DEVELOPMENT AND EVALUATION OF A NURSE LEADER DIRECTED DELIRIUM PREVENTION BUNDLE IN AN OBSERVATION SETTING

An Evidence-Based Scholarly Project

Submitted to Wilmington University College of Health Professions

in Partial Fulfillment of the

Requirements for the Degree

Doctor of Nursing Practice

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August 2024

Wilmington University

College of Health Professions and Natural Sciences

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Title: Development and Evaluation of a
Nurse Leader Directed Delirium Prevention Bundle in an Observational Setting

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Delirium is characterized by an acute abrupt cognitive behavior change that is highly prevalent among hospitalized adult patients and is preventable. Annually, delirium affects more than 2.6 million adult patients in the United States of America. Additionally, the prevalence of delirium among hospitalized patients ranges from 25% to 77% depending upon the setting. Elderly patients 65 years and above are at a higher risk of developing delirium, with a higher number of dementia patients requiring hospitalization are likely to develop delirium. As a result, there is an urgent need to improve delirium detection and prevention among elderly patients to mitigate the risks of adverse outcomes. This quality improvement project aimed to determine whether implementing a nurse-leader-directed delirium prevention bundle would reduce the incidence of delirium in an observation unit.

This quality improvement project implemented a nurse-leader directed delirium prevention bundle that consisted of four key elements: meeting and educating the observation unit nursing staff about the delirium prevention bundle, training the observation unit nursing staff on how to use the Confusion Assessment Method (CAM) tool for screening delirium, screening each patient at the unit for delirium using the CAM tool upon admission and every 12 hours, and intervention treatment including, adequate hydration and nutritional intake, optimal oral hygiene, safe sleep guidelines, noise regulation, exposure to natural lighting, and sensory support and being surrounded by relatives. The results showed that the incidence of delirium dropped from 25% to 12% ($p<0.005$; statistically significant). The hospitalization duration also significantly dropped to 11.34 ($p<0.002$; statistically significant) days following the nurse-leader-directed

delirium prevention bundle's implementation. The project concluded that implementing a nurse-leader-directed delirium prevention bundle is the most successful approach to minimizing delirium incidence in the observation setting.

Keywords: Delirium, Non-pharmacological delirium interventions, Delirium prevention bundle, Observation unit, and Quality improvement.

ACKNOWLEDGEMENTS

I would like to acknowledge and offer my special thanks to my project advisor Dr. Stacey Malinowski who made this work possible by her unwavering support brilliant commitment, suggestions, and support throughout all stages of this project. Additionally, I would like to extend my gratitude to Dr. Mukuka Mumbi my project team member for actively helping with securing my project site and picking up my phones when needed. My special thanks goes to my husband and my family for their daily encouragement and emotional support when writing my project. Finally, I am grateful to God for renewing my strength daily throughout the process of this Doctor of Nursing Practice Program.

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ABBREVIATIONS

AD8- The Eight-item Informant Interview to Differentiate Aging and Dementia

AKTIVER- Alltags-und Kognitions Training & Interdisziplinaritat verbssert Ergebnis undmindert das Risiko

ARCC - Advancing Research and Clinical Practice through close Collaboration.

AWOL- Age over 80 (A), inability to spell World backwards (W), disOrientation (O), and moderate to severe level of iLlness based on subjective nursing rating (L).

b-CAM- Brief Confusion Assessment Method

EBP – Evidence-Based Practice

CAM – Confusion Assessment Method

CI – Confidence Interval

DRFI- Delirium Risk Factor Identification

HR – Hazard Ratio

IQR – Interquartile Ranges

MD – Mean Difference

NuDESC- Nursing Delirium Screen Scale

OR – Odd Ratio

P- P value

PDSA – Plan, Do, Study, Act

PICOT – Population, Intervention, Comparison, Outcome, and Time

POD- Postoperative Delirium

RASS- Richmond Agitation Sedation Scale

RR- Risk Ratio

TSUU- Trauma/Surgical Universal Unit

CHAPTER ONE

INTRODUCTION

Problem Description

Background

Delirium is an acute abrupt cognitive behavior change that is highly prevalent among hospitalized adult patients and is preventable. Annually, delirium affects more than 2.6 million adult patients in the United States of America (Elder et al., 2023). The prevalence of delirium among hospitalized patients is 25%, 50% in surgical patients, 20% among patients in nursing homes, 77% among burn patients, and 75% among patients admitted to the intensive care unit (ANA, 2023). Several factors can predispose hospitalized older patients to developing delirium. These includes abnormal lab results like increased white blood cells, post-surgical infections, electrolyte imbalances, urinary tract infections from indwelling catheters and central lines, dehydration, pain, and other co-morbidities (He et al., 2022). Additionally, delirium is a significant financial burden and costs the United States healthcare industry's economy anywhere from $ 38 billion to $ 152 billion annually (ANA, 2023). As a result, there is an urgency to improve delirium detection among elderly patients to mitigate the risks of adverse consequences.

Delirium is characterized by disturbances in attention and cognition with an acute onset leading to increased risk of falls by fourfold (He et al., 2022). There are three subtypes of delirium; hypoactive delirium characterized by a patient state of sedation, motor slowness, lethargy, minimal interactions, reduced awareness, alertness, and speech (Klein & Kvam, 2021); hyperactive delirium associated with agitation, hallucination, disorientation, fast speech, speaking loudly, irritability, crying, laughing, and singing. Whereas patients with mixed delirium display a combination of hypoactive and hyperactive symptoms alternating (Bozkul et al., 2021).

Therefore, establishing a framework that ensured clinical experts recognize delirium signs and symptoms in all subtypes remained essential to prevent adverse outcomes.

Furthermore, delirium is a devastating condition, triggering a robust burden on the patient's health, families, and healthcare system. Since the prevalence of delirium is often under-recognized, misdiagnosed, and inadequately managed, most delirium patients suffer from cognitive decline, decline in functional independence, prolonged hospitalization increased morbidity and mortality rates (Janssen et al., 2019; Mazzola et al., 2021). The treatment of delirium is associated with a significant financial burden on medical services and costs as reported medical financial expenditures ranging from $ 806 to $ 24, 509 in 2019 per person. The mean annual healthcare costs for a single delirium patient was $ 146, 358, significantly higher than $ 94, 609 for non-delirium patients (Mosharaf et al., 2022). As a result, high hospitalization costs associated with delirium demonstrated the urgent need to identify and adopt interventions that reduce delirium and demonstrate cost-effectiveness in the healthcare sector to enhance optimal care delivery.

Interestingly, a needs assessment conducted at the project site found the prevalence of delirium cases to be 25%. While the project site had adopted a routine standard of care as a clinical approach to prevent delirium cases, it proved insufficient to prevent the occurrence of delirium cases. Additionally, the project site lacked a standardized process for identifying patients at risk of developing delirium. This evidence highlighted the gap in the current practice and necessitated the need to implement an intervention based on existing evidence-based practices that would accelerate the prevention of delirium cases in the observation unit.

Nurses as frontiers were positioned in driving the proposed delirium prevention bundle by monitoring changing patterns in patient behavior throughout their shifts (Bergjan et al., 2020).

Therefore, healthcare providers were required to apply the proposed delirium prevention bundle to assess, diagnose, plan, implement, and evaluate the patient to enhance adequate care provision preventing delirium (Toney-Burtler & Thayer, 2023). Thus, this Doctor of Nursing Practice (DNP) project sought to implement a nurse-leader directed delirium prevention bundle to reduce the prevalence of delirium cases among adult patients admitted to the observation unit.

Rationale

Despite the hospital's efforts to implement routine measures to prevent the prevalence of delirium cases among adult patients admitted to the observation unit, a baseline assessment conducted at the project site found a prevalence of delirium cases of 25%. The average length of hospital stay for a patient with delirium admitted through the Observation Unit was 24 days, higher than the United States of America's recommended average length of hospitalization of 5.5 days (Tipton et al., 2021). Prolonged hospitalization raises healthcare costs and exposes patients to delirium-associated sequelae such as falls, dementia, and mortality. Research evidence suggested that delirium is a preventable medical condition, with 30-40% of reported delirium cases highly avoidable if delirium prevention bundle is implemented (Janssen et al., 2019; Mosharaf et al., 2022).

