid placing financial responsibilities on the facility. Therefore, as listed above, the available resources that were utilized were all readily available resources that did not cost the facility any additional monetary expenses. The fixed cost included twenty 8.5 by 11-inch laminated quick reference guides. The projected cost for the guides ranged from $60-$80. The project leader created, printed, and laminated the quick reference guides and placed them in the EMU for the staff's convenience. This was the only projected fixed cost that the leader was responsible for. There are no variable costs for this project.

Benefits of this project included decreasing SAEs and RL6 submission rates. When considering the commonly reported safety events such as medication errors, delayed priority interventions, prolonged implementation of proper safety protocols, and seizure-related falls it is difficult to quantify an exact financial benefit from decreasing the various safety events. Therefore, the project leader found data to support the benefits of preventing safety events exclusively related to falls. Dykes et al. (2023) found that over a 6-year period, the average direct cost of a fall was $35,365 in the various studied facilities related to injurious and non-injurious falls. After staff interventions had been made, the researchers found that there was an average of $14,600 in net avoided costs per 1,000 patient days (Dykes et al., 2023). When considering the project's fixed cost amount ($60-$80), in comparison to the benefit of decreasing SAEs and RL6s just related to falls, there is $11,800 of potential revenue that the EMU could obtain per 1,000 patient days. Evidence suggests that the potential benefit of this quality improvement project far exceeds the cost of project implementation. A summary of the cost/benefit analysis is shown in Table 2.

Table 2

Cost Verses Benefit Analysis

Item	Cost per Unit	Projected Units	Time	Total
		Fixed Cost		
Quick Reference Guide	$3-4/guide	21	-	$60-$80
Staff Training	Mean Salary $30	21	4 hours	$2,520
		Benefits		
Decreasing SAEs/RL6s related to falls	$14,600 (Per 1,000 patient days)	1	-	$14, 600

Item	Cost per Unit	Projected Units	Time	Total
		Potential Revenue		
				$11,800

Evaluation Plan

To evaluate the effectiveness of the QI project's interventions, a quantitative method to gather data for comparison via a survey tool and a chart review method was utilized. The quantitative data was collected and analyzed for a percentage of increase. The QI interventions production of any percentage of the increase reflected an improvement, but the goals of this project were a 25% increase from the pre-education survey score compared to the post-education survey score and a 25% decrease in the number of reported safety concerns in the post-intervention time period compared to the pre-intervention time. A survey tool that has been previously published by the United States Department of Veterans Affairs Epilepsy Centers of Excellence was utilized for this project. The tool was free to use and included 18 questions that were modified to fit the needs of this project by including an additional three questions specific to the EMU where this project was conducted. The tool was validated by the Epilepsy Centers of Excellence, (2020) and the additional three questions were reviewed for face validity by the DNP project leader and project faculty chair. The pre-and post-education survey's overall grading system will be out of 100 possible points. Each question was graded as an all or no-credit question and each of the 21 questions will be worth 4.76 points.

The survey questions were deployed using Qualtrics software, and a link was sent to the participants' facility email accounts. The goal of the tool was to gain a baseline knowledge level of the nurses who work in the facility's EMU, so it could be determined

if the interventions made a quality improvement in the EMU nursing staff. The survey included 21 questions in multiple-choice, multiple-answer, true/false, and ordering formats. This survey tool assessed the participants' knowledge of the goals of an EMU admission, and the nurses' knowledge of the unit's policies and protocols. It tested their understanding of basic seizure types and common seizure semiology, and it evaluated if their priorities as an EMU nurse are most appropriate for the given situation. This survey tested the participants' critical thinking skills, and it collected data on the extent of their knowledge of the unit's seizure testing policy. The Epilepsy Centers of Excellence formulated specific questions for 2020 (See Appendix).

With improved knowledge, there was an increase in patient safety in the EMU, evidenced by decreased safety reporting post-intervention. This data was collected during the last 4 weeks of the implementation phase, the monitoring phase. After this time frame, the project leader obtained a safety report review from the project partner reflecting the 4-week monitoring phase to confirm there were fewer RL6 submissions filed compared to the pre-intervention phase. This quantitative chart review data was used to determine that there was a decrease in the number of safety concerns in the Epilepsy Monitoring Unit. This numerical data indicates that there has been an improvement in patient safety.

