Increasing Prevention and Recognition of Delirium in a Non-ICU Acute Care Population

Anne Gembrowski
Grand Valley State University

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Increasing Prevention and Recognition of Delirium in a Non-ICU Acute Care Population

Anne Gembrowski

Kirkhof College of Nursing

Grand Valley State University

Advisor: Marie VanderKooi, DNP, MSN, RN-BC

Project Team Members: Sandra Spoelstra, PhD, RN, FGSA, FAAN,

Nicole Wills, MSN, RN, Nancy Bekken, RN, MS, CCRN

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Abstract
Delirium is associated with increased mortality, nosocomial complications, increased length of hospital stay, and greater chance of readmission, increased hospital costs, and a need for skilled nursing aid after discharge from the hospital. In a hospital, delirium can affect up to 50 percent of older patient 65. The solution is to prevent delirium from occurring and to regularly screen for its presence. The purpose of this paper is to explore the best prevention strategies and screening tool for delirium and to successfully implement a delirium bundle on a medical surgical unit. The question this paper attempts to answer is if implementation of a delirium bundle will decrease adverse patient events such as falls, restraints, and safety attendant use. The goal of this quality improvement project is to increase use of delirium prevention techniques, increase use of a screening tool, and to decrease adverse patient events. The quality improvement project will take place on a neuroscience medical surgical unit which does not have a delirium policy or procedure in place. Nursing staff will be educated on delirium, its prevention, and the Confusion Assessment Method (CAM) for Intensive Care Units (ICU). After education, nursing staff will be expected to implement learned techniques. Pre-data will be collected to compare to post data regarding prevention techniques, use of the CAM-ICU, and overall rates of falls, safety attendants, and restraint use. It is expected that falls, restraints, and safety attendant use will decrease, and delirium prevention techniques will increase. Current nursing practice will change by implementing the CAM-ICU, which can lead to earlier detection of delirium.

Keywords: delirium, prevention, recognition
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Increasing Recognition and Prevention of Delirium in Non-ICU Acute Care Populations

Introduction

Delirium is an acute neurological change regarding cognition and attention which can manifest in hospitalized patients (Inouye, Westendorp, & Saczynski, 2014). The altered mental status affects as many as 50 percent of older individuals, 65 years and greater, when admitted to the hospital. Delirium is present when an individual experiences changes in mentation, memory, thinking, attention, behavior, and perception of a situation. The presence of delirium is common in the hospital setting because patients undergo abnormal procedures such as surgery, infection, medication changes, dehydration, and isolation. The setting of a hospital can cause acute confusion and alter a patient’s mentation, particularly in the elderly (Inouye, Westendorp, & Saczynski, 2014).

Delirium has a higher incidence and prevalence in the intensive care units (ICU) when compared to a medical surgical unit (Inouye, Westendorp, & Saczynski, 2014). The ICU has a higher prevalence and incidence due to intubation, sedating medications, and frequent stimulation. The prevalence of delirium in the ICU is 7 to 50 percent and incidence is 19 to 82 percent. While prevalence of delirium in a medical surgical unit is 18 to 35 percent and incidence is 11 to 14 percent (Inouye, Westendorp, & Saczynski, 2014). Although delirium occurs less often in a medical surgical unit, may have a lasting effect on a patient.

Although an acute illness, delirium can have lasting effects on a patient (Inouye, Westendorp, & Saczynski, 2014). Delirium is associated with increased mortality, nosocomial complications, increased length of hospital stay, increased hospital costs, and a need for skilled nursing aid after discharge from the hospital (Inouye, Westendorp, & Saczynski, 2014).
In the United States, delirium costs healthcare 164 billion dollars annually (Inouye, Westendorp, & Saczynski, 2014). As well, delirium is preventable in 30 to 40 percent of the cases that are detected. Despite the increased cost for the hospitals and poor outcomes for the patient, delirium continues to be underdiagnosed and treated (Inouye, Westendorp, & Saczynski, 2014).

**Current Practices**

The neuroscience unit for this quality improvement project did not have a delirium policy or procedure in place. Education regarding delirium was not provided to new hires on the unit. Due to the lack of policy or procedure related to delirium, the DNP student audited of the unit’s current delirium prevention techniques. An audit tool (see Appendix A) was designed based on the American Nurses’ Association (ANA, 2016) delirium prevention techniques. The audit tool was used for chart reviews, patient interviews, and observation as part of the organizational assessment. The nursing staff was not educated on delirium signs and symptoms and did not complete several delirium prevention strategies nor complete screening. The Confusion Assessment Method (CAM) for Intensive Care Units (ICU) entitled the CAM-ICU (see Appendix B).

The purpose of this quality improvement project was to assess the current state, identify evidence to improve care, and implement a delirium bundle, including education, prevention techniques, and screening, on a unit that did not have a policy or procedure related to delirium. The implementation of a delirium bundle was intended to prevent delirium, recognize delirium early, and decrease adverse patient events related to delirium, including falls, and restraint and safety attendant use.
Assessment of the Organization

An organizational assessment is a method to evaluate an organization, assess performance, and identify strengths and areas for needing improvement (Bartuševičienė & Šakalytė, 2013). In order to implement change, a full understanding of the performance of an organization must be identified. Following a model to complete an organizational assessment ensures all aspects within an organization are reviewed. The Burke and Litwin (1992) Model of Organizational Performance and Change is an appropriate tool for assessing an organization to implement change (see Appendix C).

Framework for Assessment

The Burke and Litwin (1992) Model of Organizational Performance and Change was used to complete an organizational assessment on the unit. This model was chosen as it identifies readiness for change by assessing internal and external factors. The Burke and Litwin model identifies the link between the factors related to change. Organizational change is multifaceted and includes several variables. Burke and Litwin identify 12 variables which impact each other and create the model. The variables include the external environment, mission and strategy, leadership, organizational culture, structure, management practices, systems, work unit climate, task and individual skills, individual needs and values, motivation, and individual and organizational performance (Burke & Litwin, 1992). Each dimension was examined during the organizational assessment in relation to the organization.

The two variables, external environment and individuals and organizational performance, are the beginning and ending within the feedback loop (Burke & Litwin, 1992). The loop is then affected by the transformational and transactional factors, which make up the other ten variables. The transformational factors include leadership, mission and strategy, and organizational culture.
These three variables are transformational because they are embedded in the organization and any change to these variables will result in considerable consequences. The remaining transactional variables are every day operations in an organization and are changed by management rather than leadership (Burke & Litwin, 1992).

The unit’s rate of falls and safety attendant use were higher when compared to other medical surgical units in the health system and to the national benchmark (see Appendix D). Data for falls were collected from January to June 2018. The neuroscience unit ranked below the national benchmark for unassisted falls. The majority of the falls were experienced with staff present with the patient. Restraint use was compared to four other randomly selected medical surgical units in the hospital. The only other unit with higher rates of restraint use was the other neurological medical surgical unit.

Safety attendants are nursing technicians who sit at the bedside with a patient at risk of self-harm. Data for safety attendant use was collected between April and June 2018. On the neuroscience unit 16 safety attendants were used for suicidal patients, 20 for patient safety, and one was marked as other.

The DNP student conducted chart reviews, patient interviews, and observation between September and October 2018 using the audit tool to examine the use of delirium prevention techniques on the unit (See Appendix E). The DNP student screened 40 patients during day shift, 7am to 7pm, and 40 patients during night shift, 7pm to 7am. The average age of the patient was 66.4 years of age and the average length of stay was 3.6 days.

The DNP student’s audit of 80 patients pre-implementation, found one positive CAM-ICU. In the one positive CAM-ICU, length of stay of four days, age was 74 years old, and female. The patient was admitted for a neurological surgery and was not confused at baseline.
When the patient was assessed by the DNP student, she was restless and confused. Staff understood this was not the patient’s normal status and the physician was aware. Staff treated the patient with a bed alarm and frequent visual checks.

The proposed unit had a high number of patients at risk for falling. Of the 80 patients, 73.8% (59 of 80) required ambulation aided by nursing staff. As well, only 15% (12 of the 80) of the patients were listed as high fall risk and had a fall risk care plan initiated to guide care (see Appendix E). However, only 1.3% (1 of 80) of patients screened had a fall since admission. Ambulation aids were only present at bedside for 55% (44 of 80) of the patients (see Appendix E).

The proposed unit had a high rate of confused patients, 32.5% (26 of 80). As well, 16.3% (13 of 80) of the patients audited had a form of restraint and 3.8% (3 of 80) required a safety attendant at bedside (see Appendix E). Of the patients’ age 65 and greater, 25% (20 of 80) had at least one high risk medication and 16.3% (13 of 80) had two or more high risk medications on their medication list. Those who received a high-risk medication and were greater than 65 year of age was 36.3% (29 of 80) (see Appendix E). Pharmacy was not consulted on any of the patients. Data about patient’s nutrition were also evaluated during the audit (see Appendix E). Several patients were not allowed to eat or drink for their safety; however, they also did not have orders for enteral feedings during that time. As well, several of the patients were eating less than 50% of their meals.

During observation, the DNP student found only 37.5% (30 of 80) of the time family was present at bedside. Whiteboards were updated with the correct date, name of nursing staff, and goals of care 38.8% (31 of 80) of the time (see Appendix E). As well, 54% (43 of 80) of patients who required glasses had them accessible at bedside, 71.4% (57 of 80) could easily
access hearing aids, and 64% (51 of 80) knew where they could access their dentures (see Appendix E). The unit staff kept the unit dark and quiet during sleeping hours. At night time, 62.5% (50 of 80) of the blinds were closed and 57.5% (46 of 80) of the televisions were turned off. However, during the day, only 25% (20 of 80) of the time the blinds were open (see Appendix E). Nurses used reorienting conversation with their patients 100% (80 of 80) of the time.

During patient interviews, patients were asked to rate their quality sleep and pain control on a scale of one to five. One was rated the worst sleep they have every experienced in their lives and 5 was the best. The scale was similar for pain, but reversed. It was found 18.8% (15 of 80) of patients rated their sleep a one and 22.5% (18 of 80) rated their sleep a five (see Appendix E). As well, 12.5% (10 of 80) rated their pain control low at a one and 38.8% (31 of 80) rated their pain well controlled at five (see Appendix E). Additional frequencies from the audit tool are shown in Appendix E.

**Strengths Weaknesses Opportunities and Threats Analysis**

The acronym SWOT stands for Strength, Weakness, Opportunity, and Threat (Newman Library, 2016). It is a strategic tool used to assess and analyze an organization. A SWOT analysis looks at both the internal and external factors. Internal factors include areas an organization needs improvement and areas where it excels. External factors include potential threats to the organization and opportunities. The external factors focus on the future of the organization (Newman Library, 2016). A SWOT analysis related to current practice regarding delirium on the proposed neuroscience unit was conducted (see Appendix F).

**Strengths.** The neuroscience unit had several strengths regarding the prevention recognition of delirium. The staff were eager to implement a new strategy to potentially help
decrease adverse patient events. As well, management was willing to discover new techniques to decrease patient harm. Some of the prevention strategies of delirium were already being performed on the unit (see Appendix E). For example, frequent reorientation, pain control, ambulation, hydration, nutrition, and maintenance of sleep and wake cycles are methods of delirium prevention (Abraha et al., 2016).

Weaknesses. The unit did not have a policy or procedure for the prevention or recognition of delirium. Although staff were performing some prevention strategies, the staff was not aware of the importance of the interventions and their effect on delirium. Retention was also a weakness for the neuroscience unit. Implementing a new evidence-based screening tool for delirium requires training and education. The frequent turnover of nurses could make it difficult to ensure continued education regarding delirium. As well, staff non-compliance is a potential weakness. Implementing the bundle would require staff to complete training and incorporate added time to their already stressful workload. As well, buy in from the site to make this project sustainable was also a concern. The unit would also need to incorporate a new screening tool and change work routine. Another potential threat to the sustainability of this quality improvement project was staff buy in. Change is only possible with staff engagement and involvement.

Opportunities. The unit was part of a larger healthcare system which had potential external opportunities that may have affected the project. The large Midwestern hospital system could improve quality indicators related to patient safety. The system had a culture willing to improve patient care which is stated in their mission statement. This could be related to their statement of becoming a national healthcare leader by 2020.

Threats. A potential threat to the prevention and recognition of delirium may be the competing priority of implementation of live video monitoring for high risk patients during time
of quality improvement project. The introduction of live video monitoring in place of safety attendants may also affect the results of the project.

**Ethics and Protection of Human Subjects**

The Institutional Review Boards (IRB) of the healthcare system and the university determined the project was quality improvement (see Appendix G).