This project focused on improving delirium detection during inpatient admission by screening patients and implementing a delirium prevention bundle to reduce delirium cases in the observation unit. Additionally, Godfrey et al. (2020) revealed that implementing a multicomponent delirium prevention bundle led to a one-third decline in the prevalence of delirium cases among hospitalized patients. Thus, this project aimed to implement a nurse-leader directed delirium prevention bundle on the observation unit that would reduce the incidence of delirium to 15%. By reducing the delirium cases by a 10% margin, the observation unit would

incur a return on investment of a similar margin, which can be applied to offering optimal care to other patients in need rather than treating delirium.

Theoretical Framework

This quality improvement project adopted the Plan-Do-Study-Act (PDSA) quality improvement framework to implement the practice change on observation unit (Appendix A). This rapid-cycle quality improvement model provided an ideal framework for developing and implementing changes that led to improvement (England, N.H.S., 2021). The four stages of the PDSA cycle included:

Plan

This quality improvement project sought to implement change in practice within an identified hospital's observation unit. The project's main objective aimed at reducing delirium cases among adult patients admitted through the observation unit by implementing a nurse leader directed delirium prevention bundle. A baseline assessment revealed that the prevalence of delirium in the observation unit is 25% despite the nursing staff utilizing a routine care treatment while offering treatment towards patients at risk of developing delirium. Therefore, this quality improvement project concentrated on how to reduce the prevalence of delirium among adult patients admitted to the observation unit to 15% or below by implementing a nurse-leader directed delirium prevention bundle. The Doctor of Nursing (DNP) project leader collected data from observation unit charts and other hospital quality improvement reports to assess the project's outcomes and whether it realized the projected predictions.

Do

At this stage, the nursing staff began screening each patient for delirium using the confusion assessment method (CAM) tool upon admission and after every twelve hours. All eligible patients received treatment based on the nurse-leader directed delirium prevention

bundle intervention. These patients received appropriate treatment therapy, adequate hydration and nutritional intake which met the recommended daily requirement, optimal oral hygiene, and safe sleep guidelines. The patients remained exposed to natural lighting, maintained noise reduction, and provided with sensory support. The patients were surrounded by their family members during the entire hospitalization as familiar faces. The observation unit staff remained responsible of maintaining health records on the incidence of delirium throughout this project duration.

Study

The DNP project leader studied the effectiveness of the nurse-leader directed delirium prevention bundle in reducing the prevalence of delirium cases. Thus, the DNP project leader completed an analysis of reported delirium cases before and after implementation of the intervention and recorded whether there are any changes. Furthermore, the DNP project leader initiated a comparison of the reported delirium rates at the end of the quality improvement project based on the predictions and highlighted possible changes. Finally, the DNP project leader summarized key aspects learned throughout the quality improvement project duration.

Act

During this stage, in collaboration with the hospital leadership, the DNP project leader decided whether the nurse-leader directed delirium prevention bundle will be implemented as a new standard of care in the observation unit. The delirium prevention bundle will be sustained to impact delirium cases, and other medical surgical units starting with current satellite facility, then eventually systems wise. Additionally, at this stage, the DNP project leader planned to implement the next PDSA cycle on the unit.

Variables

This quality improvement project examined the relationship between the delirium prevention bundle and reported delirium cases in adult patients admitted to the observation unit. The independent variable was the nurse-leader directed delirium prevention bundle, and the dependent variable was the reported delirium cases during the project period. The project also assessed the patients' demographic data that included age, gender, and ethnicity. Other outcomes assessed during this project included the length of hospital stay, duration of delirium among delirious patients, compliance with CAM screening, and compliance with the treatment interventions.

Significant assumptions associated with this project included: This quality improvement project would demonstrate that the implementation of the best evidence on delirium prevention bundle would reduce the incidence of delirium on observation unit (Smith & Bonnel, 2022). Secondly, the PDSA model would integrate both the system and change theories that will ultimately influence the outcomes. Lastly, the implementation of the delirium prevention plan would be done in a transparent manner that grants other scholars' chance for replication and testing in different population and healthcare settings.

Evidence-Based Practice Model

This quality improvement project was guided by the Advancing Research and Clinical Practice through Close Collaboration (ARCC) model evidence-based practice (EBP) model. The model was conceptualized to present a framework to advance evidence-based practice within an academic medical center and surrounding vicinity (Fineout-Overholt & Melnyk, 2019). As a framework, ARCC model focused on the system-wide implementation and sustainability of evidence-based practice to achieve quality healthcare outcomes (Melnyk et al., 2021). The model comprised of five key steps, assessing the culture and organizational readiness for intervention

implementation in the healthcare system, identify the facilitators and barriers of the evidence-based practice process in the organization, identify the project mentors, implement evidence into organizational practice, and evaluate the outcome resulting from the practice change (Melnyk et al., 2021; University of Maryland, 2020).

The ARCC model significantly related to this project since it provided an opportunity to apply evidence-based practice on the delirium prevention bundle and how it impacted delirium cases within the observation unit. In addition, the ARCC model provided a guideline for assessing cultural and organization's readiness that demonstrated the commitment to supporting implementation of the delirium prevention bundle. The model aided in ascertaining the facilitators and barriers that might hinder the implementation of the delirium prevention bundle in the unit, including nurses' increased workload, competing clinical demands and patient-related factors. Identifying these barriers assisted the DNP student to formulate strategies to overcome them and ensure the project succeeds. The ARCC model assisted to identify the project mentor who provided mentorship that enhanced the successful implementation of the delirium prevention bundle as a practice. Finally, the ARCC model aided in evaluating this project outcome on whether the implementation of the delirium prevention bundle reduced the incidence of delirium at the observation.

Specific Aims

This quality improvement project aimed to determine whether implementing a nurse-leader-directed delirium prevention bundle would reduce the incidence of delirium in an observation unit. The population, intervention, comparison, outcome, and time, (PICOT) question is: In adults (P), does implementing a nurse leader directed delirium prevention bundle (I) compared to routine care treatment (C) impact delirium rates (O) in an observation unit over six weeks (T)? The short-term goal of this quality improvement project was to implement a

nurse-leader directed delirium prevention bundle that would reduce the incidence of delirium from 25% to 15%. The long-term goal of this quality improvement project was that the observation unit would record a delirium incidence rate of < 2% following the implementation of the nurse-leader directed delirium prevention bundle.

Definition of Key Terms

The following concepts and operation definition of key terminologies were applied throughout this quality improvement project:

- ***Confusion Assessment Method (CAM) tool****:* It is defined as a validated tool applied for assessing delirium in this study (Rieck et al., 2020).
- ***Delirium:*** It is defined as a mental condition affecting patients, characterized by acute changes in attention, awareness, and cognition (Wilson et al., 2020).
- ***Delirium cases:*** Defined as the number of delirium incidences being reported on observation unit before and throughout this project period (Gibb et al., 2020).
- ***Nurse leader directed delirium prevention bundle:*** Defined as a set of activities established by the nurse practitioner that will be administered to the patients to reduce the incidence of delirium in the observational unit (Ladak, 2020).

Chapter Summary

This chapter has presented an overview of this project as the problem description has demonstrated how delirium is a critical cognitive disorder that affects the healthcare system. The rationale has justified the need to implement a practice change in the proposed project site to reduce the incidence of delirium. This chapter has also addressed the theoretical framework adopted by the project, which is, the PDSA cycle. The independent variable for this project was delirium prevention bundle, and dependent variable, was delirium cases. The project's

assumptions and the ARCC model has also being addressed. The next chapter presented a review of the literature.

CHAPTER TWO

LITERATURE REVIEW

Search Strategy

The search strategy flow diagram (Appendix B) illustrated the selection process performed by the Doctor of Nursing Practice (DNP) student to identify relevant studies from diverse databases and other sources that supported the best evidence-based practice for delirium prevention techniques and implementation of delirium prevention bundles. A total of 2564 articles from the Cumulative Index to Nursing and Allied Health Literature (CINAHL) (7), Cochrane Central Register of Controlled Trials (517), PubMed (140), Sage Journals (1857), Journal of the American Medical Association (33) and ten (10) articles were identified manually from other sources using the key words; delirium, non-pharmacological delirium interventions, delirium prevention bundle, observational unit, and quality improvement. After screening and reviewing the articles' abstracts and titles, 2097 articles were excluded due to de-duplication. After full-text reading of the eligible 467 studies, 444 were excluded for failing the eligibility criteria, that is, not published in English, addressed other care treatment for delirium other than prevention bundles, the study population was not adults, and presentation of non-relevant topics. As a result, the full-text articles assessed for eligibility were twenty-three (23) published in 2019-2023.