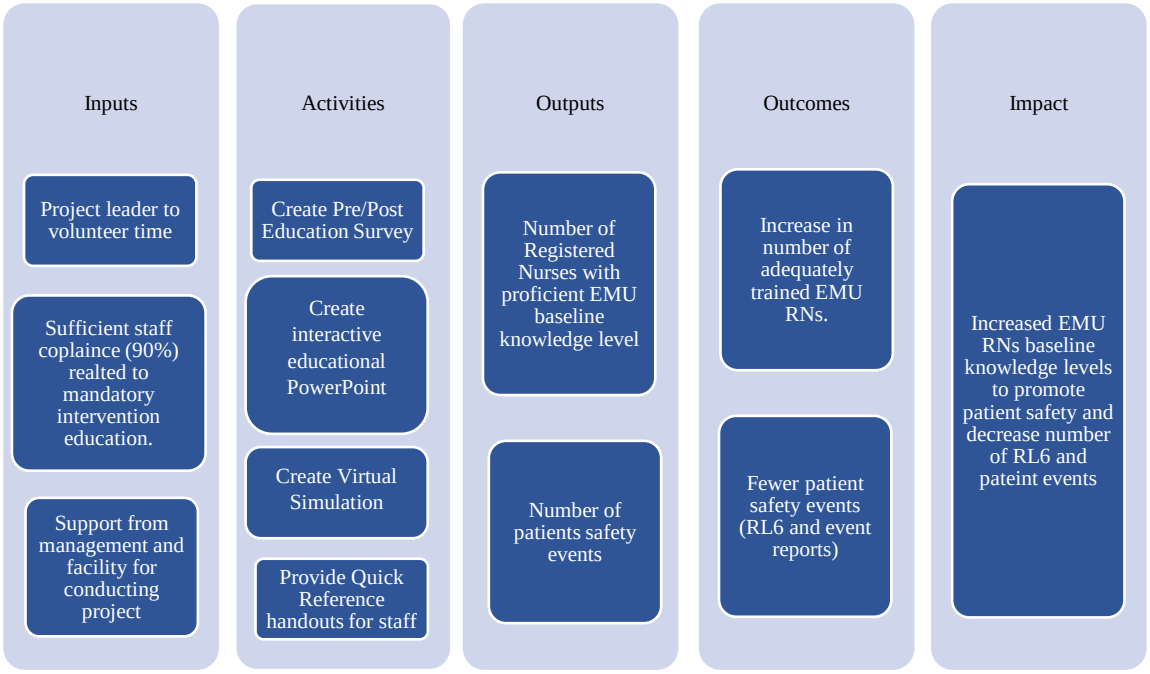
The two quantitative evaluation tools, the survey tool, and the chart review tool were appropriate evaluation tools for this QI project due to the definitive data that reflected a change that took place. The software was feasible for the project leader and the project chair to both collect and develop for a report. The chart review was an easy-to-access report that was run by the project partner and given to the project leader at the

appropriate time. Both tools presented no concerns related to reliability at face value or consistency. Both survey tools were predicted to create a positive and acceptable impact on the patient population in the EMU. Both tools utilized for this project were approved by the project chair and deemed appropriate with their development constructed and compared to the evaluation tool standards as mentioned in Zaccagnini and Pechacek (2021).

A logic model (Figure 4) demonstrates the relationship between activities and evaluation of this QI project. The input includes the project leaders' volunteer time that has been dedicated to this project's success. The inputs must also include sufficient staffing compliance with the interventions, a 90% compliance rate, and support from the facility for conducting the project. Activities include the creation of the pre-and post-education survey, the creation of the interactive educational PowerPoint, and the development of virtual simulations. Outputs consist of the number of nurses with proficient EMU baseline knowledge levels and the number of patient safety events. The outcomes of the proposed plan include an increased number of adequately trained EMU RNs and fewer patient safety events. The last factor to consider from the logic model is the impact of the project. The impact of this project is increased EMU RNs' baseline knowledge levels concerning EMU nursing priorities, responsibilities, and unit policies and protocols which will promote patient safety and decrease the number of RL6 and patient events.