**Stakeholders**

Stakeholders are those who are affected by the changes made in an organization. The key stakeholders on the neuroscience unit were the nurse manager, clinical nurse specialist, providers, registered nurses (RN), nursing technicians (NT), physical therapists (PT), occupational therapists (OT), pharmacists, and patients. The nurse manager was responsible for compliance of new implementation strategies. The clinical nurse specialist job is to implement evidence-based strategies to improve patient care. Providers, including physicians and advance care providers (APP), assess patients for delirium and treat symptoms identified. Nursing staff, including RNs and NTs would be affected the most by the practice change related to delirium. RNs did not have a policy or procedure related to the recognition of delirium and its treatment. RNs received education about delirium during their formal education, but they were not responsible for screening for delirium on the unit. NTs were responsible for aiding patients with activities of daily living and reporting acute changes to the RN. NTs would be required to implement several delirium prevention techniques with the proposed practice change. PT and OT are responsible for evaluating the patients’ physical activity level and perform tasks of daily living. The PT and OT can make recommendations if additional therapy was required. Pharmacists can review patient’s medication list to assess for high risk medications which can
lead to delirium and make helpful suggestions for alternate medications. Finally, patients are stakeholders as they were susceptible to delirium while admitted to the hospital.

**Clinical Practice Question**

An evidence-based project goal is to answer a practice or clinical question. For this project the question explored the neuroscience medical surgical population. The clinical practice question was: Does implementing a delirium bundle, which includes delirium prevention strategies and a screening tool, increase delirium recognition and prevention and decrease adverse patient events? Adverse patient events are classified as falls, restraints use, and the use of safety attendants. It is expected that delirium screening would increase, which would lead to earlier recognition of delirium.

**Review of the Literature**

**Method**

A review of literature was conducted to discover the best evidence-based screening tool for delirium, the delirium prevention techniques, and the method for implementation of a delirium bundle.

**PRISMA.** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline served as the framework for this review (Moher, Liberati, Tetzlaff, Altman, & PRISMA Group, 2009) (see Appendix H). A comprehensive electronic search was conducted in the electronic databases listed and was limited to reviews in the English language during the period of 2013 to 2018. Databases used were CINAHL, PubMed, and Google Scholar. Keywords were delirium, acute care, hospital, inpatient, CAM-ICU, medical surgical, recognition, and prevention. Similar search terms were listed by using boolean operators (OR) to broaden the
search to include all relevant articles. For example, acute care OR hospital OR inpatient were combined. As well, prevention OR recognition were utilized to broaden search.

**Inclusion and Exclusion Criteria**

**Population.** The population included were nursing staff and patients in either the intensive care units (ICU) or general medical units in hospitals. Populations excluded were outpatient and rehabilitation facilities.

**Intervention.** Interventions included implementation of delirium prevention bundles or single prevention strategies. Interventions included education, patient-oriented interventions, provider-oriented interventions, and screening tools. Screening tools were also assessed by trained professionals to assess validity, sensitivity, and specificity of tools. Interventions excluded were the lack of intervention found in retrospective studies.

**Comparison.** Interventions, either in a bundle or independent, were compared to qualifiers such as mortality rate, length of hospital stay, length of mechanical ventilation, incidence of delirium, and days in restraints. Reviews of screening tools for delirium were compared to the definition of delirium provided by the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV). The screening tools were also compared to each other. Tools examined were the Confusion Assessment Method (CAM), CAM-intensive care unit (CAM-ICU), CAM brief, 3D-CAM, the Delirium Rating Scale, 4As test, The Delirium Rating, The Nurses’ Delirium Screening Checklist, the Single Question in Delirium, and the Memorial Delirium Assessment Scale.

**Outcome.** Outcomes of the studies found bundled prevention interventions for delirium are more effective when compared to single intervention. For example, implementing a bundled technique including prevention strategies, a screening tool, and education was more effective
than implementing one item of the bundle. As well, education of nursing staff increases delirium recognition and prevention. The CAM and the CAM-ICU were the gold standard for screening for delirium in the inpatient setting.

PRISMA Guidelines were used to conduct selection of the articles for the review (Moher, et al., 2009). Initially, titles were reviewed for relevance surrounding the topic. Next, the abstracts were reviewed for appropriateness of research study and if the article possessed inclusion criteria. References of articles were assessed to determine if alternate articles could be included in review. A total of seven articles were determined relevant for the review (see Appendix I).

Summary of Results

Three of the articles assessed the appropriateness of the CAM-ICU as the chosen screening tool to implement for the quality improvement project. One meta-analysis of 22 studies explored the CAM and the CAM-ICU and their application into practice (Shi, Warren, Saposnik, & Macdermid, 2013). Of the studies included, nine examined the CAM and the other 13 looked at the CAM-ICU. Both screening tools had similar results regardless of if the patient was ventilated or not ventilated. A pooled sensitivity and specificity for both screening tools was completed. The sensitivity of the CAM was 82% (95% confidence interval [CI]: 69%–91%) and a specificity of 99% (95% CI: 87%–100%). The CAM-ICU had a sensitivity of 81% (95% CI: 57%–93%) and a specificity of 98% (95% CI: 86%–100%). Both screening tools can be used in a variety of settings and can be completed within 10 minutes by trained personnel.

The next was a systematic review of delirium screening tools (Jayita & Wand, 2015). This review included 31 studies and identified outcomes through the most studied and used screening tools, the tools’ sensitivity and specificity, and the standards for the reporting of
diagnostic accuracy (STARD) score (Jayita & Wand, 2015). Of the 21 screening tools included in the 31 studies, the CAM had sensitivity and specificities greater than 95%. This systematic review separated screening tools based on population. For the proposed project, the post-surgical and recovery unit screening tools would be most appropriate for use. The systematic review found the CAM, Delirium Detection Score (DDS), and Nurses Delirium Screening Checklist (NuDESC) to be best for this population. All three tools were compared to the DSM-IV definition of delirium. Of the three tools, the NuDESC had the best sensitivity and specificity (Jayita & Wand, 2015).

The last cross-sectional study examined screening tools for delirium was a cross-sectional study compared the CAM-ICU to the 3D-CAM in a general medical surgical population (Kuczmarska et al., 2016). The comparison between the CAM-ICU and 3D CAM were based on outcomes identification of delirium by trained professionals based on the DSM-IV criteria (Kuczmarska et al., 2016). The sensitivity [95 % CI] of delirium detection for the 3D-CAM was 95 % [74 %, 100 %] and for the CAM-ICU was 53 % [29 %, 76 %]. Specificity was greater than 90 % for both instruments. Based on subgroup analyses, the CAM-ICU had sensitivity of 30 % in patients with mild delirium compared to 100% for the 3D-CAM (Kuczmarska et al., 2016).

In the literature review, three included articles examined the best method of implementation for a delirium prevention and early recognition program (Öztürk Birge & Tel Aydin, 2017; Smith & Grami, 2017; Trogrlic et al., 2015). A systematic review compared bundled delirium care compared to single interventions (Trogrlic et al., 2015). The types of interventions included were educational meeting regarding delirium for staff, distribution of education materials, inclusion of staff to solve a problem, use of a local leader for change, use of screening tools, audit and feedback, reminders for staff, use of clinical multidisciplinary teams,
and use of evidence-based changes. Of the included studies, 11 used a multifaceted approach, to delirium management and the other 10 implemented screening for delirium. Of the 21 studies, three found a decrease ($p<0.05$) in mortality after implementation of delirium strategies. As well, five of the studies found a significant decrease in length of ICU stay after implementation phase. Significant adherence to delirium screening were found in 13 of the studies and incidence of delirium significantly decreased in 6 of the studies (Trogrlic et al., 2015).

A randomized control trial (RCT) looked at the feasibility of implementing a delirium bundle in the ICU (Smith & Grami, 2017). Multifactorial interventions implemented in the RCT decreased delirium risk factors of length of stay, days spent in restraints, and days mechanically ventilated (Smith & Grami, 2017). The multifactorial intervention was called the delirium prevention bundle (DPB). The DPB included sedation cessation, pain control, sensory stimulation, early mobility, sleep promotion, and the CAM-ICU. The DPB group found a 78% decrease in risk for delirium (odds ratio, 0.22; 95% CI, 0.08–0.56; $p=.001$). There was a significant decrease in mechanical ventilation ($p<0.001$), restraint use ($p=0.002$), and length of stay ($p=0.007$) (Smith & Grami, 2017).

A quasi-experimental study article focused on implementation of a delirium bundle with a pre-posttest design (Öztürk Birge & Tel Aydin, 2017). The study produced results through the incidence of delirium before and after the intervention of education of nursing staff. Prior to intervention, delirium was detected in 26.5% of patients. After education of nursing staff, delirium presented in 20.9% of patients ($p=0.627$). Further than incidence of delirium, length of stay reduced [9.5 (3-49), 4 (3-46)] ($p=0.005$), mean Glasgow Comas Scale (GCS) results [12.13±2.09, 13.70±1.92] ($p=0.000$), and amount of medication used in treatment [9.36±2.38, 7.81±2.18] when comparing patients with and without delirium ($p=0.006$). The study supported
an educational intervention of nursing staff to decrease the incidence of delirium (Öztürk Birge & Tel Aydin, 2017).

Lastly, an RCT studied a single intervention for the prevention of delirium (Munro et al., 2017). The study found that reorientation with a family member’s voice decreased delirium in a hospitalized patient when compared to a patient who did not receive any reorienting messages ($p=0.0437$) (Munro et al., 2017). As well, mean days with delirium between the three groups was 0.3 in family voice message group, 0.6 in the unknown voice message group, and 0.9 for the control group (Munro et al., 2017).

**Evidence to be used for Project**

The meta-analysis and systematic reviews found the CAM-ICU to be an efficacious tool for early recognition of delirium (Jayita & Wand, 2015; Shi et al., 2013). However, the cross-sectional comparison study between the 3D CAM and the CAM-ICU found the 3D CAM to be a superior screening tool in a general medical surgical unit. Although this project was conducted on a medical-surgical unit, the CAM-ICU was used as the screening tool for implementation for a variety of reasons. The literature suggests the CAM-ICU had high specificity and sensitivity for identifying delirium (Jayita & Wand, 2015; Shi et al., 2013). As well, professional opinion of four CNSs in the system was that the CAM-ICU would be the best tool to implement. The tool was already in the electronic health record (EHR) at the site. As well, the CAM-ICU had the same foundation as several other screening tools such as the CAM and 3D CAM. If the unit wanted to implement the 3D CAM, a paper tool would need to be utilized. As the unit and hospital used an EHR, a screening tool on paper would not align with unit workflow.

Through the literature review, evidence found that multifactorial delirium bundles were more effective at prevention and recognition of delirium, as well as sustainability of use within
practice (Smith & Grami, 2017; Trogrlic et al., 2015). For this project, interventions from the two studies were used. The CAM-ICU was the chosen screening tool. As well, pain control, sensory stimulation, early mobility, sleep promotion, educational meeting regarding delirium for staff, and distribution of education materials. Also inclusion of staff to solve a problem, use of a local leader for change, reminders for staff, use of clinical multidisciplinary teams, and use of evidence-based changes were utilized.

There were also several limitations to this literature review. Most importantly, there was a lack of evidence of the use of the CAM-ICU outside of the ICU setting. Kuczmarska et al., (2016) identified that the CAM-ICU is not the best screening tool for the general medical population. Shi et al.’s (2013) systematic review identified the CAM-ICU as an evidence-based screening tool; however, much of the population was in the ICU. The CAM, CAM-ICU, and brief CAM were the most studied delirium screening tools and have been found to be effective at detecting delirium, however results differed based on setting (Jayita & Wand, 2015).

Another limitation of this review was the different outcome measures within the studies (Trogrlic et al., 2015; Smith & Grami, 2017; Munro et al., 2017, Öztürk Birge & Tel Aydin, 2017). Each of the studies implemented a prevention technique of delirium, and all had the outcome measure of delirium incidence. However, not all the studies looked at the same outcome measure, which makes comparison among the studies difficult.

In sum, the results of this review found the CAM-ICU to be a highly sensitive and specific screening tool for delirium (Jayita & Wand, 2015; Shi et al., 2013). As well, some of the interventions found in both the RCT and systematic review were utilized for this project (Smith & Grami, 2017; Trogrlic et al., 2015). The literature review also found a bundled approach to prevention and recognition of delirium was best for sustainability.
Phenomenon Conceptual Model

The Nurse Role Effectiveness Model was created by Irvine, Sidani, and Hall (1998) to understand nurses’ role in health care (see Appendix J). It is a structure, process, outcome model which includes patients, nurses, and the variables of a nursing unit. The model looks at the multiple responsibilities of a nurse including independent, dependent, and interdependent roles. Independent roles include the nurses’ assessments, interventions, decision-making, and outcomes of their care. The dependent role focuses on the nurses’ judgment and how they would implement medical care based on their judgements. Finally, the interdependent role is a multidisciplinary approach to nursing care, which promotes patient centered care (Irvine, Sidani, & Hall, 1998).

The implementation of a delirium bundle quality improvement project was guided by the Nurse Role Effectiveness Model (1998). The bundle addressed all three roles of nurses. The independent role of the nurse was to assess the patient for delirium with the CAM-ICU. In the dependent role, the nurses’ assessed and use their clinical judgment to contact the physician and address the delirium with prevention techniques and safety. Finally, the interdependent variables used the healthcare team as treatment. This included NT, RNs, physicians, therapy, families, and pharmacy to collectively treat the patient and prevent any new developments of delirium. The combination of the three roles RNs played would improve patient outcomes related to delirium.