Literature Review

Most studies uncovered diverse multicomponent, pharmacological, and non-pharmacological programs developed for reducing and preventing delirium. The studies further highlighted how these interventions influence delirium severity, length of hospital stay, mortality, delirium duration, delirium knowledge, and incidence of falls. The break-down of the

level of evidence applied in this project included seven systematic reviews/meta-analysis studies (Level I), three randomized controlled trials (Level II), one controlled trial without randomization (Level III), three cohort studies (Level IV), one systematic review of qualitative studies (Level V), seven quality improvement and narrative review studies (Level VI) and one expert opinion study (Level VII).

Delirium Assessment and Screening

Overall, healthcare facilities desire to reduce delirium incidence and severity among high-risk patients. To realize this goal, there is a need to empower the healthcare staff to provide care for patients with or at risk of delirium with adequate assessment and screening mechanisms that can promote timely delirium detection (Yager et al., 2021). The adoption of clinically validated diagnostic instruments has proved to be effective in assessing and screening delirium. Most of the literature reviewed articles applied the Confusion Assessment Method (CAM) due to its golden standard for screening delirium in an inpatient setting (Alvarez et al., 2020; Blandfort et al., 2019; Burton et al., 2021; Deeken et al., 2022; Faeder et al., 2023; Gembrowski, 2019; Kim et al., 2021; Kim et al., 2022; Kuusisto-Gussmann et al., 2021; Ladak, 2020; LaHue et al., 2019; Lee et al., 2021; Leon-Salas et al., 2020; Ludolph et al., 2020; Mohammed, 2022; Roederer, 2020; Rohatgi et al., 2019; Unal et al., 2021; Versloot et al., 2023; You et al., 2022; Young et al., 2021).

In most cases, the CAM assessment was completed on admission, during each shift, and identified changes in patient conditions as either positive or negative. Additionally, the CAM tool was extensively relied upon due to its high sensitivity of 94-100%, specificity of 90-95%, and high inter-rate reliability (Gembrowski, 2019). Other studies applied multiple screening tools, including the AWOL score, NuDESC score, Richmond Agitation- Sedation Scale (RASS)

Brief Confusion Assessment Method) b-CAM, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition and Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition for delirium screening (Burton et al., 2021; LaHue et al., 2019; Roederer, 2020). However, a retrospective cohort study by Choi et al. (2019) developed a simple screening tool to identify patients at risk of delirium. The delirium risk was assessed based on age category, history of delirium or dementia, and K-AD8 score. All patients 70 years and above, with a history of dementia or delirium, are under dementia medical prescription, and have an AD8 score of ≥ 2 were classified as at high risk of developing delirium.

Delirium Prevention Bundles

Most clinical guidelines and medical societies promoted the routine use of delirium prevention bundles in clinical practice due to their efficacy in preventing delirium. A total of two studies implemented the postoperative (POD) delirium prevention bundle to mitigate delirium incidence in respective settings (Choi et al., 2019; Young et al., 2021). The POD prevention bundle comprised of four key elements: education, delirium screening, delirium prevention, and scheduled assessment. Similarly, evidence from six articles demonstrated the effectiveness of multicomponent delirium prevention bundle in mitigating delirium incidences (LaHue et al., 2019; Lee et al., 2021; Mohammed, 2020; Rohatgi et al., 2019; Unal et al., 2021; Versloot et al., 2023). In both accounts, the components of the multicomponent delirium prevention bundle included educating the nursing staff on delirium, screening using validated tools, applying non-pharmacological interventions to prevent delirium, and managing delirium using a multicomponent team.

In a stepped-wedge cluster randomized clinical trial, Deeken et al. (2022) investigated whether a multifaceted delirium prevention program effectively reduced postoperative delirium

incidence and prevalence after various major surgical procedures. A total of 1470 patients 70 years and older undergoing elective surgery in five German tertiary medical centers were recruited as participants between November 2017 and April 2019. The authors implemented an Alltags-und Kognitions Training & Interdisziplinaritat verbssert Ergebnis undmindert das Risiko (AKTIVER) delirium prevention program, whose components included nursing staff education on delirium screening, and implementation of non-pharmacologic interventions. The study findings revealed that the component demonstrated great reliance on reducing delirium incidence. Additionally, Gembrowski (2019) assessed whether implementing a delirium bundle would decrease adverse patient events, including falls, restraints, and safety attendant use in a neuroscience medical surgical unit sizeable Midwestern hospital system. The delirium bundle was a large part of the DNP project audit whose components entailed screening patients at risk of delirium and assessed their risk of falls, movement, sensory orientation, nutritional intake, oxygen levels, sleep quality, and pain control.

Consequently, a quality improvement project by Ladak (2020) evaluated how a nurse-led delirium prevention bundle can reduce delirium incidence in hospitalized geriatric patients on a 250-bed academic medical center. The initial component of the bundle focused on educating the nurses on how to identify patients at risk of delirium by using the Delirium Risk Factor Identification (DRFI) tool. The second component focused on implementing delirium prevention strategies, which included nutrition, hydration, and oxygen control. Lastly, the bundle required nurses to document the care provided to enhance patient monitoring and assess its effectiveness. Furthermore, Roederer (2020) implemented an evidence-based delirium prevention bundle on a 19-bed level one trauma center catering for adult patients in central Kentucky. The initial component of the bundle aimed at implementing a web-based educational intervention training

for healthcare staff in collaboration with the Clinical Nurse Development Specialists and Trauma/Surgical Universal Unit (TSUU) nursing staff. Secondly, the intervention focused on adjusting the duration of delirium assessment to accommodate workflow. The bundle also implemented pharmacological and non-pharmacological interventions to prevent delirium. Finally, the bundle implemented a compliance program using an audit tool to identify critical areas that required continuous development and processing.

Non-pharmacologic Delirium Prevention Interventions

A range of studies has reported the successful implementation of delirium prevention interventions to prevent delirium incidence. Specifically, clinical experts recognized that the adoption of non-pharmacological interventions which focused on other aspects of care rather than medication remained effective in reducing the risk of delirium (Burton et al., 2021; Choi et al., 2019; Deeken et al., 2022; Faeder et al., 2023; Gembrowski, 2019; Kim et al., 2021; Kim et al., 2022; Ladak, 2020; LaHue et al., 2019; Lee et al., 2021; Leon-Salas et al., 2020; Ludolph et al., 2020; Mohammed, 2022; Roederer, 2020; Rohatgi et al., 2019; Unal et al., 2021; Versloot et al., 2023; Yager et al., 2023; Young et al., 2021). The non-pharmacologic interventions included reorientation, early mobilization, hydration, nutrition, sleep, hearing, and or vision adaptation.

Early Mobility

Immobility has been classified as a contributing factor that contributes to developing delirium. The clinical experts acknowledged that planned motion exercises in bed or walk ensured that patients maintain their functional and health status which aids in preventing delirium (Deeken et al., 2022; Unal et al., 2021). Additionally, encouraging patients to move their bodies helped in preventing muscle loss and other complications triggered by a lack of

physical movement (Kim et al. 2021; Mohammed, 2022; Roederer, 2020; Versloot et al., 2023; Yager et al., 2023).

Sleep Management

Patients experiencing inadequate sleep are at a high risk of experiencing delirium (LaHue et al., 2019). As a result, the treatment care plans for patients at risk of delirium should comprise of sleep management techniques that enhanced non-interruptions during their sleep (Unal et al., 2022). Reducing light and noise during the night providing patients at risk of delirium with a dark environment eliminated interruptions, thereby enhancing adequate sleep (Deeken et al., 2022; Faeder et al., 2023; Gembrowski, 2019; Kim et al., 2021; Kim et al., 2022; Ladak, 2020). Also, the provision of natural light during the day facilitated the sleep-wake cycle (Lee et al., 2021; Leon-Salas et al., 2020; Ludolph et al., 2020; Mohammed, 2022; Roederer, 2020; Unal et al. 2022; Versloot et al., 2023; Yager et al., 2023).