Figure 4

Logic Model



Project Implementation

This project received university Quality Improvement (QI) and Institutional Review Board (IRB) committee approval in the late months of 2023. The project was then presented to the facility's IRB committee to obtain approval. After the development of protocol documentation, the project leader received facility approval for the project to begin implementation in late 2023. However, the initiation of this phase was strategically postponed until the start of the new year due to a large education load being placed on the participants for routine mandatory education. The implementation phase began in January of 2024. The active implementation phase extended over 36 days and ended in February 2024. Directly after the completion of the active implementation phase, a 4-week monitoring phase was initiated to observe RL6 report submissions within the EMU related to nursing staff. This monitoring phase was concluded in March of 2024.

Threats and Barriers

There were many barriers and threats to this project's success. While none of these obstacles immobilized the project, many had negative impacts on the outcomes and the overall data. As mentioned, the project's implementation was postponed due to an unexpected educational load being placed on the nursing staff that required facility education. It was so determined that to obtain the highest participation rate, the project needed to be implemented when there were no other looming obligations, such as mandatory education modules. The project leader, in conjunction with the facility manager and the Project Chair, deemed it appropriate to delay implementation until January 2024 in an effort to avoid low compliance rates.

During this same phase of pre-implementation, a threat that compromised the project's original timeline was introduced. This threat was related to the education delivery software that the facility utilizes for routine education and that the project leader had planned to incorporate for the distribution of the project material. The pre-education survey, educational PowerPoint, Virtual Simulations, and post-education survey were to be uploaded into the HealthStream software in the form of modules and dispersed via the participant's HealthStream accounts. This mode of delivery was altered when it was suddenly determined that the project's material was not deemed compatible with the HealthStream software. Since this threat was presented within a few days of implementation, the project leader and chair constructed amendments to the protocol. Amendments were made in regard to a software change from HealthStream to Qualtrics along with a condensed timeline. The project leader obtained IRB approval from both the university and the facility for the protocol amendments.

This software change affected the project's means of availability to the participants and created technological challenges during the active implementation phase. After the approval of the change in protocol, the project was sent out to the participants in Qualtrics via their work emails versus within the HealthStream software. This utilization of Qualtrics triggered many firewalls when participants would attempt to complete the material on facility computers. The project leader assisted participants with troubleshooting many of the technological challenges and recommended the material be completed outside the facility domain if error messages were received. No technological errors were reported to the project leader from the utilization of the participants' personal computers.

The software change triggered an additional threat to the project's success in the form of the impending change from mandatory education to optional education. When the amendment to the protocol was introduced and the software was converted from HealthStream to Qualtrics, there was a concern for the participants' anonymity. With the facility's education system no longer an available resource, there was no way for the facility manager to regulate the data for the project leader in a way that would ensure the privacy and protection of the participants and their data. Therefore, the project had to be dispersed in a manner that all collected data would be anonymous, and there would be no way to enforce a mandatory completion and there would not be a means to assess which participant had completed the material and which had not. With this in cogitation, the completion of the education and surveys were changed from mandatory to optional with the permission to use data still being indicated via the informed consent.

The now-optional participation generated responses from several of the participants, but the overall compliance rate was below the project's target percentage of 90%. This finding was likely due to the elective nature of education. Another factor that could have contributed to a decreased compliance rate was higher priority education. Despite the project leaders' best efforts, during the educational material disbursement and post-education survey, the facility announced another mandatory education module which was a system-wide Electronic Medical Administration Record (eMAR) Software merge. This merge training took professional priority for the participants. This is the probable cause of a decrease in compliance rate in the post-education survey versus the pre-education survey.

Another factor to consider when contemplating the decreased compliance rate and diminished data from the post-education survey was the overall length of the second educational module. The second portion of the project contained the educational PowerPoint presentation, the Adult and Pediatric Virtual Simulations, and the 21-question post-education survey. When analyzing the data from Qualtrics, it was apparent that many participants would not complete the entire post-education survey after reviewing the educational materials which led to incomplete responses and diminished data for analytical utilization.