Project Plan

Purpose of Project and Objectives

The goal of this project was to implement a sustainable delirium bundle on a neuroscience medical surgical unit. The delirium bundle’s purpose was to aid healthcare personnel in prevention and early recognition of delirium through education and the
implementation of the CAM-ICU. The success of the project was to be measured by the overall
decrease of adverse patient events such as falls, restraint use, and safety attendant, as well as the
application and use of the CAM-ICU.

**Design for the Evidence-based Initiative**

The design for this quality improvement project was an observational pre/post
intervention approach using the Promoting Action on Research in Health Sciences (PARiHS)
framework (Kitson, Harvey, & McCormack, 1998). In addition, Powell et al. (2015) provides 68
implementation strategies for clinical quality improvement projects. Several of Powell’s et al.
(2015) strategies were chosen to guide implementation of the bundle.

**Setting**

This DNP project took place in a neuroscience medical surgical unit which is part of a
large midwestern hospital system. Patients admitted to the unit were adults, aged 18 and greater,
and typically had a neurological diagnosis, however, the unit also accepted overflow patients
with a variety of diagnoses. The large treatment team of providers included neurologists,
neurosurgeons, general medical physicians, and advanced care providers (APP). As well, there
were 58 RNs and 24 NTs on the neuroscience unit. Approval for the DNP quality improvement
project was obtained from several key stakeholders.

**Participants**

The project targeted all patients admitted to the neuroscience unit, and RNs and NTs who
worked on the unit. All patients admitted to the unit during time of implementation were
screened for delirium by the RN. With the CAM-ICU once a shift and with any acute
neurological change. As well, RNs were encouraged to address concerns regarding the
development of delirium with providers, therapists, and pharmacists. Both RNs and NTs were
encouraged to perform delirium prevention techniques during implementation.

**Model Guiding Implementation**

The Promoting Action on Research in Health Sciences (PARiHS) framework (see Appendix K) was chosen to guide implementation of this quality improvement project (Kitson, Harvey, & McCormack, 1998). There are three elements the PARiHS model uses to effectively use research in practice. The three elements are evidence, context, and facilitation.

**Evidence.** Evidence is needed to create evidence-based practice changes (Kitson, Harvey, & McCormack, 1998). The evidence included should be compiled from a variety of sources. Evidence, clinical experience, and patient experience are all considered evidence. High level evidence includes systematic review, meta-analyses, and RCTs. High clinical experience refers to consensus views. Finally, high patient experiences incorporate patients’ input towards their care (Kitson, Harvey, & McCormack, 1998).

Evidence for this project was collected through the literature review. Evidence needs to be specific to the population and adapted to the context. The literature review found the most reliable tool for delirium screening for the inpatient population and found a bundled approach is the most effective form of implementation.

**Context.** The context is the setting. The setting is where evidence-based care changes take place (Kitson, Harvey, & McCormack, 1998). There are three elements which affect the context; culture, leadership, and management. Like evidence, the three elements of context can be ranked from high to low. High culture includes care that is learning focused, patient centered, and facilitated by management. High ranking leadership includes transformational leaders changing culture through the integration of evidence-based research into care. Lastly, high measurement includes peer review, evaluation of internal and external factors, and audits with
feedback (Kitson, Harvey, & McCormack, 1998).

The context of the PARiHS model is the setting in which change will take place. The organization needs to be ready for change, capable of change, have a developed plan, and have the resources to enact change. For this project, context was at a large midwestern hospital on an inpatient neuroscience medical surgical unit. The population consisted of all patients admitted to this unit. The willingness and adaptability of the unit was evaluated in the organizational assessment. The organizational assessment found the unit was capable of implementation.

**Facilitation.** A facilitator is a person who makes implementation of evidence-based research into practice easier for others (Kitson, Harvey, & McCormack, 1998). A facilitator must possess three elements, purpose, role, and skills and attributes. A facilitator’s purpose is to take a holistic approach to complete a task. The role of a facilitator is to assist with change through a multifaceted role. Providing advice, networking, and counseling are some activities that are part of a multifaceted role of the facilitator. Finally, the skills and attributes of a facilitator were used to aid in the implementation of evidence-based research. The facilitator should be able to adjust their role and responsibilities to accommodate the project (Kitson, Harvey, & McCormack, 1998).

Facilitation of the project was the support needed to change workflow through implementation of a quality improvement project. The main facilitator for this project was the DNP student. The student created a plan to reach the goal through achievement of competencies with the aid of key stakeholders. The facilitator in this project guided the team of nurses to prevent delirium with strategies and implement the CAM-ICU. The student supported the implementation system through expertise and presence for the staff.
Implementation Steps and Strategies

Powell’s et al (2015) implementation strategies were used to guide implementation. Of Powell’s 68 implementation strategies, 17 were chosen for this project.

Implementation for the project began with an assessment of the organization. Assessing for readiness and identifying barriers is one of Powell’s implementation strategies. The organizational assessment identified readiness for change and identified barriers. The SWOT analysis section of the organization assessment mentioned previously in this paper identified the neuroscience unit as an appropriate unit for quality improvement.

After an organizational assessment was completed, a team of experts was created to guide the student. The team consisted of academic faculty, a nursing director, CNSs, and the unit manager. As well, time was spent collaborating with a statistician, nurse educator, and nursing supervisor. Each expert offered suggestions to the DNP student regarding implementation. The unit manager determined if participation in the DNP student’s project was expected of the employees. The team of experts utilized four of Powell’s et al. (2015) implementation strategies. This included building a coalition of experts, conducting discussions, utilizing implementation advisors, and to utilizing workgroups.

After literature review, a plan was developed by the DNP student for implementation. Developing a formal implementation blueprint is essential for the facilitator to have a purpose, a timeline, identify the scope of change, and performance measures (Powell et al., 2015). After planning, the DNP student developed and distributed educational materials, and conducting educational meetings. The student used the charge nurses on the unit as champions to assist with facilitation and answer questions when the student was not available.

An anonymous pre-test assessed baseline knowledge of RNs and NTs (Appendix M). The
test examined staff knowledge of delirium and the effect of delirium on patients. Education was provided in forms of written material and verbal presentations. Written materials were provided in binders throughout the unit and staff were expected to complete the education and test during free time in their shift. Verbal presentations were held in the break room located on the unit before and after each shift twice a day for 4 days. It was expected by management that RNs and NTs complete the education. After reading the educational material, staff completed the post-test which included the same questions as the pre-test. After completion, the tests were placed in an envelope. In each binder, there was a sign off sheet with names of RNs and NTs so that the DNP student could ensure staff completion of the education.

After education, the DNP student engaged the stakeholders through frequent rounding on the unit to assess for readiness for implementation through conversations with the unit manager, RNs, and NTs and assessed knowledge gained. The DNP student determined additional education was not needed. Prior to implementation, the DNP student also placed reminders to complete the CAM-ICU on each of the computer screens on the unit.

At start, RNs were expected to complete the CAM-ICU for each patient once a shift or, every 12 hours for patients with acute neurological change. As well, implementation of delirium prevention techniques began. During the implementation period, the DNP student was available to answer questions and address concerns and educational binders were available throughout the unit when the DNP student was not present.

**Measures**

There were several measures used to gauge the success of the project (see Appendix L). This project measured adverse patient events of falls, restraint, and safety attendant use. Regarding adverse events, it was been found that individuals who experience delirium in an
acute care setting have an increased rate of falls and restraints (Mazur, Wilczyński, & Szewieczek, 2016; Dharmarajan et al., 2017). Also, when patients are confused and in restraints, a safety attendant is typically utilized to ensure patient safety.

The ANA (2016) suggests delirium prevention strategies to maintain cognition in a hospitalized patient. The use of orienting conversation from the healthcare provider to the patients is useful and simple. For example, greeting the patient by their preferred name and introducing self with role is helpful for patients. Providing sensory stimulation is another way to maintain cognition. Providing a working clock, an updated whiteboard with a date and goals for the day, and maintaining a schedule of day and night is helpful for maintaining cognition. As well, pain control, adequate oxygen, nutrition, hydration, toileting schedules, and sleep promotion are recommended to prevent delirium in a hospital setting (ANA, 2016).

The audit tool included patient demographics (age, sex, and admitting diagnosis) and was analyzed using descriptive statistics. Impulsivity on fall risk assessment was included to correlate between a positive CAM-ICU, presence of delirium, and if the patient was impulsive. The DNP student expected to see an increase in the use of high fall risk care plans, range of motion performed, therapy consults, euvolemic fluid status, nutrition, completed pain assessment, and pain management. As well as oxygenation above 90 percent, family presence, pharmacy consult, nicotine replacement for tobacco users, withdrawal from alcohol protocol for patients with alcohol abuse, and natural sleep aids. After implementation of the delirium bundle, the DNP student expected to see an increase in the patients’ accessibility of glasses, hearing aids, and dentures. As well, white boards filled out with name, date, and goals for the day incidence should increase. Patient were expected to report better sleep and pain numbers after implementation. Sleep promotion through dimmed lighting, blinds open and closed, and television off was also
expected to increase. Measures that were expected to decrease were days between bowel movements and prescription and administered high risk medications. The completion of the CAM-ICU for each patient was also tracked, it was expected to increase. The identification of delirium was also expected to increase because screening was not completed prior to implementation of the delirium project.

Prevention of delirium was a part of the bundle. Early recognition of delirium was also completed through screening with CAM-ICU. The third part of the bundle was staff education. The staff implementing the project must understand its importance and application.

**Tools**

The tools for this project were the audit tool, the CAM-ICU, and the education with pre- and post-test. The audit tool was created based on the American Nursing Association’s (ANA) delirium prevention technique. The prevention techniques evaluated several causes of delirium and steps to prevent its onset.

The CAM-ICU was the chosen valid screening tool for delirium. This decision was based on a systematic review and a meta-analysis of screening tools for delirium (Shi et al., 2013; Jayita & Wand, 2015). In addition to clinical judgment, the CAM-ICU is a useful tool for nursing staff (Shi et al., 2013; Jayita & Wand, 2015).

Education with pre- and post-test were created by the DNP student. The information provided to nursing staff was collected during the DNP’s literature review.

**Data Collection Procedures**

The DNP student was responsible for collecting data through chart review, patient interview, and observation. Pre- post-data were collected for this quality improvement project. Pre-data was collected between September and October 2018. Post-data was collected February
18th through 25th on fall rates, safety attendant use, restraint use, and measures on the audit tool and obtained through quality indicator data supplied by the CNS.

Chart review was completed on the unit using the audit tool and the healthcare system’s EHR at varying times to assess the presence of delirium prevention strategies during the day and night. The DNP student looked at nursing flowsheets which included patient assessment, medication list, and patient demographics for data.

The CAM-ICU was already built into the EHR for the RNs of the unit to access. The RNs were not completing the CAM-ICU prior to the project. Before intervention, the DNP student performed the CAM-ICU on patients which was included in the assessment. The DNP student performed chart reviews to ensure the CAM-ICU was completed by RNs during the intervention phase for the collection of data following implementation.

The pre- and post-education tests were on paper and collected in manila envelopes located in the binders and from in-person sessions held by the DNP student. The sample size for this project was 80 patients before intervention and 80 patients after intervention. The audit tool was the main source of measures included in the project. Safety attendant data, restraint use, and fall data was collected from the CNS.

Data Management

The DNP student was responsible for data management. Data were collected in an Excel spreadsheet and stored in a file dedicated to DNP student projects at the healthcare systems’ network drive and computer. Data was not taken off the healthcare system’s drive or computer. A statistician student analyzed the data and prepared percentages and outcomes for the DNP student. The statistician student analyzed the data with SPSS and left results in the secured computer file at the organization.
Analysis

Analysis of knowledge gained through the education portion of the quality improvement project was tracked with pre and post-tests and averages compared. It was expected scores would improve after education. Analysis of restraints and fall rates were before and after implementation and compared, it was expected to see a decrease in the fall rates and restraint use on the unit after implementation.

Pre-data measures included on the audit tool were analyzed using frequencies (see Appendix E). Fall rates, restraint use, and safety attendants results were obtained by the CNS and rates were compared pre- and post-implementation. The final results of the project were analyzed with SAS Enterprise Guide version 7.15. Data presented was a variety of forms including tables and graphs.

Resources & Budget

Revenue and expenses were factored into a budget for this project. Revenue was quantified through increased length of stay for a delirious patient. On average, a delirium patient has a 4-day increased length of stay (Organization for Economic Co-operation and Development, 2018) resulting in an additional $8,520 per delirious patient.

The budget for the is shown in Appendix O. Most of the budget was time spent on the project. The DNP student contributed time to educate the staff at eight educational meetings each 30 minutes (4 hours). As well, the DNP student donated 4 hours of time spent creating the pre and post-tests for the RNs. The DNP student donated (4 hours) on 15 of the 31 days of implementation (60 hours total). During the time of implementation, the student be rounded and was available to answer any questions or concerns. The DNP was a RN with 3 years of
experience and an estimated hourly rate of $27.50 (Glassdoor.com, 2018d). The total donated cost by the DNP student was $1,980.