Unnecessary Catheter Removal

These studies reported that limited bladder catheterization remained essential in minimizing risk of urinary tract infections which is a delirium causative agent (LaHue et al., 2019; Leon-Salas et al., 2020). Other studies recommended the need to insert the catheter only when urinary retention complications arise (LaHue et al., 2019; Leon-Salas et al., 2020; Roederer, 2020; Unal et al., 2021).

Oxygen Saturation Monitoring

Monitoring the patient's oxygen supply in vital organs remains crucial for preventing hypoxia. The provision of oxygen support using a nasal cannula based on physician order in case of decreased oxygen saturations remained essential to eliminate altered mental confusion (Kim et al., 2022; Lee et al., 2021; Leon-Salas et al., 2020; Unal et al., 2021; Yager et al., 2023).

Dehydration Prevention and Nutritional Support

Poor nutrition and hydration are risk factors for delirium. Evaluating patient's hydration and nutritional status is core to facilitate optimal nutritional and fluid support (Ludolph et al., 2020). Providing patients' companionship during meals helped in improved meals and fluid intake (Deeken et al., 2022; Kim et al., 2022; Ladak, 2020; Lee et al., 2021; Leon-Salas et al., 2020; Mohammed, 2022; Unal et al., 2021; Yager et al., 2023).

Orientation

During delirium episodes, older patients usually experience altered state of reality and attendance to routine activities. The implementation of orientation visits focused on assisting the patients at risk of delirium name daily schedules, verbal orientation, put on clean glasses, or use of hearing aids (Deeken et al., 2022; Faeder et al., 2023; Gembrowski, 2019). Further evidence suggests patients suffering from visual or hearing impairment were issued with aiding devices which significantly reduced the risk for delirium (Kim et al., 2022; Ladak, 2020; Lee et al. 2021; Leon-Salas et al., 2020; Ludolph et al., 2020; Mohammed, 2022; Roederer, 2020; Unal et al. 2021; Yager et al. 2023).

Cognitive Stimulation

As a clinical condition, delirious patients experiences fluctuating deterioration of the cognitive state. Thus, the implementation of cognitive stimulation is aimed at stimulating patient brain activities to maintain and improve their cognitive capability and execute functions, including attention, memory, reasoning, and language (Kim et al., 2021; Kim et al., 2022; Ladak, 2020; Lee et al., 2021; Leon-Salas et al., 2020; Roederer, 2020; Unal et al., 2021).

Family Involvement/Companionship

Providing patients with companionship helped in combating social isolation and loneliness which are key factors contributing to delirium, resulting in improved recovery (Kim et al., 2021). More so, the involvement of patient family members assisted patients in feeling safe, at ease, and calm (Leon-Salas et al., 2020; Ludolph et al., 2020; Roederer, 2020; Unal et al., 2021).

Hospital Environment

The hospital unit design has a significant impact on triggering the risk of delirium among elderly patients. Patients living in multiple-bed rooms units usually experience challenges such as noise, sleep disturbances, stress, and lack of privacy which propagates delirium incidences (Blandfort et al., 2019). A reduction in delirium incidence was witnessed among patients staying in single-bed units (16%) compared to patients staying in multi-bed units (29%) (Blandfort et al., 2019). The results demonstrate the significance of adjusting the hospital environment to prevent delirium during hospitalization.

Pharmacologic Delirium Prevention Interventions

Although non-pharmacological interventions have been proven to be very successful in preventing delirium, pharmacological interventions can still be applied to prevent delirium in high-risk settings. Pharmacological strategies such as antipsychotics, cholinesterase inhibitors, alpha-2 agonists, and melatonin receptor agonists have been proven to prevent the occurrence of delirium episodes (Faeder et al., 2023). Additionally, as a hormonal substance produced by the pineal gland in the brain from the amino acid tryptophan, melatonin controls the circadian sleep-wake cycle, thereby acting as a sleep aid (LaHue et al., 2019; Roederer, 2020). In this case, a patient will likely experience delirium episodes due to the disturbance of the melatonin

metabolism. Healthcare practitioners successfully applied synthetic melatonin supplements to restore the body's sleep, wake cycle, and circadian rhythm.

As evidenced in a systematic meta-analysis of studies by You et al. (2022), melatonin had a significant preventive effect on delirium in hospitalized medical patients (RR=0.60, 95% CI: 0.47-0.76), P<0.001). The findings from eighteen randomized controlled studies selected for inclusion as samples in the studies demonstrated an overall homogeneity of (I2=62%, P<0.0003) of the selected samples on the effect of melatonin in preventing delirium among hospitalized patients. Melatonin reduced the incidence of delirium in patients (relative risk =0.69, 95% CI: 0.60-0.80), which is significant. After excluding individual studies, the effect size was maintained within 95% CI, strengthening the reliability of the original meta-analysis results (You et al., 2022).

Impact of the Delirium Prevention Bundles

Implementing the delirium prevention bundles is associated with reduced delirium incidence, reduced delirium duration, decreased length of hospital stay, decreased delirium severity, increased delirium knowledge, and reduced fall rates.

Delirium Incidence

The results from twenty-one articles reviewed affirmed that the implementation of delirium prevention bundles led to a decline in delirium incidence (Alvarez et al., 2020; Blandfort et al., 2019; Burton et al., 2021; Choi et al., 2019; Deeken et al., 2022; Faeder et al., 2023; Gembrowski, 2019; Kim et al., 2021; Kim et al., 2022; Ladak, 2020; LaHue et al., 2019; Lee et al., 2021; Leon-Salas et al., 2020; Ludolph et al., 2020; Mohammed, 2022; Roederer, 2020; Rohatgi et al., 2019; Unal et al., 2021; Versloot et al., 2022; You et al., 2022; Young et al., 2021). Multicomponent non-pharmacological interventions hold a high potential in reducing the

incidence of delirium compared to usual care (risk ratio (RR) 0.57, CI 95% 0.46 to 0.71 I2=39%; 3693 participants) (Burton et al., 2021). Meanwhile, the implementation of the preventive intervention led to a reduction in the occurrence of new delirium incidences (19.9% compared to 23.4% RR, 0.85; 95% CI, 0.70-1.03; P=0.10: RR, 15.2%, 95% CI, -3.1 to 30.2) (Deeken et al., 2022).

Delirium Duration

Out of the twenty-three articles identified for literature review, results from seven articles showed that the implementation of a delirium bundle led to a decline in delirium duration (Burton et al., 2021; Deeken et al., 2022; Kim et al., 2021; Ladak, 2020; Lee et al., 2021; Leon-Salas et al., 2020; Ludolph et al., 2020). Patients receiving automated reorientation messages with a familiar voice had more delirium-free days of 1.9 days compared to 1.6 days for patients with no reorientation message (Kim et al., 2021). The duration of delirium days also declined from a mean of 2.1 days in the pre-intervention group to a mean of 1.6 days in the intervention group (p=0.19) (Ladak, 2020). The duration for delirium was lower in experiential groups than in control groups (Experiential. 1.7 vs Control. 3.4; Experiential. 28.1 vs. Control. 60.2; Experiential. 1.94 vs. Control. 4.14) (Lee et al., 2021).

Length of Hospital Stay

The findings from ten articles reviewed acknowledged that the length of hospital stay among delirious patients massively declined following the implementation of delirium prevention bundles (Blandfort et al., 2019; Burton et al., 2021; Choi et al., 2019; Deeken et al., 2022; Kim et al. 2021; Ladak, 2020; LaHue et al. 2019; Ludolph et al. 2020; Rohatgi et al. 2019; Young et al. 2021). The medical unit experienced a statistically significant reduction in length of hospital stay of 9% following the rolling-out of the delirium care pathway (p=0.028) in adjusted

models, which was associated with a 7% proportional decline in total direct costs (p=0.0002) (LaHue et al., 2021). A decline trend was observed in the length of hospital stay that was not statistically significant through the multicomponent intervention compared with usual care (MD= -0.71 days; 95% CI= -1.47 to 0.05; P=0.07) (Ludolph et al., 2020). The estimated length of hospital stay also declined by a margin of 0.13 days annually (p<0.001) (Rohatgi et al., 2019).