Monitoring of Implementation

During implementation, there were scheduled emails that were periodically sent out to the participants. The emails were sent to update the participants when a project module was released to them, when a module was closing, and when the module had closed. There were also reminder emails sent out to the participants routinely to notify

them how many days were left to complete the material in a timely manner and of upcoming certification classes like PALS.

The project functioned off a flexible timeline that allowed for the completion of the project in a timely manner. The implementation and monitoring timelines were completed as planned and the data was collected and analyzed quickly after collection.

The project leader collected all the data regarding the pre- and post-education survey scores during the implementation phase. The facility manager collected the RL6 and SAE report data from the monitoring phase and provided it to the project leader for analysis. The project was concluded in the Spring of 2024.

Interpretation of Data

In this project, there was a relatively small sample size of 21 participants who were staff nurses trained to work in the specialized unit, the EMU. For the pre-education survey, there were a total of 17 recorded responses. However, out of the 17 responses, 5 were incomplete responses and one participant opted to withhold their data from utilization. This provided the project leader with 11 responses for baseline knowledge level analysis. For the pre-education survey, 17 of 21 participants responded resulting in an 81% compliance rate. For the post-education survey, there were a total of 13 recorded responses out of the possible 21 which resulted in a 62% compliance rate. Of the 13 responses, 9 were incomplete responses, which provided the project leader with 4 responses to utilize for data analysis. When considering the incomplete responses within both surveys, these data points were discarded due to the missing data and were not utilized for data analysis.

The survey data was anonymously collected and automatically stored within the password protected Qualtrics software. The facility manager collected the event reporting data, removed all identifying information, and sent it to the project leader. The pre-education event reports were taken from early 2023 to be the control data. The post-education event reports were closely monitored during the implementation phase, February 2024 through March 2024, recorded, all identifying information removed, and sent to the project leader for analysis.

The pre-and post-education survey tools were scored out of 100 possible points. Each question was graded as an all or no-credit question and each of the 21 questions was worth 4.76 points. All recorded complete pre-and post-survey scores were averaged to obtain the aggregate mean, median, standard deviation (SD), and range from pre-survey and post-survey scores. Then a percent change was calculated. Because of the lower number of post-survey responses and one outlier score of 57, the median is more reflective of the change between scores. Table 3.

Table 3

Pre-and Post-Education Knowledge Scores

	Pre-education	Post-education	Percent Change
n	11	4	
Mean	78.76	77.35	-2%
Median	80.92	83.30	+3%
SD	7.49	13.67	
Range	23.8	28.56	

Note. Percent change rounded to the nearest whole number.

When analyzing pre- and post-education scores, it was evident that there were low and high missed questions. On the pre-education intervention, the EMU RNs scored high on questions 3-5. These questions draw from an epilepsy semiology knowledge basis. On question 3, 7 of the 11 participants responded correctly. On question 4, 9 of the 11 participants answered appropriately. This trend was also seen in question 5, where 10 of the 11 participants responded correctly. Inversely, question 13 was a highly missed question on the pre-education survey. This question relates to seizure testing and unit policies. It was evident that the participants were unfamiliar with the proper interval for seizure testing. This was determined by 9 of the 11 participants answering incorrectly and choosing answer choices that incorporated every-hour assessments or only assessing the patient once. However, when analyzing the post-education survey there is a potential for a knowledge gap to still exist. This possible gap was noted during the reanalysis of question 13 and analysis of question 15. Question 13 showed that 3 of the 4 respondents still felt that they only needed to complete seizure testing once or every 30 minutes even when the patient was still post-ictal. While the number of responses varied from the pre- to post-education survey, question 15, dealing with seizure testing and policies, became a high miss question in the post-intervention evaluation. For this question, 3 of the 4 participants responded incorrectly and did not recall the proper seizure orientation questions to ask a post ictal patient.