Other budget resources were donated by the hospital staff. A neuroscience unit manager donated several hours meeting with DNP student and communicating with staff the logistics and expectations of staff’s involvement in DNP student’s project. The average hourly wage for a unit manager at an acute care hospital was $35.11 (Glassdoor.com, 2018c). The total amount of time donated by the unit manager (10 hours) resulted in $351.10 of donated cost. A CNS donated several hours with meetings, answering emails, and reading proposal documents. A CNS in an acute care setting makes an hourly wage of $47.16 (Glassdoor.com, 2018a) and the total time donated (20 hours) resulted in $943.20. The Nursing Director of Neuroscience also donated time (8 hours) of meetings with the DNP student, responding to emails, and attending the DNP student’s project proposal. An hourly wage of a nursing director is $48.98 (Glassdoor.com, 2018). A total of $391.86 was donated by the nursing director. A student statistician also donated time analyzing data (10 hours). A statistician’s hourly wage is $48.744 (Glassdoor.com, 2018e) which totals $489.44 of donated time.

Nursing staff also donated time to the DNP’s project. Education of RNs and NT took about 15 minutes per person. An average RN’s wage $27.50 (Glassdoor.com, 2018d) and there were 58 RNs on the unit. This totaled $398.46 of collectively donated time from the RNs during education. An average wage per hour for an NT is $11.79 (Glassdoor.com, 2018b). There were 24 NTs on the unit which totaled $70.74 of donated time.

In sum, this healthcare organization could save $6,294 after implementation of this project after admission of just one delirious patient.

Timeline
A timeline of the project was used (see Appendix P). The project began with education of the nursing staff on the delirium bundle. January 8, 2019 and continued for 2 weeks, until January 20th.

Implementation of the bundle began January 21, 2019. Data were collected from February 18 to 25, 2019. Data were collected with the audit tool which included delirium prevention techniques and the CAM-ICU results. Ongoing education continued throughout the time of implementation.

The DNP student audited 80 patients during the time of implementation and compared the data to the pre-data collected. As well, the fall rates, restraint use, and safety attendant data use was collected from the CNS before and after implementation. Pre-implementation data from the CNS was collected January through June 2018 and post-implementation data was collected January through February 2019. Audit tool data were collected by February 25, 2019. The data was analyzed by the statistician and be completed on March 19, 2019. Findings were distributed to key stakeholders March 25, 2019 and included a sustainability plan for the delirium bundle.

Results

Pre-Post Delirium Test

There were a total of 72 staff, 47 RNs and 25 NTs, who were required to compete delirium education with tests. Of these, 68% (33 of 47) of RNs, and 44% (11 of 25) of NTs completed education and testing. The RN pre- mean were 90.5 (SD = 11.7) and the post- 95.7 (SD = 6.7) an increase of 5.2% in knowledge. The NT pre- mean was 80.3 (SD = 31.5) and post- 92.4 (SD = 11.5) and increase of 12.1% in knowledge. The education had a small effect on the RN and NT. There was a greater increase in knowledge gained for the NTs compared to RNs (12.1% to 5.2%).
CAM-ICU Completion

The CAM-ICU screening tool was an addition to the RN practice during implementation. Prior to implementation, the CAM-ICU completion rate was 0% and after implementation, 77.5% (62 of 80) was completed (see Appendix Q).

Audit Tool

Completion of delirium prevention strategies was a large part of the DNP’s audit. Frequencies were collected and compared to pre and post implementation (see Appendix Q). Initiation of a clinical practice guideline (CPG) for high fall risk patients was required to be completed when a patient’s Hester Davis (2013) fall risk score was 15 or greater. Pre-implementation, a high fall risk CPG was initiated 30% of the time for appropriate patients. Post-implementation, 69.6% of the time the CPG was initiated. The proportion of patients that had a CPG initiated differed significantly pre- and post-implementation ($p=0.0023$).

Ambulation and range of motion (ROM) were to be completed four times within 24 hours to decrease the likelihood of delirium. Pre-implementation, ambulation and ROM was completed 40% of the time and post-76% of the time. Patients had significant improvement in ambulation or ROM ($p=<0.0001$). For patients that required ambulation aids, pre-implementation found 73.3% of the time ambulation aids were present at bedside and post-implementation found 86.5% of the time ($p=0.0845$).

The chart audit consisted of 80 patients both pre and post implementation for a safety attendant, restraints, or a fall since admission. Prior to implementation, 4% patients required a safety attendant compared to 0% post-implementation, not a significant change (Fisher’s exact, $p=0.25$). Prior to implementation, 1.3% of patient experienced a fall since admission and 4% post implementation, not a significant finding (Fisher’s exact, $p=.62$). Pre-implementation, 16.3% of
patients required physical restraints and 1.3% post-implementation required physical restraints, which was a significant decrease ($p=0.0008$).

Sensory stimulation is important to prevent delirium and includes the presence of glasses, hearing aids, and dentures when necessary for patients. Pre-implementation found patients who required glasses had them available 54% and 77% post-implementation which was a significant increase in accessibility of glasses ($p=0.0199$). Pre-implementation found those who required hearing aids had them accessible 62% and 48.2% post-implementation which was not a significant decrease, but rather an increase ($p=0.3039$). As well, pre-implementation patients who required dentures had them available 64.3% and 77.8% post-implementation which was not a significant increase (Fisher’s exact, $p=0.4533$).

Keeping a day and night cycle is important to reorient patients to the time of day during their stay in the hospital. This is achieved by opening blinds in the morning and closing them at night. As well, turning off televisions at night to promote restful sleep keeps a day and night cycle. Pre-implementation found blinds were open 50% of the time and post-implementation 93% of the time which was a significant increase ($p=0.0001$). Pre-implementation blinds were closed at night 61% and post-implementation 72% of the time which was not a significant finding ($p=0.2999$).

Nursing staff can also prevent delirium by orienting patients with an updated whiteboard of correct date, name of nurse, and two to three goals for their hospital stay. As well, using orienting conversation and introducing themselves when entering a patient’s room can prevent delirium. Whiteboards were completed with the above requirements 39% of the time pre-implementation and post-implementation 60% of the time which was a significant increase ($p=0.0072$). Pre-implementation, nursing staff using orienting conversation happened 91% and
97% of the time and post-implementation which was not a significant increase \((p=.2453)\).

Patient’s perception of pain control and sleep quality were collected through patient interview. The patients rated their feelings on how their pain has been managed on a scale of 1 to 5. The worst rating was 1 and the best was 5. The same scale was used for quality of sleep. There was enough evidence to say that the distribution of pain scale responses differs pre and post implementation \((p=0.0025)\). As well, patient responses for pain were significantly increase post-implementation \((p=0.0029)\).

**Overall Adverse Patient Events**

The overall fall rates and restraint use for the unit were compared pre- and post-implementation. The unit mean fall rate pre-implementation were 4.22 falls per 1,000 patient days (over 12 months, March 2018 to February 2019). Post-implementation mean fall rates were 4.05 and 2.36 for January and February 2019 respectively.

Mean restraint rate per patient day hours pre-implementation were 1.81 for the unit (over 12 months, March 2018 to February 2019) and during implementation (January and February 2019) restraint rate was .76 and .74 respectively. Restraint use during the time of implementation ranked below the unit’s mean.

Safety attendant data prior to implementation were collected to 36 days (November 1st to December 6, 2018). During that time, 15 safety attendants were ordered, and four (27%) were for suicidal patients, 10 (67%) were for patient safety, and one (6%) was marked as other. During implementation, 36 days (January 21 to February 25, 2019), the unit ordered 14 safety attendants. Of the 14 safety attendants, eight (57%) were for suicidal patients and six (43%) were for patient safety. Delirious patients would have a safety attendant for patient safety. Therefore, pre-implementation, 67% of safety attendants were for patient safety and during implementation
43% were for patient safety which signifies a decrease in safety attendant need.

Discussion

This project evaluated the implementation of a delirium bundle on a non-ICU population to decrease adverse patient events, prevent delirium, and recognize the presence of delirium early. An organizational assessment found that the selected unit for implementation was appropriate and ready for change. The bundle consisted of education for the nurses with pre and post testing to measure knowledge gained, implementation of delirium prevention strategies, and the use of the CAM-ICU to screen and recognize the presence of delirium.

According to the literature, delirium is a primary cause to cognitive impairment with fluctuating consciousness which leads to adverse patient events (Inouye, Westendorp, Saczynski, 2014; Toye et al., 2017). On the chosen unit for this project there was no policy or guideline related to delirium. Therefore nurses were not educated about delirium, nursing staff was not aware of prevention strategies, and there was no screening for delirium completed. With the unit’s high rate of falls, safety attendants, and restraint use, it could be hypothesized that patients on the unit were delirious and were not treated with prevention or early recognition.

The DNP project implemented a delirium bundle to decrease adverse patient events. At the end of the project, there was a decrease in falls, restraints use, and safety attendant use. As well, there was an overall increase in prevention strategies initiated by the nursing staff. As well, there were several significant increases in prevention strategies including initiation of CPG for high risk fall patients, ambulation, whiteboard completion, availability of patient’s glasses, blinds open during the day, and patient perception of pain control and sleep quality.

Limitations

There were limitations to this quality improvement project. First, the amount of time for
implementation and education was a limited. Education was 34 days and was not mandatory, but expected, for staff to complete. If staff involvement was mandatory, staff may have completed the education and possibly fewer CAM-ICUs would have been incomplete. As well, the implementation period for the delirium bundle was only 36 days when post-implementation data was collected. A longer amount of time for implementation prior to data collection might have produced more reliable and valid outcomes. The sample size was only 80 patients pre- and post-implementation. A larger sample size would have produced more reliable and valid data.

During both pre- and post-implementation audits, the DNP student chose patients to audit at random. Several of the measures collected on the audit tool, like high risk medication, were dependent on the patient’s age. Certain medication for patients over the age of 65 were considered high risk. During post implementation data collection, the mean age of the patients was 63, compared to the pre implementation mean age of 66. Therefore, results for high risk medications on MAR and high risk medications received may have been affected.

**Stakeholder Support and Sustainability**

Sustainability of this project can be achieved in several ways. There were several areas of significant improvement. The benefits of this delirium bundle could include costs reductions and improved patient safety. The CAM-ICU is already embedded in the healthcare system EHR, therefore, for sustainability, it would be expected RNs screen patients daily. As well, all the prevention techniques are part of nursing care. With education provided about delirium, the nurses may be more apt to complete the prevention techniques. For overall sustainability, buy in from the unit manager and unit educator are needed. The manager would need to set a standard to include prevention and screening of delirium for the unit. A guideline was created for the delirium bundle on a medical surgical unit which was based on the healthcare system’s guideline
for the ICU (see Appendix R). As well, it would be expected for the nurse educator to inform new employees of the delirium bundle.

**Implications for Practice**

This project had several implications for practice. Implementation of a delirium bundle can increase the use of a screening tool and increase the use of delirium prevention strategies. Evidence supports the use of a delirium prevention strategies and recognition tools decrease the incidence and prevalence of delirium and recognize the presence of delirium early (Chong, et al., 2014; Jayita & Wand, 2015; Kuczmarska et al. 2016; Öztürk Birge & Tel Aydin, 2017; Shi et al., 2013; Smith & Grami, 2017; Trogrlic et al., 2015).

Each part of the delirium bundle resulted in the project expected outcomes. The use of the delirium bundle could positively impact practice. During this project, nursing staff were heavily relied upon to increase delirium prevention strategies and accurately chart them in the EHR. As well, they were expected to add screening for delirium to daily assessment. Change in an organization can be difficult and people can be complacent. However, with consistent reminding and encouragement, change was a possibility. The implementation of a delirium bundle was used to increase patient safety by decreasing adverse events. Although it was not an easy fix, use of a delirium bundle addressed several safety concerns.

**Reflections on DNP Essentials**

The American Association of College of Nursing (AACN) requires that all DNP graduate are proficient in the eight essentials. The eight DNP essentials structure what a DNP student should learn in their curriculum to prepare them to be an advanced are provider (AACN, 2006). Each essential will be reviewed in the next section and how it was enacted by the DNP student.

**Scientific Underpinnings for Practice**
Scientific underpinnings for practice includes using new nursing practices based on science and evidence-based. Through a literature review, the DNP identified the most effective method of implementation, a valid and reliable screening tool for delirium, and the most effective delirium prevention strategies. The bundled approach to delirium prevention and early recognition was based on the literature review’s findings. In addition, the student used the Burke-Litwin Causal Model (1992) to perform the organizational assessment. As well, the Nurse Role Effectiveness Model (1998) was used to understand the phenomenon. For implementation, the student used The Promoting Action on Research in Health Sciences (PARiHS) framework (1998) and Powell’s et al (2015) strategies to guide implementation. The scientific underpinnings created the basis for this project and provided reliable evidence.