Delirium Severity

Of the twenty-three articles identified for literature review, four presented results on the effect of delirium prevention bundles on delirium severity (Burton et al. 2021; Lee et al. 2021; Leon-Salas et al. 2020; Young et al. 2021). Two studies demonstrated uncertainty on the effect of multicomponent interventions on delirium severity compared to usual care (standardized mean difference -0.49, 95% CI -1.13 to 0.14, I2=64%; 147 participants) (Burton et al. 2021) while no severity was observed associated with delirium in the intervention group (Young et al., 2021). However, delirium severity declined in the experiential group compared to the control group after implementing non-pharmacological interventions (Experiential 15.0% vs. Control. 45.9%) (Lee et al., 2021). The multicomponent intervention reduced the severity of delirium by 1.46 compared to usual care (0.49) (Leon-Salas et al., 2020).

Delirium Knowledge and Experience

Out of the twenty-three articles identified for literature review, the results from four articles acknowledged that the implementation of the delirium prevention bundle increased delirium knowledge and experience among the nursing staff (Choi et al., 2019; Gembrowski, 2019; Ladak, 2020; Roederer, 2020). The medical staff education on knowledge about delirium rose from 40.52 in pre-training session tests to 43.24 in post-training scores (Choi et al., 2019). Besides, the registered nurses' delirium knowledge increased by 5.2% from 90.5 pre-mean to

95.7 post-mean, and nursing technicians' delirium knowledge rose by 12.1% from 80.3 pre-mean to 92.4 post-mean (Gembrowski, 2019). Meanwhile, the nursing staff's delirium knowledge also increased from a pre-test mean of 80.00 to a post-test mean of 94.29 (Ladak, 2020). The pain control management with re-education improved to 100%. The compliance rate improved to 84% (+10.9) (Roederer, 2020).

Falls Rates

Out of the twenty-three articles identified for literature review, the results from four articles suggested that implementation of a delirium prevention bundle resulted in a decline in the number of patients at risk of falls (Burton et al., 2021; Gembrowski, 2019; Versloot et al., 2023; Young et al., 2021). The multicomponent interventions reduced the rate of falls compared to usual care (Risk ratio 0.56, 95% CI 0.35 to 0.90 I2=8%; 1680 participants) (Burton et al., 2021). Implementing delirium prevention strategies also led to a drop in patients requiring physical restraints from 16.3% to 1.3% (Gembrowski, 2019). As a result, the mean number of patients experiencing falls monthly per 50 patients declined significantly from 14.5 (Standard Deviation 3.0) pre-implementation to 11.8 (Standard Deviation) post-implementation, represented by a relative reduction of 18.97% (Versloot et al., 2023). Falls incidence was lower in the intervention group 19 than in the control group 20. No severity was observed associated with delirium in the intervention group (Young et al., 2021).

Staff and Family Member Education on Delirium

The current healthcare environment is experiencing dynamism associated with complex health conditions portrayed by patients, restricted budgeting, and constant demand for quality services (Rohatgi et al., 2019). While initial healthcare staff commitment and sustained efforts continue to report improvement, there is a need to enhance their knowledge, skills, and

experiences through education and training to ensure enhanced earlier delirium detection and implementation of effective prevention mechanisms and incidence reduction (Burton et al., 2021; Choi et al., 2019: Deeken et al., 2022; Gembrowski, 2019; Kim et al., 2022; Leon-Salas et al., 2020). The nursing staff can quickly improve their knowledge of delirium through verbal presentations in meetings with delirium experts, distribution of educational materials, resident lectures, seminars, a pocket card, and multimedia education highlighting delirium evaluation, management, and prevention (Gembrowski, 2019; Ladak, 2020; LaHue et al., 2019; Lee et al., 2021). The graduate nurses also benefited from the continued delirium training since it intensified their confidence to routinely identify, prevent, and manage delirium against occurrence (Young et al., 2021).

Alternatively, increasing the patients' and their family members' knowledge of delirium is paramount in creating awareness of delirium prevention and management and identifying a patient at risk of delirium (Burton et al., 2021; Roederer, 2020). The family members that received psychoeducation concerning delirium diagnosis found the caregiver experiences less distressing and experienced reduced distress and increased preparedness to provide care to delirium patients after discharge (Faeder et al., 2023). The training ensured that family members could efficiently execute the non-pharmacological interventions to mitigate delirium, such as reorientation, early mobility, a safe environment, and sensory support (Roederer, 2020). Such actions not only enhance a decrease in the use of drugs but also reduce the societal burden of delirium and healthcare costs and improve the quality of life (Rohatgi et al., 2019; Versloot et al., 2023). However, difficulties associated with maintaining a continuous educational program remain a key challenge hindering the implementation of non-pharmacological interventions from preventing delirium (Alvarez et al., 2020). Hence, implementing ongoing delirium education

sessions, including delirium assessment during nurse orientation, remains significant in enhancing early detection and prevention (Yager, 2021).

Technology-based Interventions and Delirium Prevention

The application of technology in the healthcare setting remains ideal to improve the patient wellbeing. While the non-pharmacological interventions are effective in preventing delirium incidence, they are poorly implemented in clinical practice, necessitating the need to develop software for mobile devices that will bring closer the non-pharmacological interventions for delirium prevention to hospitalized adult patients (Alvarez et al., 2020). The software had a highly accessible user interphase comprising of diverse modules to access ease access by patients. The desktop module provided patients with information on time and space to enhance orientation and access to other modules (Alvarez et al., 2020). The exercise module comprised of twelve videos of physiotherapist guided physical exercises easily duplicated by elderly patients. The software also has a documentary module that comprises of short videos aimed at stimulating the cognitive functioning of patients, offer entertainment and educative sessions about delirium (Alvarez et al., 2020). A game module also helps to stimulate attention and memory functioning, while an alert module focuses on stimulating the sensory systems during software use.

While examining the current technologies-based interventions for preventing and reducing delirium in a systematic review of thirty-one studies, Kim et al. (2021) identified 31 technology-based interventions distinguished into eight categories: audio studies (music/voice messages), light dynamic, video games, virtual reality, sleep aids, communication support, multiple components and others developed to support the prevention of delirium. Ideally, the non-pharmacological interventions for delirium prevention such as time spatial re-orientation, cognitive stimulation, early mobilization, use of sensory support promotion, sleep hygiene, pain

assessment improvement, and education on delirium are integrated within the technologies for delirium prevention (Alvarez et al., 2020). As a result, the consideration of these insights remains effective in transforming the healthcare settings into a healing environment through the application of robust technologies.

Through the literature review, evidence reveals that implementing delirium prevention bundle is effective in recognizing and preventing delirium. Majority of the studies reviewed affirmed that implementing a delirium prevention bundle has an impact on reducing delirium incidences, duration of delirium, the length of hospital stay and delirium severity. The pharmacological and non-pharmacological interventions are greatly associated with a reduction in delirium incidences. More so, increasing the nursing staff and family members' knowledge on delirium remains effective in its prevention and treatment. As a result, this quality improvement project seeks to implement a nurse leader directed delirium prevention bundle comprising both pharmacological and non-pharmacological interventions to impact the delirium incidences at the observational unit.

Chapter Summary

Chapter two has presented the search strategy applied while identifying strong evidence to support the literature review. A total of twenty-three articles were included in the literature review and represented all levels of evidence. Key findings from the literature review suggests that most healthcare setting relies on CAM tool for delirium screening. Implementing a delirium prevention bundle is highly associated with decreased delirium cases. Further, the literature has affirmed that implementing a delirium prevention bundle is associated with declined length of hospital stay, delirium duration, and increased delirium knowledge and compliance. Enhancing nurses' knowledge, skills, and experiences through education and training to ensure aided in

earlier delirium detection and implementation of effective prevention mechanisms and incidence reduction. The next chapter discussed the project's methodology.

CHAPTER THREE

METHODOLOGY

Context

The organization where this project was implemented is a 150 bed medium-sized hospital providing care services in Houston, Texas. Specifically, the project was implemented in the hospital's observation unit a 25-bed medium-sized unit that provided close monitoring to patients seeking care services from 24 hours to 72 hours before admission to the inpatient unit. The patient population admitted to the unit included, but is not limited to, adult patients experiencing pain, dehydration, or infections such as urinary tract and pneumonia. All patients with these symptoms were deemed at risk of developing hospitalized-acquired delirium.