The quantitative chart review tool demonstrated all reported pre- and post-education RL6 reports related to nursing staff in the EMU. After the data was provided to the project manager, the results were totaled and compared to assess the percent change (Table 4). The percent change was calculated and showed a 100% decrease in RL6

reports filed when comparing the pre-education period to the post-education period. An important factor to consider is that the monitoring phase only demonstrates a 4-week snapshot of the post-intervention period. Therefore, this 100% decrease could be related to the short monitoring phase, the staffing of the unit during those 4 weeks, or the seizure semiology of the patients admitted during the phase.

Table 4

Pre-and Post-Education Event Reports (RL6)

Pre-education Event Reports	Post-education Event Reports	Percent Change
February – March 2023	February – March 2024	
7	0	+100%

The goal impact of this project was to increase EMU RNs' baseline knowledge levels by 25% concerning EMU nursing priorities, responsibilities, and unit policies and protocols which will promote patient safety and a 25% decrease in the number of RL6 and SAE reports. The quantitative data collected during this project did not reflect a 25% increase in the EMU RN's baseline knowledge level. When we analyzed the pre- and post-education score median, with respect to the post-education outlier score, there was a 3% increase in the post-intervention scores. This increase was not the anticipated 25% increase in baseline knowledge levels but does represent a positive change. Due to the nature of aggregate data and the lack of the ability to ensure the participants completed the entirety of the interventional education prior to taking the post-education quiz, it is difficult to determine if the RL6 data is multifactorial, but after the 3% increase in EMU RN's baseline knowledge levels, a 100% decrease was observed during the post-

intervention monitoring phase. It is imperative to recollect that these numbers represent aggregate data and only apply directly to the EMU.

Process Improvement Data

The outcomes of this project were not as originally expected. There was not a 25% increase in EMU RNs' baseline knowledge level, but instead a 3% increase from the pre-education survey to the post-education survey. This meager percentage increase may be due to extenuating factors affecting the implementation phase. However, instead of the planned 25% decrease in patient safety events, there was a 100% decrease in patient safety events, which was reflected by the percent decrease in RL6 and patient event reporting in the EMU after the project's intervention.

As the project leader, it is reasonable to deduce that because of this project, there has been a change in the staff's awareness as to what their priorities, their roles, and their responsibilities are as EMU RNs. This project has also changed the perspective of the stakeholders within the facility to show them the need that is still present and necessitates attention within the healthcare center. For some EMU RNs, this project may have not improved their baseline knowledge level because there was not a knowledge basis to be improved. This education may have provided that initial step in the process by determining where the knowledge gap lies among the EMU staff

The impact of this project was a 100% decrease in patient safety events which, in turn, improved patient safety within this high-risk specialized patient population. Although this change cannot be directly attributed to this project, this project may have been one of the contributing factors to this impact. By improving patient safety, this project also decreased hospital spending on decreasing patient events and RL6s related to

medication errors, delayed priority interventions, prolonged implementation of proper safety protocols, and seizure-related falls. Just related to falls, there is $11,800 of potential revenue that the EMU could obtain per 1,000 patient days with this 100% decrease in patient event reports post-project intervention. Evidence suggests that the confirmed benefit of this quality improvement project far exceeds the cost of project implementation.

While this project will need to be modified to be compatible with facility educational software, this project education material should be added to the onboarding curriculum for new hires. This material should also be utilized for periodical review and added to the yearly mandatory education modules. In the future, there could be a longer implementation and monitoring phase for additional data points to be collected and trended to assess for long-term quality improvement. By merging this education with the facilities' educational software, it would provide the stakeholders with the ability to analyze paired data versus the aggregate data that was utilized for the purposes of this project. Paired data would provide a better measurement of each participant's knowledge level seen in the pre-education survey and knowledge gain seen in the post-education survey by comparing the joined scores. By making this education required, the stakeholders could also promote higher compliance rates. While the goal compliance rate of 90% was not achieved during this project, the pre-education survey ended with an 81% compliance rate, and the post-education survey ended with a 62% compliance rate.