Organizational and Systems Leadership

The student provided leadership throughout the project by establishing collaborative relationships within the organization and with systems leaders. First by meeting with leaders in the organization to introduce the project and its potential impact on the organization. The relationship between the student and the leaders of the organization was vital to the project’s success. Close contact and frequent updates to identify potential barriers were essential. Communication between the unit manager, clinical nurse specialists, and nursing staff were completed through email and face to face encounters. Key stakeholders stayed up to date about the project’s progress through communication with the DNP student. The student also found financial savings for the organization demonstrated in the budget (Appendix O). The student also demonstrated organizational leadership through the development of a project plan for implementation. The impact of the quality improvement project found a decreased of quality initiatives including falls, restraint use, and safety attendant use.
Clinical Scholarship and Analytical Methods

After obtaining evidence-based research, the DNP student was be able to interpret the information and effectively translate it into practice. The literature review provided the student with the best method of implementation, but the DNP student needed to adapt the bundle to the organization’s needs while maintaining fidelity of the intervention. The delirium bundle addressed the organization’s needs to reduce falls, safety attendant use, and restraint use on the neuroscience unit. Through audit of the EHR, observation, and patient interview the DNP student identified gaps in care where the delirium bundle would be effective. Through education of the staff, implementation of a delirium screening tool, and the application of delirium prevention techniques, the DNP student used evidence-based research and translated it into practice.

Information Systems Technology

The AACN’s (2006) Essential regarding information systems technology expects the DNP graduate to be capable of improving patient outcomes and a system’s process by utilizing technology. In this project, the DNP student utilized the EHR at the organization. The CAM-ICU was previously built into the EHR system and the DNP student needed to educate the nurses on how to locate the screening tool. The audit conducted through chart review was also completed using the EHR by the DNP student. As well, communication between nursing staff, the unit manager, and the CNS was completed using email. Technology was a pivotal part of this project and the project could not be completed without the use of technology.

Advocacy for Health Care Policy

It is expected that a DNP student influences policy of health care through engagement. The DNP should be prepared to advocate, educate, create, and implement health care policies
The purpose of this quality improvement project is to be sustainable for the organization after the student’s implementation phase has ended. The DNP student created a new policy for the organization to sustain the project.

**Interprofessional Collaboration**

The terminal nursing degree of a DNP prepares the student to work with other professions within a healthcare team (AACN, 2006). The DNP student worked closely within the healthcare team with different professions including CNS, nursing staff, and administration. Collaboration is important to the process to collect all different viewpoints of the team and towards sustainability of the project.

**Clinical Prevention Population Health**

To promote health and decrease disease is another essential of the DNP curriculum (AACN, 2006). The DNP student’s project works to decrease the prevalence and incidence of delirium on a medical surgical unit. Earlier recognition and prevention of delirium can lead to decreased falls, safety attendant use, and restraint use (Smith & Grami, 2017; Trogrlic et al., 2015). The prevention and recognition of delirium increases patient safety by decreasing adverse patient events.

**Advanced Nursing Practice**

A DNP graduate will have the ability to practice as an advanced care professional (AACN, 2006). Throughout the project, the student demonstrated several skills of an advanced care provider. The student investigated and created a delirium bundle to prevent disease and promote health for patients. As well, the student used interprofessional collaboration with other specialties to create the most effective quality improvement project for all key stakeholders. The student promoted change within an organization with a sustainable and quality improvement
Dissemination of Outcomes

Dissemination of the delirium bundle first occurred with the stakeholders on March 25\textsuperscript{th}, 2019. As well, the DNP student presented the project at the 3-minute thesis competition located at the university. A flyer was sent to the nursing staff of the unit with findings of the project and brief explanation of overall outcome. A student participated in a poster presentation at the healthcare organization. The final defense of the DNP project was presented at Grand Valley State University April 18\textsuperscript{th}, 2019. As well, the final draft of the scholar project paper was uploaded to ScholarWorks©.

Conclusion

A Midwestern healthcare organization identified an opportunity to decrease adverse patient events on a neurological unit by creating a quality improvement project focusing on delirium. An organizational assessment found the unit to have a rate of falls above the national benchmark, the unit had the second highest use of restraints in the hospital, and a large number of safety attendants for high risk patients. As well, the unit did not have a policy or procedure for the prevention or early recognition of delirium. A literature review found that a delirium bundle would be the most effective method of implementing a screening tool, the CAM-ICU, and delirium prevention strategies. The three-part bundle focused on (a) education with a pre-post test of the nursing staff regarding pathophysiology of delirium, how to prevent delirium, and how to use the CAM-ICU (b) implementation of delirium prevention strategies (c) and application of the CAM-ICU in RNs’ standard nursing care. Implementation of the delirium bundle lasted for one month. There were no positive CAM-ICUs during this time and 77.5\% of the time RNs completed the CAM-ICU on their patients. Several delirium prevention strategies improved
significantly when compared to pre-implementation. The delirium bundle can lead to lower rates of adverse patient events and have financial savings for a healthcare organization.
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Appendix A

Delirium Techniques Prevention Audit Tool created by DNP student based on ANA delirium prevention strategies (2016)

<table>
<thead>
<tr>
<th>Chart Review</th>
<th>Patient 1</th>
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<td>Age</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Admitting Diagnosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Based on Hester Davis’ Fall Risk, is patient impulsive?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Based on Hester Davis’ Fall Risk, does the patient require ambulation assistance?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fall CPG initiated if Hester Davis score 15 or greater</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are ambulation aids needed (walker, cane, gait belt, etc)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambulation/ROM: how many times in 24 hours?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Has the patient fallen since admission?</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Therapy Consult (PT/OT)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Safety</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have restraints been used on patient since admission?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the patient require a safety attendant at bedside?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I&amp;O Status in 24 hours: positive, negative, euvolemic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meals Consumed: more than 50% of meals consumed or continuous tube feeding</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cognition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Confusion present based on orientation assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pain</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed Pain assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pain management effective based on post assessment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oxygenation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SpO2 &gt;90%?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Family</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family present?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Medication</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many high risk medication does patient have on medication list based on BEERS list?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many high risk medications has the patient received in the past 24 hours?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy consult for potential polypharmacy?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If tobacco user, nicotine replacement?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If alcoholic, CIWA protocol in place?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bowel/Bladder</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many days since last bowel movement?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is patient continent?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are they taking medical sleep aids</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hearing aids?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glasses?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dentures?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Observational/Interview</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ambulation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are ambulation aids present at bedside?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>If ambulation aids are needed and not present at bedside, which aid is missing (GB, Walker, Cane)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are nurses/techs using orienting conversation when interacting with patient?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the whiteboards filled out appropriately with correct date/name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Pain</td>
<td>Do you feel your pain is being treated appropriately?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleep</td>
<td>Do you feel like you are sleeping well?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensory</td>
<td>Are glasses on or easily accessible at bedside?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Are hearing aids in or easily accessible at bedside?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Are dentures in or easily accessible at bedside?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Blinds open during day and light on?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blinds closed and lights off during sleep times?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Television off during sleep times?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>Non English speaking is interpreter utilized?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Communication board at bedside for non-verbal patient</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Collected by Investigator</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RASS score</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CAM-ICU positive or negative</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The audit tool was created from the ANA (2016) delirium prevention techniques. Hester Davis (2013) fall risk assessment scale evaluates a patient for falls. Severity of fall risk is based on...
patients’ age, date of last fall, mobility, mental status, types of medications, toileting needs, volume status, communication ability, and behavior. A Hester Davis (2013) score greater than 15 requires an RN to activate a Clinical Practice Guideline (CPG). Activation of a CPG will guide nursing care of a high fall risk patient. The American Geriatrics Society (2015) created the Beers Criteria for potentially harmful medications in older adults. The list of medication, referred to as the Beers list, inform prescribers of medication which can cause complication, like delirium. The acronym CIWA stands for Clinical Institute Withdrawal Assessment (Sullivan et al., 1989). It is an assessment for alcohol withdrawal and provides suggested administration of Ativan (lorazepam) to provide patient relief (Sullivan et al., 1989). The acronym RAAS stands for Richmond Agitation Sedation Scale and is a scale for nursing staff to assess level of agitation or sedation (Vanderbilt University, 2002). The RAAS score plays a part in the CAM-ICU for nursing staff during screening for delirium.
Appendix B

Flowsheet for CAM-ICU

Adapted from “Confusion assessment method for the ICU (CAM-ICU): The complete training manual” from Vanderbilt University 2002.
Appendix C

Burke-Litwin Causal Model

Appendix D

Data of Neuroscience Unit Restraint Use and Falls

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient Falls Rate per 1,000 Patient Days</td>
<td>4.02</td>
<td>5.83</td>
<td>5.35</td>
<td>2.37</td>
<td>5.54</td>
<td>4.72</td>
</tr>
<tr>
<td>Falls with Injury Rate per 1,000 Patient Days</td>
<td>2.01</td>
<td>2.33</td>
<td>2.14</td>
<td>0</td>
<td>2.22</td>
<td>0</td>
</tr>
<tr>
<td>Unassisted Falls per 1,000 Patient Days</td>
<td>3.02</td>
<td>3.5</td>
<td>3.21</td>
<td>2.37</td>
<td>2.22</td>
<td>1.18</td>
</tr>
</tbody>
</table>

Restraint Usage Rate Per Patient Days Hours (Compared to other medical surgical units)

- Proposed Unit: 3.27
  - Unit 1: 5.75
  - Unit 2: 1.14
  - Unit 3: 3.17
  - Unit 4: 0.89
- Proposed Unit: 2.33
  - Unit 1: 8.49
  - Unit 2: 1.75
  - Unit 3: 0.66
  - Unit 4: 1.11
- Proposed Unit: 2.49
  - Unit 1: 9.04
  - Unit 2: 0.97
  - Unit 3: 3.21
  - Unit 4: 3.49
- Proposed Unit: 1.79
  - Unit 1: 9.04
  - Unit 2: 1.30
  - Unit 3: 1.00
  - Unit 4: 0.80
- Proposed Unit: 1.01
  - Unit 1: 3.16
  - Unit 2: 1.70
- Proposed Unit: 1.60
  - Unit 1: 6.42
  - Unit 2: 0.30
  - Unit 3: 0.30
  - Unit 4: 1.63

Data of the unit’s fall rate. Restraint use of unit compared to four other randomly chosen units in hospital.
Appendix E

Pre-Implementation Data Collection Results

*Figure 1*. Pre-data of 80 patients using the audit tool. Looks at percent of patient population with impulsiveness and ambulation assistance required by staff. Care plan initiation based on Hester Davis Fall Risk Assessment score (15 and greater require a care plan). Looks at percentage of patient falls since admission. Identifies percentage of patients with therapy consults.
Figure 2. Percent of the 80 patients audited during pre-data collection who had ambulation aids (gait belt, walker, etc.) present at bedside

Figure 3. Percent of the 80 patients audited during pre-data collection who required restraints or safety attendants
Figure 4. High risk medications based on the BEERS criteria (Health in Aging, 2015) suggested by the ANA’s (2016) delirium prevention techniques. Pre-data collected on 80 patients. High risk medications counted for patients 65 and older. Percentage of patients with high risk medications on medication list. Also, percentage of patients, 65 and older, who received high risk medications. Percentage of pharmacy consults for polypharmacy or high-risk medication review.
Figure 5. Patient’s nutrition status was assessed in pre-data collection. Of the 80 patients, 56% were eating at least 50% of their meals or had enteral feedings. However, 44% of the patients were eating less than 50% of their meals and did not have enteral feedings if deemed unsafe to eat by mouth.

Figure 6. Percentage of patients in pre-data, 80 patients, who had updated whiteboards with correct name of nurse, correct date, and at least daily goals.
Figure 7. Percentage of pre-data patients who have their glasses, hearing aids, and/or dentures present at bedside or easily accessible.

Figure 8. Percentages of observations made my student of the 80 patients during pre-data collection. Promotion of sleep and wake cycle is made with blinds open and closed during respective hours. As well, during sleep times having the television turned off.
Figure 9. Pre-data collected on 80 patients. During patient interview, patients were asked to rate their sleep in the hospital on a scale of 1-5. 1 was the worst sleep they have ever experience, and 5 is the best.