Organizational Support

The observation unit had a total of 16 healthcare staff: two charge nurses, 10 registered nurses, and four certified nurse assistants (night and day) shift staffing for 24 hours. The hospital was led by a medical director, responsible for monitoring its operations in providing quality care that meets the population's health needs. The observation unit has an acute care nurse practitioner and charge nurses responsible for ensuring patients seeking care are well monitored and receive appropriate care that help to resolve their health needs in a timely manner. The organization's culture remained committed to become a leading provider of healthcare services by delivering high-quality and efficient care.

Key Stakeholders

A range of key stakeholders were involved in the implementation of this project. The shareholders included the medical director, a charge nurse, quality and safety assurance members, primary care providers, registered nurses, certified nurse assistants, and information

technology experts. The interdisciplinary team comprised of pharmacist, dentist, physiotherapist, dietician, and nutritionist. Each stakeholder engaged in a team effort to improve the detection, prevention, and management of delirium (Monaghan et al., 2023).

Project Barriers and Facilitators

The DNP project leader anticipated to encounter several barriers during the implementation process. Due to other quality improvement projects at the hospital, the initial site, intensive care unit was not available. As a result, the project was implemented in the observation unit. The inability to gain access to the hospital's health information system also acted as a potential barrier to the project. The information technology officers were only allowed to provide access to the health information upon receiving permission from the hospital administrator. The DNP student overcame this barrier by meeting with the hospital's education leadership representative in charge of quality improvement projects. The representative met with the hospital administrator who granted the IT team permission to issue health information associated with this project.

Several factors facilitated the implementation of the project. The organization's leadership and employees were highly knowledgeable about the processes of implementing quality improvement projects and programs. The proposed project site had a hospital education leadership department led by a graduated DNP nurse. The department's main role included supervising all the quality improvement projects undertaken at the hospital. The hospital education leadership department nurse leader also acted as a sponsor of the quality improvement project. As a sponsor, the nurse leader liaised and resolved various organizational factors and challenges that would limit the implementation of the project.

Benefits of the Project

The organization, healthcare providers and patients directly benefited from this quality improvement project. A reduction in the delirium incidence rates was equated to improved patient care as less patients were delirious. The reduction in delirium cases was associated with reduced costs to the organization as the delirium incidence rates and length of hospital stay negatively impacted the hospital's finances. The project increased the healthcare providers' knowledge and experiences on effective evidence-based approaches that reduced the incidence of delirium in care settings.

Intervention

This quality improvement project implemented the nurse leader-directed delirium prevention bundle as an intervention to impact delirium incidences in the observation unit. The Plan Do Study Act framework cycle was applied to implement the intervention. The interventions included:

1. Meeting and educating the observation unit nursing staff about the delirium prevention bundle.
2. Training the observation unit nursing staff on how to use the Confusion Assessment Method (CAM) tool for screening delirium.
3. After successful training, the observation unit nursing staff was responsible for screening each patient at the unit for delirium using the CAM tool upon admission and every 12 hours.
4. All patients who were identified to be at risk of delirium received the following interventions.
    a. Use SBAR to notify appropriate treatment team members. Initiation of ordered treatment therapy to suppress the underlying health condition triggering delirium.

b. Adequate hydration and nutritional intake.

c. Optimal oral hygiene.

d. Safe sleep guidelines.

e. Noise regulation.

f. Exposure to natural lighting.

g. Sensory support and being surrounded by relatives.

At six weeks, the DNP project measured the project outcomes. The DNP project leader assessed the delirium incidence rates before and after implementation of the intervention. The variance in incidence rates demonstrated whether the nurse leader-directed delirium prevention bundle impacts delirium cases or not. The nurses initiated an initial treatment for patients diagnosed with initial positive CAM score. The healthcare providers continued to monitor the patient, assessed the underlying condition triggering delirium and developed long-term care plan that suited the patient recovery based on the highlighted intervention. The information department integrated the delirium bundle intervention within the electronic medical records. The nurses at the observation unit utilized the (tablet) portable electronic device to document patient CAM score following assessment. Through the electronic device, the nurses also documented the interventions that were applied to a patient diagnosed with delirium.

Inclusion Criteria

1. All adult patients 18 years admitted to observation unit were included in this project.
2. Adult patient were considered at risk of delirium if they have presentation symptoms of the following: infections; pain complaints; dehydration; infections, to include urinary tract infections and pneumonia; a history of substance abuse; trauma; withdrawal from antipsychotic drugs.

Exclusion Criteria

1. Patients under the age of 18.
2. Adult patients who do not have any risk factors for delirium.
3. Adult patients receiving mechanical ventilation.

The DNP student collaborated with staff at observation unit to enhance the successful implementation of the intervention. Additionally, the DNP student identified, allocated, and assigned various duties and responsibilities to observation unit staff for effective delirium prevention bundle implementation. The DNP project leader resolved arising challenges that might have delayed delirium bundle implementation and maintained healthy workplace relationships while training the observation staff to adequately utilize the delirium prevention bundle. The DNP project team comprised of the DNP student, faculty advisor and project mentor, formed based on the guidelines established by the Wilmington University. The hospital's education leadership department leader also acted as a member to the project.

Study of Interventions

The DNP project leader conducted a retrospective chart review to assess the impact of the delirium prevention bundle on delirium incidences to establish whether the observed outcomes were due to the intervention, and to make key observations on the incidence of delirium before and after the implementation. A retrospective chart review was also conducted to identify the length of hospital stay among patients before and after the implementation of the intervention.

Measures

The DNP project leader conducted a needs assessment from October through December 2023 and gathered key data before the intervention implementation. The delirium prevention

bundle was implemented beginning February 5, 2024 and ran for six weeks until March 18, 2024. A comparative design method was applied to measure the outcomes of the intervention (Siedlecki, 2020). A quantitative comparative design data was collected from the retrospective chart reviews with the data applied to compare the delirium incidence rates, length of hospital stay, and compliance rates on CAM tool use before and after the bundle implementation.

1. **Delirium Incidence Rates**

The delirium incidence rates were used to measure the prevalence of delirium cases in the observation unit. The delirium incidence data before the intervention implementation revealed that the delirium incidence was 25%. The DNP project leader assessed and compared the incidence of delirium rates following the intervention implementation and identify any recognizable changes.

2. **Length of Hospital Stay**

The DNP project leader also measured the length of stay of delirium patients admitted through the observation unit. The needs assessment shows that the mean length of hospital stay among delirious patients admitted through the observation unit was 24 days. Through retrospective chart analysis, the DNP project leader extracted data demonstrating the average length of hospital stay of delirium patients following the delirium prevention bundle implementation.

3. **Compliance Rate on CAM Tool Use for Delirium Screening**

The DNP project leader assessed the compliance rate on CAM tool use for delirium screening by the nursing staff. At first, the DNP project leader assessed the compliance rate of CAM tool use for delirium screening before the implementation of the bundle which stood at

52%. After implementing the bundle, a follow-up was made to identify the compliance rate. The Confusion Assessment Method (CAM) Tool, developed by Inouye (1990) was utilized in this quality improvement project (Tate & Balas, 2019). The tool enabled the trained observation unit staff to identify and recognize delirium quickly. Although limitedly applied, the CAM tool is available for public use. The CAM tool has the highest diagnostic accuracy, with a sensitivity of 100% and specificity of 86% in diagnosing delirium incidences among adult patients, hence is considered to be a reliable screening tool (Llisterri-Sanchez, et al., 2023).

Analysis

A retrospective chart review was conducted to collect data from the hospital's health information systems. Specifically, this quality improvement project collected demographic data about the patients admitted through the observation unit. The demographic data included gender, ethnicity, and age. The analysis of demographic data assisted the DNP leader in developing a better understanding of the sample population (Keane et al., 2023). Nominal levels data of gender and ethnicity was generated for each measure. An ordinal level of data measured the age of the participants. The DNP project leader utilized descriptive statistics to analyze the collected data. The descriptive statistics provided a clear and concise summary of the data (Siedlecki, 2020). The results were tabulated, and others presented in the form of graphs for proper visualization and interpretation. The DNP project leader utilized the t-tests statistical test to analyze the patterns and relationships of the means delirium incidence rates, length of hospital stay, bundle use at the observation unit before and after the intervention implementation.