The implications of the data are vast and varying. Post-education scores may have been lower than expected due to many factors, but most likely could be the length of the second education module. In the data analysis portion of the project, it was found that

after the participants accessed the virtual simulations, they would often close the module prior to completing the post-education survey, most likely related to time constraints. This premature closing of the module not only prevented the completion of the module, but it created large quantities of incomplete participant responses, which were unusable data for analysis. This poor response rate led to poor outcomes and the project fell short of fulfilling the goal of increasing EMU RN's baseline knowledge levels by 25%.

While this quality improvement project presented many challenges, it influenced professional growth, nurtured personal performance goals, and inspired professional and personal empowerment to promote and pioneer quality change for the future. This project did not meet all the subgoals including an increase in EMU RN's baseline knowledge levels by 25%, but it did reflect a positive 3% change and a 100% decrease in inpatient events and RLs submission rates. While the optimal range of improvement was not obtained, any percentage of positive change will reflect a positive impact on patient safety. It is evident through this data that the promotion of patient safety was striven for, and it was achieved. With the completion of this quality improvement project, the EMU RNs are now able to function at the highest level of their roles, by accentuating their nursing responsibilities and priorities. They are better equipped to capture patient events and maintain patient safety during their high-risk admission. The future patients of the EMU will benefit from multiple perspectives from this positive change that has taken place within this specialized nursing care unit.

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Appendix

2020 Epilepsy Centers of Excellence Formulated Questions

1. What do VEEG/LTM/EMU stand for?
    a. Virtual Electric Genome/Lumbar Tensile Monitoring/Electric Monitoring Unit
    b. Visual Estimation Gustatory/Laser Temporal Monitoring/Estimation Monitoring Unit
    c. Video Electroencephalogram/Long-Term Monitoring/Epilepsy Monitoring Unit
    d. Validation Epilepsy Genetics/ Lengthening Testable Monitoring/Essential Monitoring Unit

2. What is the purpose of the VEEG/ LTM/EMU? Select all that apply.
    a. Identify and characterize seizures.
    b. Localize the origin of seizures in the brain.
    c. Diagnose non-epileptic seizures.

3. In 2017, the Epilepsy Classifications were updated. What is the new term for partial seizures?
    a. Simple motor seizures without impaired awareness
    b. Focal seizures with and without impaired awareness
    c. Complex partial seizures with impaired awareness
    d. Partial temporal lobe seizures

4. How does a generalized seizure differ from a focal seizure?
    a. In a generalized seizure, the patient is always conscious, while in a focal seizure, the patient is always unconscious.
    b. A generalized seizure always begins with an aura, while a focal seizure always happens with no warning.
    c. Generalized seizures begin on both sides of the brain, while a focal seizure only begins on one side of the brain.
    d. There is no difference between generalized and focal seizures.

5. What is a psychogenic non-epileptic seizure?
    a. A psychogenic non-epileptic seizure is a spell that resembles a seizure, but it is not
    b. caused by abnormal electric discharges in the brain.
    c. A psychogenic non-epileptic seizure is a spell that is caused by a side effect of taking an anti-epileptic medication.
    d. A psychogenic non-epileptic seizure is a spell that is caused by a metabolic imbalance.
    e. A psychogenic non-epileptic seizure is a spell that is caused by liver problems.

6. Which is NOT a method used to provoke seizures in the EMU?
    a. Sleep Deprivation
    b. Administration of Placebo Drugs
    c. Titration Down of their Anti-Epileptic Drugs (AEDs)
    d. Photic Stimulation and Hyperventilation

7. Which of the following SHOULD be done to make the patient's room as safe as possible? Select all that apply.
    a. Put the bed at a low height.
    b. Have oxygen ready with a new cannula.
    c. Clear clutter and unnecessary equipment from the room
    d. All the above

8. The following action/actions SHOULD be taken immediately when a patient is actively having a seizure:
    a. Place a bite block in their mouth.
    b. Call the patient's nearest family member.
    c. Hold the patient down.
    d. Place the patient on their side and call a coworker for assistance.