Figure 10. Pre-data collected on 80 patients. During interview, patients were asked to rate how their patient was being managed while in the hospital. 1 scored no pain management, and 5 was great pain management. Pain management was described as assessment of pain, distribution of pain medication, and offering of other pain-relieving methods (heat, cold, massage, etc).
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the patient confused based on nurses’ neurological assessment?</td>
<td>32.50%</td>
<td>67.50%</td>
<td>X</td>
</tr>
<tr>
<td>Has the patient received a pain assessment in 12 hours?</td>
<td>96.25%</td>
<td>3.75%</td>
<td>X</td>
</tr>
<tr>
<td>Has the patient’s pain been reassessed after intervention?</td>
<td>92.50%</td>
<td>7.50%</td>
<td>X</td>
</tr>
<tr>
<td>Is the patient’s SpO2 greater than 90%?</td>
<td>100%</td>
<td>0%</td>
<td>X</td>
</tr>
<tr>
<td>Is family present at bedside?</td>
<td>37.50%</td>
<td>62.50%</td>
<td>X</td>
</tr>
<tr>
<td>Is tobacco replacement being utilized for patient that smoke?</td>
<td>X</td>
<td>5%</td>
<td>95.00%</td>
</tr>
<tr>
<td>Is alcohol withdrawal/replacement therapy in place for alcoholic patients?</td>
<td>2.50%</td>
<td>X</td>
<td>97.50%</td>
</tr>
<tr>
<td>Is the patient continent of urine and stool?</td>
<td>66.25%</td>
<td>33.75%</td>
<td>X</td>
</tr>
<tr>
<td>Does the patient have a sleep aid?</td>
<td>33.75%</td>
<td>66.25%</td>
<td>X</td>
</tr>
<tr>
<td>Are nurses using orienting conversation with patients?</td>
<td>91.25%</td>
<td>8.75%</td>
<td>X</td>
</tr>
<tr>
<td>Is there a language interpreter present for non-english speaking patients?</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>Is there a communication board present for non-verbal patients?</td>
<td>0%</td>
<td>2.50%</td>
<td>97.50%</td>
</tr>
</tbody>
</table>

*Figure 11*. Table created containing results of pre-implementation audit using the audit tool.
**Intake and Output Status**

<table>
<thead>
<tr>
<th>Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>30%</td>
</tr>
<tr>
<td>Negative</td>
<td>30%</td>
</tr>
<tr>
<td>Euvolemic</td>
<td>40%</td>
</tr>
</tbody>
</table>

*Figure 12. Intake and output status of patients. Percentage of patient who were fluid positive, negative, or euvolemic within 500cc.*

**Days since Last Bowel Movement**

<table>
<thead>
<tr>
<th>Days</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 days</td>
<td>20%</td>
</tr>
<tr>
<td>1 day</td>
<td>35%</td>
</tr>
<tr>
<td>2 days</td>
<td>33.75%</td>
</tr>
<tr>
<td>3 days</td>
<td>5%</td>
</tr>
<tr>
<td>4 or more days</td>
<td>6.25%</td>
</tr>
</tbody>
</table>

*Figure 13. Number of days since last bowel movement*

**Patient Demographics**

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>66.38 years</td>
</tr>
<tr>
<td>Length of Stay</td>
<td>3.56 days</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gender</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>56.25%</td>
</tr>
<tr>
<td>Female</td>
<td>43.75%</td>
</tr>
</tbody>
</table>

*Figure 14. Patient demographics of those included in pre-data. Demographics included to analyze those this a positive screening to assess all aspects of patient. Age, length of stay (Lo_st), and sex were added to demographic charts.*
Figure 15. RASS score and CAM-ICU screening. The RASS score of 1 and the positive CAM-ICU were the same patient. Only 2.50% of the patients received a 2 RASS score.
Appendix F

SWOT Analysis of Neuroscience Unit

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Part of a large healthcare organization</td>
<td>• High staff turnover. More than half of RNs having less than 2 years of experience on the unit.</td>
</tr>
<tr>
<td>• Team is eager to implement a strategy to offer patients more autonomy</td>
<td>• Patient population can be impulsive and difficult to manage</td>
</tr>
<tr>
<td>• Management values the importance of evidence-based practice change and the safety of their patients</td>
<td>• Elevated falls, restraints, and safety attendant use</td>
</tr>
<tr>
<td>• Clinical Nurse Specialist who work specifically in the neuroscience department</td>
<td>• No protocol related to delirium management</td>
</tr>
<tr>
<td>• Some prevention strategies for delirium are already being performed</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Improving quality indicators</td>
<td>• Competing priority of implementation of live video monitoring for high risk patients during time of quality improvement project</td>
</tr>
<tr>
<td>• Decreasing adverse patient events</td>
<td></td>
</tr>
<tr>
<td>• Early identification and treatment of delirium</td>
<td></td>
</tr>
<tr>
<td>• Culture of organization willing to change and implement quality improvement</td>
<td></td>
</tr>
<tr>
<td>• Avoidance of reimbursement for adverse patient events</td>
<td></td>
</tr>
</tbody>
</table>

SWOT Analysis of neuroscience unit
Appendix G

IRB Approval Letters

Available upon request.

Figure 1. IRB approval by the proposed healthcare system.

Figure 2. IRB approval by Grand Valley State University.
Figure 1. Flow diagram of search selection process. Adapted from “Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement,” by D. Moher, A. Liberati, J. Tetzlaff, D. Altman, and PRISMA Group. Copyright 2009 by PLoS Medicine.
Appendix I

Literature Review

<table>
<thead>
<tr>
<th>Author (year) Purpose</th>
<th>Design (sample, setting)</th>
<th>Intervention</th>
<th>Results</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jayita &amp; Wand (2015). A Systematic Review of delirium screening tools for hospitalized patients</td>
<td>Systematic review including 31 studies describing 21 delirium screening tools were included. Review is looking specifically at non-ICU settings for screening tools</td>
<td>Definition of delirium was found in the DSM-IV and was used to identify appropriate screening methods.</td>
<td>'The Confusion Assessment Method (CAM) was the most widely used instrument to identify delirium. The Delirium Rating Scale and its revised version performed best in the psychogeriatric population but requires an operator with psychiatric training. The Nurses’ Delirium Screening Checklist appears best suited to the surgical and recovery room setting. The Single Question in Delirium shows promise in oncology patients. The Memorial Delirium Assessment Scale, while demonstrating good measures of validity in the surgical and palliative care setting, may be better used a measure of delirium severity. The 4As Test performed well when delirium was superimposed on dementia, but it requires further study.</td>
<td>The most commonly used were the CAM, CAM-ICU, brief CAM, and the Delirium Rating Scale.</td>
</tr>
</tbody>
</table>

| Cross-sectional comparative effectiveness study including 101 randomly chosen patients aged 75 and older who could communicate, did not have terminal conditions, greater than 2 days admitted in the hospital, and were not a previous study participant. Located on 2 medical surgical unit in a hospital. | Presence of delirium was determined by experts using the definition provided by DSM-IV criteria. 2 qualified research assistance then blindly used both the CAM-ICU and 3D CAM to screen patient for delirium. | Outcomes measured through CAM-ICU, 3D CAM, family interview, patient interview and review of medical record. 19% of the participants were diagnosed with delirium after expert determination with the DSM-IV criteria. The sensitivity of delirium detection for the 3D-CAM was 95% and for the CAM-ICU was 53%, while specificity was >90% for both instruments. Subgroup analyses showed that the CAM-ICU had sensitivity of 30% in patients with mild delirium vs. 100% for the 3D-CAM. | The 3D CAM has a higher sensitivity in this population when compared to the CAM-ICU. |
Munro et al. (2017). Implementing delirium prevention through the use of automated reorientation in critically ill adults. RCT 30 patients separated into 3 groups in an Intensive Care Unit (ICU). 1 control group, 1 group received messages by non-family members, 1 group received messages from family members. Messages were scripted, no more than 2 mins in length, used the patient's preferred name, and were based on a 5th grade reading level. Messages were received during daytime hours. Outcomes were measured through the presence of delirium which was found with the CAM-ICU. The family voice group had more delirium free days than the non-family voice group, and significantly more delirium free days ($p = 0.0437$) than the control group. This RCT found the importance of delirium prevention strategies. Family presence, especially voices, can prevent delirium for a patients. Family voices reoriented the patient to their surroundings and decreased incidence of delirium.
Öztürk Birge & Tel Aydin (2017). The effect of nonpharmacological training for delirium identification and intervention strategies

| Quasi-experimental study conducted using a pretest-posttest design. Including 95 patients admitted to the medical ICU of a university hospital and 19 RNs working on the unit | Nurses on the unit received educational training improve the skills of diagnosing and managing delirium increase the efficiency of nurses and improve the patient outcomes. Also implementing non-pharmacological interventions to prevent delirium. | Outcomes were measured using the Patient and Nurse Introduction, Confusion Assessment Method for the ICU (CAM-ICU), and Delirium Risk Factors, and non-pharmacological interventions in Delirium Prevention Forms. Before education implementation, delirium was identified in 26.5% of the patients. After training, delirium was identified in 20.9% of the patients. The delirium recognition rate of nurses increased from 7.7% to 33.3% in the post-training phase. | Educational training about delirium prevention techniques can lead to increased recognition of delirium via CAM-ICU |
|---|
| Systematic Review and Meta-analysis. 22 studies included (9 studies examined CAM (n = 1,033) while 13 assessed for CAM-ICU (n = 1,409). |
| The two screening tools were compared to the Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) criteria. Two reviewers assessed the studies to determine their eligibility, validity, and quality. Sensitivity and specificity were calculated using a bivariate model. |
| Both scales can be completed in 10 minutes or less and must be completed by trained personnel. The pooled sensitivities and specificity for CAM were 82% (95% confidence interval [CI]: 69%–91%) and 99% (95% CI: 87%–100%), and 81% (95% CI: 57%–93%) and 98% (95% CI: 86%–100%) for CAM-ICU, respectively. |
| Both the CAM and the CAM-ICU are highly sensitive and specific tools to screen for delirium. However, they should not replace clinical judgment. |
| Smith & Grami, (2017). Looked in the feasibility and effectiveness of a delirium prevention bundle in critically ill patients. | RCT (Control group without delirium protocol in an 18 bed ICU and an intervention group of a 10 bed ICU) | 447 Patients admitted to an 18-bed medical-surgical ICU were in the control group and received standard ICU care. Patients admitted to a 10-bed medical-surgical ICU were in the intervention group, and received care with the delirium prevention bundle (DPB). DPB included sedation cessation, pain control, sensory stimulation, early mobility, and sleep promotion. | Outcomes measured by days of mechanical ventilation, days in restraints, and length of stay in ICU. RCT found Intervention group experienced highly significant reductions (78%) in the relative risk for delirium (odds ratio, 0.22; 95% CI, 0.08-0.56; P = .001). | Delirium is associated with increases in age, length of stay in the ICU, use of mechanical ventilation, and restraints. A delirium prevention bundle is effective in preventing delirium. |
| Trogrlic et al. (2015). Systematic review looking at implementation strategies for assessment, prevention, and management of ICU delirium and their effect on clinical outcomes | Systematic Review. 21 studies included (17 RCTs and 4 prospective and retrospective studies). Located in intensive care units (ICU) | Strategies included education, provider oriented interventions to prevent delirium, patient oriented interventions, and practice change. | Of the studies included 16 were before-after studies; one was an RCT; and 4 were prospective and retrospective cohort studies. Measured through outcomes such as mortality and length of stay. Mortality and ICU length of stay decreases found in 10 studies. 1 study found decrease in length of stay, but not mortality. | Multi-component implementation programs (ie bundles) focusing on ICU delirium assessment, prevention and treatment have better outcomes than single implementation strategies. |
Appendix J

Nurse Role Effectiveness Model

![Diagram of Nurse Role Effectiveness Model]

Figure 1. Adapted from “Linking outcomes to nurses’ roles in health care” by Irvine, Sidani, & Hall, 1998, *Nursing Economics, 16*(2), 58-59. Copyright 1998 by ProQuest.
Appendix K

PARiHS Framework

Figure 1. Adapted from “Enabling the implementation of evidence-based practice: a conceptual framework” by A. Kitson, G. Harvey, and B. McCormack. Copyright 1998 by Quality and Safety in Health Care.
Appendix L

Table of Measures

<table>
<thead>
<tr>
<th>Concept measured</th>
<th>How measured (tool, survey, variable)</th>
<th>When measured</th>
<th>Who measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation strategies</td>
<td>Pre-implementation organizational assessment. Debrief discussion with key stakeholders.</td>
<td>Pre/post implementation of delirium bundle</td>
<td>Student</td>
</tr>
<tr>
<td>Education</td>
<td>Pre/Post Testing. Attendance of in-person educational session or acknowledge reading of written information.</td>
<td>Student will schedule 8 meetings to provide education on delirium bundle. Written materials will be distributed throughout the unit in 3 binders</td>
<td>Student</td>
</tr>
<tr>
<td>CAM-ICU</td>
<td>EHR</td>
<td>Pre-implementation student will screen patients with CAM-ICU. Post-education and during implementation RNs will be expected to screen patients. Post-data will be collected during the last 2 weeks of implementation phase. Looking if RNs are screening patients, how often, and the results of the CAM-ICU, if it is identifying delirium.</td>
<td>Student</td>
</tr>
<tr>
<td>Patient Outcomes</td>
<td>Quality Data</td>
<td>Data measured by hospital system and collected by CNS who will distribute to student</td>
<td>Data collected March 2018-December 2018 for pre-implementation data. Will be collected again for months of January and February 2019 post/during implementation.</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Falls compared to National Benchmark. Also compared pre-implementation period (March 2018-December 2018) to implementation period (January 2019 and February 2019)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restraint use compared to National Benchmark. Also compared pre-implementation (March 2018-December 2018) to implementation period (January 2019 and February 2019).</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Safety attendant use for compared pre-implementation (November 1, 2018-December 6, 2018) to implementation period.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase in delirium prevention strategies to prevent delirium from occurring in patients.</td>
<td>Audit tool created by DNP student based on ANA (2016) prevention strategies.</td>
<td>Data collected pre-implementation (September 6, 2018-October 3, 2018) and during implementation period (February 11, 2019-February 21, 2019)</td>
</tr>
</tbody>
</table>

Table created by measures implemented in the quality improvement project. Also includes patient outcomes through the implemented interventions.
Appendix M