Budget

Throughout this DNP project, the project leader anticipated incurring a wide range of expenses and income. The anticipated return on investment are quantified based on the savings

attributed to delirium treatment costs per patient following the bundle implementation is $ 442,910 in 2023. The return on investment revenues are also attributed to direct hospitalization cost savings associated with reduced length of hospital stay is $ 2550 in 2023. Thus, it is anticipated that in 2023, the observational unit would generate a return on investment worth $ 440,948.04 from delirium treatment (Appendix C).

Ethical Considerations

The quality improvement project maintained anonymity of information of human subjects involved. The patient identifiers were masked using unique codes. All the data collected from the observation unit health information system were entered into a spreadsheet and stored on a computer hard drive for five years. Access to the computer was restricted using a strong password only known to the project leader. The ethical principles of justice, beneficence and equity were adhered to throughout this project. The DNP project leader attended the Human Subjects training as required by Wilmington University guidelines by completing the Collaborative Institutional Training Initiative (CITI) (Appendix D). In October 2023 the DNP project leader sought approval for implementing the delirium prevention bundle intervention from the Wilmington University Human Subjects Review Committee and approval was granted in November 2023 respectively. The organization where the intervention was implemented did not provide an internal IRB approval. Instead, the organization issued an exemption document signed by the director and the DNP project leader (Appendix E).

Chapter Summary

This chapter has reviewed the methodological framework that guided this quality improvement project. The chapter has discussed the context of the organization where intervention implementation took place. The chapter has also explained the delirium prevention

bundle components, including adequate hydration and nutrition, adequate sleep, reduced noise, and family support. The chapter has also established the outcome measures that would be applied in assessing the success of the intervention, and the data analysis framework. A t-test statistical method was to be applied to compare the delirium incidence rates before and after the intervention implantation. The quality improvement project results will be presented in the next chapter.

CHAPTER FOUR

RESULTS

Sample Characteristics

Through the whole of this quality improvement project, the project leader successfully identified 252 patients visiting the observation unit between February 5, 2024, and March 18, 2024, as participants. Out of the 252 patients, 100 patients were identified as at risk of developing delirium, and hence acted as the project sample. The identified patients were admitted through the observation unit to the med-surge unit. These 100 patients were closely monitored by the healthcare staff and received treatment based on the delirium prevention intervention. The project fully administered treatment to 95 of these patients (95%) based on the nurse-leader directed delirium prevention intervention. The remaining five patients (5%) refused care and treatment based on the delirium prevention intervention. As a result, the project leader was unable to capture data related to these patients.

Prior to the delirium prevention intervention implementation, the DNP project leader conducted pre-intervention quantitative measures using a control group. The identified comparison group comprised 102 patients admitted through the observation unit from October through December 2023. Throughout their stay in the hospital, these patients received treatment based on the routine measures implemented to prevent the prevalence of delirium. The DNP project leader reviewed all charts from October through December 2023 demonstrating the patient demographics, incidence of delirium cases, CAM screening tool use, delirium duration, and reliance on the routine measures at the unit based on the current routine measures practice in preventing delirium cases. The pre-intervention control group data was collected to ascertain the

delirium incidence at the observation unit from October through December 2023 based on the routine care processes for delirium prevention. The post-intervention data concerning delirium incidence was collected at the observation unit following the implementation of the nurse-leader delirium prevention bundle from February 5, 2024, through March 18, 2024.

The DNP project leader analyzed the participants' demographic data, including gender, ethnicity, and age. In terms of gender, 41 (43.16%) were male and 54 (56.84%) were female in the post-intervention group (Table 1). In the pre-intervention group, 56 (56.90%) were males and 46 (45.10%) females. Among the post-intervention group, 45 (47.37%) were Caucasian, 12 (12.63%) were Native American, 14 (14.74%) were African American, 8 (8.42%) were Asian American, 7 (7.37%) were Hispanic, 5 (5.26%) were Latino, and 4 (4.21%) were Pacific Islander. In the pre-intervention group, 39 (38.24%) were Caucasian, 8 (7.84%) were Native American, 20 (19.61%) were African American, 10 (9.80%) were Asian American, 15 (14.71%) were Hispanic, 8(7.84%) were Latino, and 2 (1.96%) were Pacific Islander. The post-intervention group had a greater sample of Caucasian and Native American groups compared to the pre-intervention sample group, as shown in Figure 1. The median and mean age of patients admitted through the observation unit in the pre-intervention group were 69.50 and 69.69 years, whereas the median and mean age of patients admitted through the observation unit in the post-intervention group were 74 and 72.23 years, respectively (Standard Deviation; 6.865). The post-intervention group had a median and mean average of above 70 years compared to the pre-intervention sample group, as shown in Table 2.

Table 1

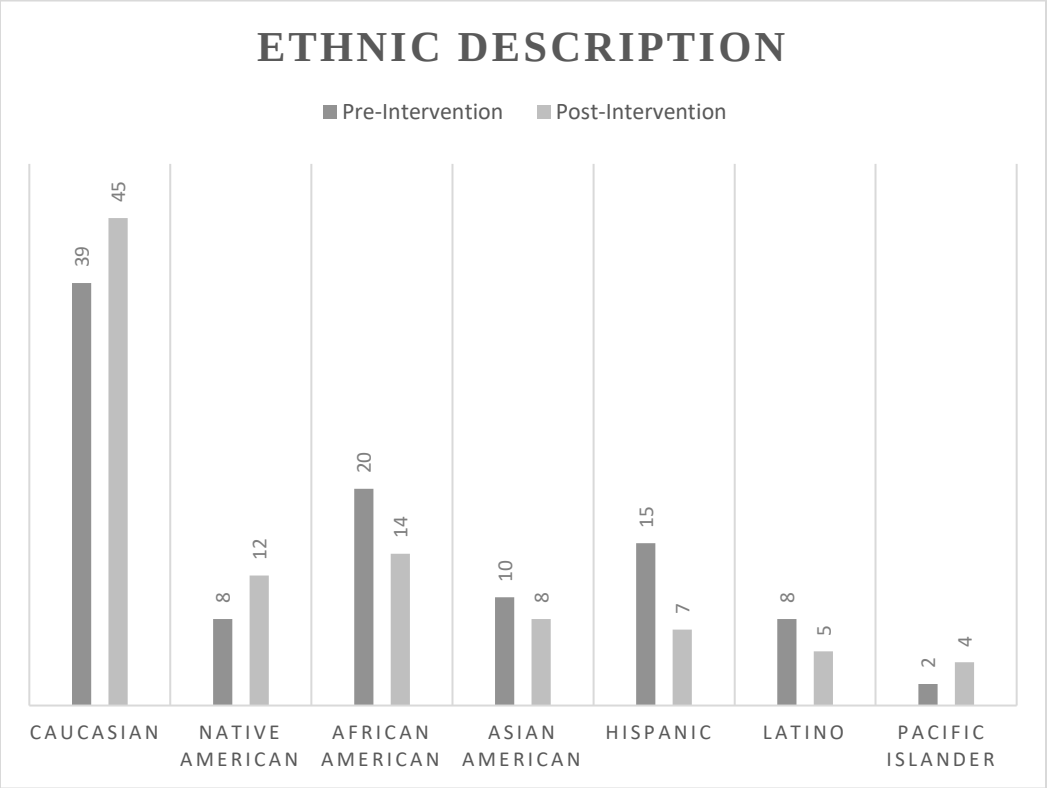
Characteristics of the project sample; gender

Variable	Pre-Intervention (n=102)	Post-Intervention (n=95)
Male	56 (54.90%)	41 (43.16%)
Female	46 (45.10%)	54 (56.84%)
Total	102	95

Source: Data extracted from the observation unit chart reviews, 2024

Figure 1

Characteristics of the project sample; ethnicity



Source: Data extracted from the observation unit chart reviews, 2024.

Table 2

Characteristics of the project sample; age

Variable	Pre-Intervention (n=102)	Post-Intervention (n=95)
30-39	2	1
40-49	3	1
50-59	6	3
60-69	40	22
70-79	39	64
80-89	12	4
Total	102	95
Median	69.5	74
Mean	69.69	72.23

Source: Data extracted from the observation unit chart reviews, 2024.