9. If a patient is having a tonic-clonic seizure, the following action or actions SHOULD be taken: Select all that apply.
    a. Roll the patient on to their side.
    b. Carefully suction secretions from the side of their mouth and apply the nasal cannula.
    c. Assign someone to notify the MD.
    d. All the above

10. True or False? When a patient is having a generalized tonic-clonic seizure, you should always place something in their mouth to prevent them from swallowing their tongue.

11. Which of the following are NOT part of a seizure protocol upon admission to the EMU?
    a. Rescue Medications
    b. Room set up with seizure safety measures in place.
    c. When to call a physician.
    d. Determining when the patient can be discharged.

12. Please identify which question is part of the patient's seizure assessment.
    a. “Are you going to have another seizure?”
    b. “What is your name?”
    c. “Would you like to use the bathroom?”
    d. “Would you like me to call a family member?”

13. How often SHOULD the patient's seizure assessment be performed?
    a. The seizure assessment should be done every minute until the patient returns to baseline.
    b. The seizure assessment should be done every 15 minutes until the patient returns to baseline.
    c. The seizure assessment should be done every 30 minutes until the patient returns to baseline.
    d. The seizure assessment only needs to be done once.

14. Where should the RN’s seizure assessment be documented?
    a. On a scratch sheet of paper
    b. On the change of shift report
    c. On the “Seizure Assessment” template or a similar note in CPRS
    d. On the “EMU Assessment” folder on CPRS

15. Please identify which question is part of the patient's Seizure Assessment, and SHOULD be
    a. asked when the nurse suspects an event is starting:
    b. "Are you going to have another seizure?"
    c. "What is your name?"
    d. "Would you like to use the bathroom?"
    e. "Would you like me to call a family member?"

16. The following item or items is/are included in the documentation of the patient's seizure: Select all that apply.
    a. Date and time of seizure
    b. Duration of the seizure
    c. A description of the seizure and the aura and postictal phase, if applicable
    d. All the above

17. Upon encountering a patient experiencing a non-convulsive event or without impairment of consciousness (for example, they press the seizure button because they are having an odd feeling, the patient appears to be fumbling with their equipment, the patient is demonstrating chewing movements, and rubbing his fingers together, and exhibiting confused speech, etc.), the nurse SHOULD do the following: Select all that apply.
    a. Pull back the bed sheets.
    b. Take note of the time the event started.
    c. Perform the language and memory test.
    d. Reassure the patient.
    e. Stay with the patient and call a team member to the room to assist.
    f. All the above

18. After having a seizure, a patient becomes confused and begins trying to get out of bed. Do you
    a. call for help in holding the patient down?
    b. apply restraints (and get the restraint order later)?
    c. let the patient sit up and the side of the bed, assess their strength & readiness, and/or
    d. assist the patient to the bathroom?
    e. remain with the patient until he or she returns to their baseline mental status?
    f. C and D

Additional questions were added to assess unit-specific knowledge levels. The questions include:

19. In the event of a tonic-clonic seizure, what is the EMU nurses' priority? Place in correct order beginning with the first action.
    a. Maintain a clear airway.
    b. Assess oxygen saturation level.
    c. Monitor the patient's blood pressure.
    d. Prevent them from falling.

20. The EMU RN responded to a "push button" event. Upon entering the room, the nurse assesses the patient and determines that the patient is having a tonic-clonic event. The nurse goes to the bedside and nursing priorities are implemented. After 5 minutes, the patient is still convulsing and the nurse notices that the patient's oxygen saturation is 88% on a 6L nasal cannula. What will the nurse do next?
    a. Get the Ambu Bag from the code cart.
    b. Leave the room and get a non-rebreather for the patient.
    c. Have a co-worker retrieve a simple mask.
    d. Increase the oxygen to 10L via the nasal cannula.

21. A patient has been admitted to the EMU as Phase I to characterize a new semiology. Due to the description of the new semiology, the patient is determined to be a fall risk. While assisting the patient to the restroom, the patient reports having an aura of déjà vu and feelings of weakness. Which action will the nurse perform next?
    a. Continue assisting the patient to the toilet and have them sit down.
    b. Initiate the push button for additional assistance.
    c. Assist the patient down on their side and place a pillow underneath the head.
    d. Assess if the patient took their seizure medication this morning before coming in.