Nursing Staff Pre/Post-test

1. What is delirium?
   a. A chronic or persistent disorder of the mental processes caused by brain disease or injury and marked by memory disorders, personality changes, and impaired reasoning.
   b. An acutely disturbed state of mind that occurs in fever, intoxication, and other disorders and is characterized by restlessness, illusions, and incoherence of thought and speech.
   c. A severe mental disorder in which thought, and emotions are so impaired that contact is lost with external reality.
   d. I do not know

2. How can a nurse prevent delirium?
   a. Delirium cannot be prevented, only treated with antipsychotics
   b. Delirium may be prevented through frequent reorientation, early mobilization, adequate nutrition and hydration, presence of family, and pain control
   c. Maintain bedrest, avoid opioids/benzodiazepines, and keep room calm and dark
   d. I do not know

3. Incorporating screening every 12 hours and with any acute neurological change as well as, incorporating prevention techniques for delirium into nursing care, has the potential to decrease rates of delirium
   a. True
   b. False
   c. I do not know

4. Untreated or under recognized delirium does not lead to adverse events such as restraint use, safety attendant use, falls, increased mortality/morbidity, or longer hospital stay.
   a. True
   b. False
   c. I do not know

5. A delirious patient can act acutely confused and irritated as well as lethargic and depressed.
   a. True
   b. False
   c. I do not know

6. Identify which of the following are evidence-based delirium prevention strategies (select all that apply)
   a. Using orienting conversation
   b. Mobility
   c. Encourage patient to take frequent naps
   d. Discourage family presence
   e. Sensory stimulation (glasses/dentures/hearing aids)
   f. Pain control

7. **For RNs only.** Throughout your day you notice your patient is more lethargic and withdrawn than normal. This is an acute change. What is your next step?
   a. Perform the CAM-ICU, contact the provider, continue delirium prevention techniques
   b. This is not a possible presentation of delirium. Do nothing.
   c. Continue to monitor your patient
Appendix N

Education Provided to Nursing Staff

Implementing a Delirium Protocol for 4 South

Objectives
- Definition
- Importance
- Prevention Techniques
- Screening with CAM-ICU

Delirium
- What is delirium?
- It is a "disturbance of consciousness" (i.e., reduced clarity of awareness of the environment) with reduced ability to focus, sustain or shift attention
- This acute issue is commonly found in the elderly hospital population
- Patients experiencing delirium may have
  - Fluctuating neurological exams
  - Altered mental status
  - Impaired attention
  - Increased or decreased psychomotor skills

Importance
- Untreated delirium can lead to
  - Increased use of:
    - Rehospital
    - Safety Alarms
    - Falls
    - Dementia
    - Decreased autonomy
    - Mortality/Morbidity
    - Increased length of stay
    - Increased financial burden

Prevention
- As nursing staff, you have the ability to make a difference in your patient’s care.
- Preventing delirium is a multi-step process that can easily be incorporated into your care.
- As nurses, we need to understand the harms of delirium for our patients AND methods of prevention.
- Prevention is a team approach!
  - Some interventions are interdisciplinary intervention
  - Team approach techniques are marked by an *
  - Consider suggesting strategy for delirium prevention during rounds

Prevention Techniques
- Simple ways YOU can prevent delirium
- Orientation
  - Introduce yourself each time you enter the room. Explain your role.
  - Remind the patient they are in the hospital and explain why.
  - Use the patient’s name
  - Use short, concise instructions
  - Blinds closed at night. Blinds open in the morning
Prevention Techniques

- Nutrition and Hydration
  - Keep fluids by bolus to full
  - * If NPO, ask for immediate parenteral feedings
  - Sip small aliquots for meals
  - Feed patient when necessary
  - Track percentage of meals consumed
  - Sit patient upright for meals, in the chair if possible

- Pain Control
  - Assess pain
  - Ask patient if pain is being controlled after interventions
  - * Include pharmacological and non-pharmacological measures

- Tolering
  - Make a toleing schedule
  - If patient is incontinent, make sure to check for stools at every 2 hours
  - Assist with bowel movement and treat appropriately

Prevention Techniques

- Sensory Stimulation
  - Update the whiteboard daily
  - Ask family for pictures from home
  - Invite family to stay and visit with patient
  - Keep stairs, hearing aids, and dentures in during day time and easily accessible
  - Have meaningful conversations
  - * Consider OT consult

- Mobility
  - Aggressive early mobility is key!
  - If patient is bed bound, perform ROM 2-4 times a day
  - Encourage patient to sit in chair for meals
  - Encourage family to walk with patient if safe
  - Walk the patient in the halls
  - * Consider PT/OT consult

Prevention Techniques

- Sleep
  - Sleep is so important
  - Although there are frequent neurological checks during sleeping hours, try to coordinate care between nursing staff to discourage interruptions
  - Keep room dark and noise free
  - TV off
  - Keep the unit quiet

Prevention Techniques

- Polypharmacy
  - A large list of medications can cause confusion
  - If your patient has several medications including antibiotics, antipsychotics, pain medications, and benzodiazepines
  - * Consider asking for a pharmacy consult to review safety of medication list
**Recognition**

- Recognizing delirium is the next step.
- The CAM-ICU is a delirium screening tool commonly used in Intensive Care Units (ICU).
- On [redacted], we will be implementing the CAM-ICU for all patients.
- It is expected that nurses will screen each patient with the CAM-ICU once a shift AND with any acute neurological change.

**CAM-ICU**

- Using the CAM-ICU:
- Instructions for how to complete the CAM-ICU are located in 2 locations.
- [Redacted] Delirium Prevention and Management for Adult Critical Care Patients: Guidelines
- Prompts on the right-hand side bar.

**Step 1**

- Assess for a change or fluctuating mental status by answering the question:
  - "If there was a change in the patient's mental status yesterday - what is the reason?"
  - If they differed from how they usually are prior to this admission.
  - Consider the baseline normal mental status and not how they appeared "yesterday".
- If the patient does not have an acute change from their baseline they are "CAM-ICU negative" and they do not have delirium. If the CAM-ICU screen is complete, no need for additional steps.
- For patients whose admission is related to a neurologic injury (e.g., stroke, traumatic brain injury, drug overdose, acute brain injury) they are assessed for their "new normal", not how they were previously in their neurologic injury.
- If the patient does not have a change or fluctuating mental status, assess Step 2.

**Step 2**

- Assess the patient's ability to maintain attention while performing the task of squeezing the staff member's hand when they hear the letter "A". If one of the following phrases is spelled:
  - "SAVEABRAME" alternately can read using "SAVEABRAME" to provide options for repeated testing.
  - Scoring: the patient is CAM-ICU negative, no delirium if they squeeze the practitioner's hand whenever they hear the letter "A". It is considered an error if they squeeze on letters other than "A". If they do not squeeze when hearing the letter "A", if they have 0 - 2 errors they are CAM-ICU negative, they are not delirious and the screen is complete.
- If they have more than 2 errors, including the inability to follow directions, continue to test Step 3.

**Step 3**

- **Does the patient have a Richmond Agitation and Sedation Scale (RASS) score other than 0?**
  - If the RASS is anything other than 0 they are CAM-ICU positive, the patient is delirious and the screen is complete.

**RASS score**

- [Diagram of the RASS scale]
- You are also able to chart the RASS under the Cognitive tab of the assessment section.
- If the RASS is positive, continue to the next step.
Step 4

- Assesses disorganized thinking by asking the following questions:
  - Will a stone float on water?
  - Are there fish in the soil?
  - Does one pound weigh more than two?
  - Can you see a hammer to pound a nail?
- Alternately, Step 4 can be assessed by asking the patient to:
  - "Hold up the many fingers" (hold up 5 fingers)
  - "Now do the same thing with the other hand" (do not demonstrate or can request they "Add one more finger" if the patient is unable to move both arms.
- 0 to 1 errors is CAM-ICU negative, the patient is not delirious and the screen is complete.
- More than 1 error is CAM-ICU positive, the patient has screened positive and is delirious.

What to do with the Results

- **Negative Screen**
  - Continue with your delirium prevention techniques

- **Positive Screen**
  - Contact your provider,
  - Continue/review your prevention techniques for delirium
  - Do not use restraints. This will only lead to increased behaviors of delirium

Example

- You are performing your daily head to toe assessment. Patient is alert and oriented x4 which is their baseline.
  - Screen with the CAM-ICU
  - CAM-ICU will be negative after step 3
  - Screen is complete
  - Continue with prevention techniques

Example

- Your patient is normally oriented x4. During your q4 hour neuro check, patient is confused to time and situation. This is an acute neurological change. You screen with the CAM-ICU. Follow the steps of the CAM-ICU.
  - The CAM-ICU can aid the nurse in deciding if confusion is delirium or another neurological effect.
  - Complete the CAM-ICU
  - Call provider with changes

CAM-ICU

- This is a multi-step screening, but it is easy!

  - The maximum amount of time this screen will take is 5 minutes.

Conclusion

- It is important for all nursing staff to be aware of the effects delirium has on the patient, nursing staff, and hospital.
  - Prevention is key! Simple steps can be taken to prevent delirium
  - Screening for delirium is evidence-based and beneficial for patient care. Early recognition provides faster treatment for the patient
• Thank you for your participation in this project.
• You are all making a difference in your patient’s lives!
• You rock!

Education given to neuroscience unit nursing staff. Education present at in person sessions and supplied in binders throughout the unit.

References
## Appendix O

Budget of Quality Improvement Project

<table>
<thead>
<tr>
<th>Initial Cost: Delirium Bundle outside of ICU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of a Delirium Bundle on a Neuroscience Medical Surgical Unit</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager Time (in-kind donation)</td>
</tr>
<tr>
<td>Team Member Time:</td>
</tr>
<tr>
<td>Statistician (in-kind donation)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost Mitigation (prevention of delirium)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of Hospital Stay (Increased length of stay, 4.2 days for one delirious patient)</td>
</tr>
</tbody>
</table>

| Total Income | $10,989.00 |

<table>
<thead>
<tr>
<th>Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Manager Time (in-kind donation)</td>
</tr>
<tr>
<td>Statistician (in-kind donation)</td>
</tr>
<tr>
<td>Team Member Time:</td>
</tr>
<tr>
<td>Registered Nurses (extra time spent in meetings to be educated on pilot project)</td>
</tr>
<tr>
<td>Nursing Technicians (extra time spent in meetings to be educated on pilot project)</td>
</tr>
<tr>
<td>Unit Manager (in-kind donation)</td>
</tr>
<tr>
<td>Clinical Nurse Specialist (in-kind donation)</td>
</tr>
<tr>
<td>Nursing Director (in-kind donation)</td>
</tr>
<tr>
<td>Professionally Printed White Paper</td>
</tr>
<tr>
<td>Educational Materials Supplied in Binders</td>
</tr>
</tbody>
</table>

| Total Expenses | $4,695.20 |

| Operating Income | $6,293.80 |

Budget created of revenue and expenses for implementation of Delirium Bundle
Appendix P

Timeline of DNP Student’s Project

Timeline created to complete the quality improvement project.
Appendix Q

Post-Implementation Results

Figure 1. N=80 pre and post implementation. Pre-implementation RNs did not fill out any CAM-ICUs because it was not a part of their standard nursing care. Post-implementation found 77% of the 80 patients audited had their CAM-ICU completed by the RN within 12 hours.

Figure 2. N=80 pre and post implementation. Pre-implementation found 2% of the 80 patients had a positive screening. Post implementation of the delirium bundle found 78% of screening tools were negative and the other 22% were not completed or completed incorrectly.
Those who required High Fall Risk CPG scored 15 or greater on Hester Davis Fall Risk Assessment. There was sufficient evidence to say that the proportion of patients that had a Fall CPG initiated differs pre and post implementation ($X^2 = 9.25, p = 0.0023$). There is a higher proportion of patient post implementation (69.6%) than pre implementation (30%). However, statistical analysis does not take into consideration the amount of patients who did not require a CPG to be initiated. Pre-implementation 40 of the 80 patients required implementation. Post-implementation, 23 of the 80 patients required a CPG to be initiated based on the Hester Davis Fall Risk Assessment.
Figure 4. N=80 pre and post implementation. This figure presented the percentage of patients who were impulsive. Thus factor helped the DNP student understand what the general type of patient sampled was. Patients in pre-implementation audit required more ambulation assistance but were not as impulsive. Patients in the post-implementation phase were more impulsive but were more independent with ambulation. This may have contributed to better outcomes based on ambulation needs.

Figure 5. N=80 pre and post implementation. This figure demonstrates the percentage of patients who required ambulation assistance.
Figure 6. N=80 pre and post implementation. This figure presented the percentage of patients needed equipment for ambulation.

Figure 7. N=80 pre and post implementation. There was sufficient evidence to say that the proportion of patients that had a ROM at least 4 time in 24 hours differs pre and post implementation ($X^2 = 25.3$, $p < 0.0001$). There is a higher proportion of patient post implementation (76.3%) than pre implementation (39.7%).
Figure 8. N=80 pre and post implementation. During observation, if patient required ambulation equipment, DNP student would see if the equipment was readily available at bedside. No significant difference pre compared to post ($X^2 = 2.97$, $p = 0.0845$).

<table>
<thead>
<tr>
<th>Ambulation Aids Missing at Bedside</th>
<th>Pre-Implementation</th>
<th>Post-Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gait Belt</td>
<td>2%</td>
<td>10%</td>
</tr>
<tr>
<td>Walker</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Cane</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>N/A</td>
<td>97%</td>
<td>87%</td>
</tr>
</tbody>
</table>

Figure 9. Specified which ambulation equipment was missing from bedside when required by patient. This measure added after initial audit of 80 patient as collected pre-implementation. 8 patients were collected pre-implementation and compared to 80 patients post-implementation.
Figure 10. N=80 pre and post implementation. Pre-implementation found 4% of 80 patients needed a safety attendant, 16% needed restraints, and 1% experienced a fall. Post-implementation found 0% of 80 patients needed a safety attendant, 1% required restraints, and 4% experienced a fall. There was only sufficient evidence to say that the proportion of patients that had restraints used differs pre and post implementation ($X^2 = 11.27, \ p = 0.0008$). There was no significant change in safety attendant use or falls.
Figure 11. N=80 pre and post implementation. This graph compares pre and post implementation of sensory stimulation (glasses) accessibility. Only significant evidence to say availability of glasses post-implementation (p = 0.0199)

Figure 12. N=80 pre and post implementation. This graph compares pre and post implementation of sensory stimulation (hearing aids) accessibility. No significant difference.
Figure 13. N=80 pre and post implementation. This graph compares pre and post implementation of sensory stimulation (dentures) accessibility. No significant difference.

Figure 14. N=80 pre and post implementation. DNP student observed if a day/night cycle was kept with closing of window curtains at night.
Figure 15. N=80 pre and post implementation. DNP student observed if a day/night cycle was kept with opening of window curtains during the day. Significant finding were for opening the windows during the day when comparing pre and post implementation (p = 0.0001).

Figure 16. N=80 pre and post implementation. DNP student observed if a day/night cycle was kept with turning televisions off at night.
Figure 17. N=80 pre and post implementation. Pre-implementation of the delirium bundle found 61% of whiteboards missing information (patient name, name of nurse, correct date, at least 2 goals for hospital stay). Post-implementation found 40% of whiteboards filled out incorrectly. There was sufficient evidence to say that the proportion of patients that have their whiteboards filled out correctly differs pre and post implementation ($X^2 = 7.22, p = 0.0072$).
There was sufficient evidence to say that the distribution of pain scale responses differs pre and post implementation (Wilcoxon Rank Sum test, $S = 5586$, $p = 0.0025$). The responses were ranked higher on the scale post implementation, meaning the patients thought their pain was being better managed post imp compared to pre imp.

*Figure 18.* N=80 pre and post implementation. There was sufficient evidence to say that the distribution of pain scale responses differs pre and post implementation (Wilcoxon Rank Sum test, $S = 5586$, $p = 0.0025$). The responses were ranked higher on the scale post implementation, meaning the patients thought their pain was being better managed post imp compared to pre imp.
There was sufficient evidence to say that the distribution of sleep scale responses differs pre and post implementation (Wilcoxon Rank Sum test, $S = 5573.5, p = 0.0029$). The responses were ranked higher on the scale post implementation, meaning the patients thought their quality of sleep was better post imp compared to pre imp.

![Patients’ Sleep Quality](image)

**Figure 19.** N=80 pre and post implementation. There was sufficient evidence to say that the distribution of sleep scale responses differs pre and post implementation (Wilcoxon Rank Sum test, $S = 5573.5, p = 0.0029$). The responses were ranked higher on the scale post implementation, meaning the patients thought their quality of sleep was better post imp compared to pre imp.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pre-Implementation (n=80)</th>
<th>Post-Implementation (n=80)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>Rate</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>56% Male</td>
<td>43% Male</td>
</tr>
<tr>
<td></td>
<td>44% Female</td>
<td>57% Female</td>
</tr>
<tr>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Length of stay (days)</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Age</td>
<td>66</td>
<td>63</td>
</tr>
</tbody>
</table>

**Figure 20.** N=80 pre and post implementation. Mean age, length of stay, and sex both pre and post implementation.
Figure 21. N=80 pre- and post-implementation. High risk medications were accounted for patients aged 65 and greater and were based off of BEERs list criteria. Post-implementation sampled a younger age group, mean of 63 years, which may have resulted in better outcomes.
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes Pre-Implementation</th>
<th>No Pre-Implementation</th>
<th>Yes Post-implementation</th>
<th>No Post Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the patient confused based on nurses’ neurological assessment?</td>
<td>33%</td>
<td>67%</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Has the patient received a pain assessment in the past 12 hours?</td>
<td>96%</td>
<td>4%</td>
<td>98%</td>
<td>2%</td>
</tr>
<tr>
<td>Has the patient's pain been reassessed after intervention?</td>
<td>92%</td>
<td>8%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Is the patient's SpO2 greater than 90%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Is family present at bedside?</td>
<td>38%</td>
<td>62%</td>
<td>48%</td>
<td>52%</td>
</tr>
<tr>
<td>Is the patient continent of urine and stool?</td>
<td>66%</td>
<td>34%</td>
<td>84%</td>
<td>16%</td>
</tr>
<tr>
<td>Does the patient have a sleep aid?</td>
<td>34%</td>
<td>66%</td>
<td>53%</td>
<td>47%</td>
</tr>
<tr>
<td>Are nurses using orienting conversation with patients?</td>
<td>91%</td>
<td>9%</td>
<td>97%</td>
<td>3%</td>
</tr>
<tr>
<td>Does the patient have therapy consulted?</td>
<td>68%</td>
<td>32%</td>
<td>70%</td>
<td>30%</td>
</tr>
</tbody>
</table>

*Figure 22.* N=80 pre and post implementation. Table created containing results of pre and post implementation audit using the audit tool. Improvement post-implementation seen in pain assessment frequency, reassessment of pain frequency, family presence at bedside, continence of patients, sleep aid availability, nursing staff using orienting conversation, and consults to therapy.
Appendix R

Policy for Delirium on a Medical Surgical Unit

**GUIDELINE: Delirium Prevention and Management for Adult Medical/Surgical Patients**

1. **Purpose**

   Provide a guideline for medical/surgical nursing staff regarding the screening and prevention of delirium in adult patients.

2. **Definitions**

   According to the Diagnostic and Statistical Manual of Mental Disorder (DSM-IV) delirium is a disturbance of consciousness with a reduced ability to focus, sustain or shift attention. It is a change in cognition or the development of a perceptual disturbance that is not better accounted for by a preexisting, established or evolving dementia. The disturbance develops over a short period of time (usually hours to days) and tends to fluctuate during the course of the day. There is evidence from the history, physical examination or laboratory findings that the disturbance is caused by the direct physiological consequences of a general medical condition (American Psychiatric Association, 2000).

3. **Guideline Contents**

   **Types of Delirium**
   - Hyperactive delirium: occurs in ~1% of patients and is demonstrated by restlessness, agitation and/or combativeness.
   - Hypoactive delirium: occurs in ~35% of patients and is demonstrated by lethargy, sedation and stupor.
   - Mixed delirium: occurs in ~64% of patients and is demonstrated by alternating periods of hyperactive and hypoactive episodes.

   **Prevalence and Incidence**

   Prevalence of delirium in a medical surgical unit is 18 to 35 percent and incidence is 11 to 14 percent (Inouye, Westendorp, & Saczynski, 2014).

   **Short Term Outcome of Delirium**
   - Delusions, hallucinations, altered memories
   - Prolonged hospitalization
   - Increased mortality
   - Increased cost

   **Long Term Outcome of Delirium**
   - Mortality
• Cognitive impairment
• Need for skilled nursing facility after discharge

Known Risk Factors for Delirium
• Preexisting dementia
• History of hypertension
• History of alcoholism
• High severity of illness on admission

Potential Precipitating Factors for Delirium
• Medications
• Infection
• Dehydration
• Immobilization
• Restraints
• Malnutrition
• Electrolyte imbalance
• Sleep deprivation
• Respiratory insufficiency
• Tubes/catheters

4. Delirium Assessment

The CAM-ICU is the assessment tool created for adult patients and should be done at least once per shift and prn changes in the patient’s mentation or behavior. Although designed for the ICU, the CAM-ICU may also be used in a medical/surgical setting. This tool has a sensitivity of 81% and a specificity of 98% (Shi, Warren, Saposnik, & Macdermid, 2013). The CAM-ICU assesses for an acute change in a patient’s mental status or for fluctuations in the mental status such as:

• Inattention
• Altered level of consciousness
• Disorganized thinking

Directions for CAM-ICU Completion (Vanderbilt University, 2002)

Step 1: Assess for a change or fluctuating mental status by answering the question “Is there an acute change from the patient’s mental status baseline” – meaning are they different from how they usually are prior to this admission. Consider the baseline their normal mental status, not how they appeared “yesterday”. If the patient does not have an acute change from their baseline they are “CAM-ICU” negative and they do not have delirium. The CAM-ICU screen is complete.
For patients whose admission is related to a neurologic injury (e.g. stroke, traumatic brain injury, drug overdose, anoxic brain injury) they are assessed for their “new normal”, not how they were before their neurologic injury.

If the patient does have a change or fluctuating mental status, assess Step 2.

**Step 2:** Assess the patient’s ability to maintain attention while performing the task of squeezing the staff member’s hand when they hear the letter “A” when one of the following phrases is spelled: “SAVEAHAART”, alternately can test using “SAVEABRAAN” to provide options for repeated testing.

Scoring: the patient is CAM-ICU negative, no delirium if they squeeze the practitioner’s hand whenever they hear the letter “A”. It is considered an error if they squeeze on letters other than “A”, or if they do not squeeze when hearing the letter “A”.

If they have 0 – 2 errors they are CAM-ICU negative, they are not delirious and the screen is complete. If they have more than 2 errors, including the inability to follow directions, continue to test Step 3.

**Step 3:** Does the patient have a Richmond Agitation and Sedation Scale (RASS) score other than 0? If the RASS is anything other than 0 they are CAM-ICU positive, the patient is delirious and the screen is complete.

If the RASS is 0 continue to Step 4.

**Step 4:** assesses disorganized thinking by asking the following questions:

- Will a stone float on water?
- Are there fish in the sea?
- Does one-pound weigh more than two?
- Can you use a hammer to pound a nail?
- Alternately, Step 4 can be assessed by asking the patient to:
  - “Hold up these many fingers” (hold up 2 fingers)
  - “Now do the same thing with the other hand” (do not demonstrate) or can request they “Add one more finger” if the patient is unable to move both arms.

0 to 1 errors is CAM-ICU negative, the patient is not delirious and the screen is complete.

More than 1 error is CAM-ICU positive, the patient has screened positive and is delirious.

5. Delirium Prevention Strategies

There is no evidence that medication administration of antipsychotics or sedatives will reduce the risk of delirium. Non-pharmacologic strategies are the primary interventions for delirium prevention (Interdisciplinary Team). (ANA, 2016)
• Early and progressive mobility
  ▪ Improves functional outcome
  ▪ Reduces the duration of delirium, if it does occur.
• Sleep/Wake Cycle enhancement, ideally with non-pharmacologic methods:
  ▪ Provide day-night cues
  ▪ Prevent / reduce constant environmental stimulation
  ▪ Encourage mobility during the day to encourage sleep at night
  ▪ Administer ordered sleep meds only if necessary.
  ▪ Sedation is not sleep!! DO NOT administered sedating medications with the misconception of improving sleep.
• During day time hours:
  ▪ Raise blinds
  ▪ Allow only brief naps
  ▪ No caffeine after 1500
• During night time hours:
  ▪ Dim lights
  ▪ Close curtains
  ▪ Provide a warm bath
  ▪ Adjust alarms to prevent nuisance or un-actionable alarms
  ▪ Optimize room temperature to patient’s preference
  ▪ Turn off TV.
  ▪ Identify patient’s home sleep routine and mimic if possible
• Provide purposeful reorientation:
  ▪ Introduce each care provider and their role that enters the patient’s room.
  ▪ Explain why the patient is hospitalized
  ▪ Explain where they are, the progression of the illness, day, date, time, etc.
• Assure adequate oxygenation
• Manage pain
• Prevent or relieve constipation
• Provide nutrition and fluid
• Encourage the use of the patient’s glasses and / or hearing aids.
• Encourage cognitive stimulation such as reading material, games, etc.
• Begin rehabilitation as soon as possible
• Incorporate the patient’s family into routine care as desired by both patient and family.
• Minimize polypharmacy and use non-deliriogenic medications when possible.
• Close observation and monitoring for delirium when deliriogenic medications are required.

Avoid Medication Commonly Associated with Delirium

• First generation (sedating) antihistamines
• Antispasmodic
• Tricyclic antidepressants
• Muscle Relaxants
• Benzodiazepines
• Non-benzodiazepine hypnotics
• CNS acting alpha agonist hypotensive agents

6. Delirium Management: When patient screens positive for delirium.

• CAM-ICU screens positive
  o Alert the provider
  o Continue prevention strategies
    o Try to avoid physical restraints and sedating medications