Project Findings

Retrospective chart reviews showcased the impact of the delirium prevention bundle intervention in the observation unit. The DNP project leader evaluated the effect of this quality improvement project on measures based on the highlighted project objectives. The initial objective aimed to determine whether implementing a nurse leader-directed delirium prevention bundle would reduce the incidence of delirium at the observation unit from 25% to 15%. Data analysis at the end of the project, six weeks of implementation, revealed that the incidence of delirium among the patients admitted through the observation unit dropped from 25% to 12%, exceeding the project's goal of 15% ($p<0.005$; statistically significant) as presented in Table 3. The study findings agreed with the national data, demonstrating that <25% of hospitalized patients develop delirium (ANA, 2023).

This quality improvement project achieved its target of reducing the incidences of delirium. The incidences of positive delirium screening decreased each week as the project continued from (23.75) 25% 0-1week to (20) 21.05% in 1-2 week. In 2-3 weeks, delirium incidence dropped to (14.85) 15.63%, (13) 13.69% in 3-4 weeks, (12) 12.63% in 4-5 weeks, and (11.4) 12% in 5-6 weeks, as shown in Figure 2.

Table 3

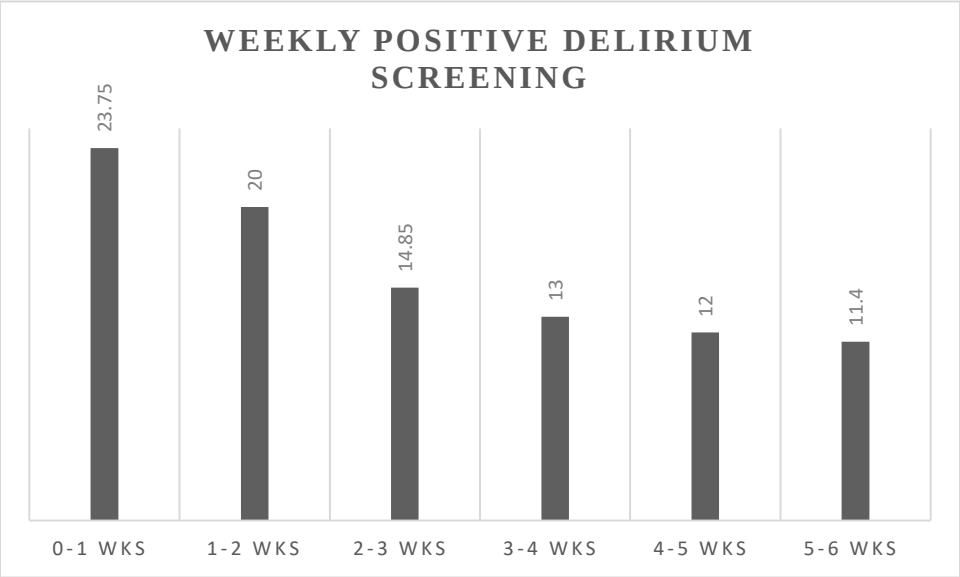
Results for positive delirium screening

Variable	Pre-Intervention n=102	Post-Intervention n=95	Total n= 197	p value
Positive Delirium Screening	(23.75) 25%	(11.4) 12%	197	p<0.005

Source: Data extracted from the observation unit chart reviews, 2024

Figure 2

Weekly positive delirium screening



Source: Data extracted from the observation unit chart reviews, 2024.

The second objective aimed to assess whether implementing a nurse-leader-directed delirium prevention bundle would increase nurse compliance with CAM screening tools to 70% in an observation unit. Data analyzed from the retrospective chart review showed that the compliance rate of CAM tool use for delirium screening at the observation unit before the implementation of the intervention was 52%. The post-intervention data outcomes demonstrated an 89% nurse compliance with the CAM screening tool following the intervention implementation. Thus, the quality improvement project surpassed its target of increasing the

observation unit nurse compliance with the CAM screening tool to 70% by 19%. Consequently, before the implementation of the intervention, the rate of daily delirium screening was 39%. Upon implementing the nurse-leader-directed delirium prevention bundle, the rate for daily delirium screening rose to 92%, representing a 53% rise.

The quality improvement project also focused on assessing the compliance rate of the nurse-leader delirium prevention bundle intervention at the observation unit and its components. The project outcome showed that the overall compliance on the nurse-leader delirium prevention bundle intervention at the observation unit before implementing the intervention was 51%. After implementing the nurse-leader-directed delirium prevention bundle, the observation unit recorded 90% overall compliance on the nurse-leader delirium prevention bundle intervention. The post-intervention data further demonstrated improvements in the nurse-leader-directed delirium prevention bundle components. The post-intervention outcomes for early mobility mechanisms (post: 97% vs. pre 62%), appropriate treatment therapy for suppressing delirium risk (post: 90% vs. pre 59%), adequate hydration and nutritional intake (post: 94% vs. pre 55%), optimal oral hygiene (post: 89% vs. pre 48%), adequate sleep management (post: 92% vs. pre: 52%) and provision of sensory and family member support (post: 99% vs. pre 61%) ($p<0000000586$; statistically significant) (Table 4). The rise in reliance on the delirium bundle components demonstrates the healthcare staff's commitment to improving patient care outcomes.

Table 4

Results for improving reliance on delirium prevention bundle components

Variable	Pre-Intervention (%)	Post-Intervention (%)	p value
Nurse-leader directed delirium prevention bundle reliance rate	51	90	p<0000000586
Early mobility mechanisms	62	97	
Appropriate treatment therapy for suppressing delirium risk	59	90	
Adequate hydration and nutritional intake	55	94	
Optimal oral hygiene	48	89	
Adequate sleep management	52	92	
Provision of sensory and family member support	61	99	

Source: Data extracted from observation unit chart reviews, 2024

The third objective of this quality improvement project aimed to investigate whether implementing a nurse-leader-directed delirium prevention bundle would reduce the length of hospital stay among patients admitted through the observation unit. The pre-intervention data revealed that most delirium patients admitted through the observation unit spent an average of 24.46 days being hospitalized at the general units. The project outcomes showed that the hospitalization duration significantly dropped to 11.34 ($p<0.002$ statistically significant) days following the nurse-leader-directed delirium prevention bundle's implementation, as presented in Table 5.

Table 5

Results for length of hospital stay

Variable	Pre-Intervention	Post-Intervention	p value
Length of hospital stay	24.46 days	11.34 days	p<0.002

Source: Data extracted from the observation unit chart reviews, 2024.

Strengths of the Study

A range of strengths were linked with this quality improvement project. The staff at the observation unit demonstrated an eagerness to implement the new intervention to aid in reducing the delirium rate. The hospital management also remained committed to implementing new quality improvement techniques to improve patient care outcomes. The observation unit had already implemented some of the components of the delirium prevention bundle, including early mobility mechanisms, optimal oral hygiene, and adequate sleep management, making it easier to roll out the intervention. The project's results were also statistically significant and strongly suggested that implementing the nurse-leader-directed delirium prevention bundle reduced the delirium incidence rate and the length of hospital stay.

Chapter Summary

This chapter presented the outcomes of the quality improvement project. The project outcomes recorded a 13% drop in delirium incidences following the effectuation of the nurse-leader-directed delirium prevention bundle intervention at the observation unit. The length of hospital stay was also reduced from a mean of 24 days to a mean of 11 days. The reliance on the CAM screening tool for delirium has also increased among the healthcare staff. Chapter 5 discusses the summary and interpretations of the project findings. The chapter also discusses the limitations, implications for advanced nursing practice and plan for sustainability associated with the project.

CHAPTER FIVE

DISCUSSIONS AND IMPLICATIONS

Summary

In the six-week quality improvement project interactions with patients admitted through the observation unit, elderly patients remained at risk of developing delirium. As a matter of comparison, before implementing the nurse-leader-directed delirium prevention bundle, the hospital recorded a 24% delirium incidence among patients admitted through the observation unit. Over the six-week implementation of the nurse-leader-directed delirium prevention bundle, results revealed a drop in delirium incidence to 12%. The drop in delirium incidence to 12% exceeded the quality improvement project's short-term specific aim of achieving a delirium incidence drop to 15%. As a result, the results signified the efficiency and effectiveness of the nurse-leader-directed delirium prevention bundle in preventing patients admitted through the observation unit from developing delirium. This project's rationale aimed at implementing a Plan-Do-Study-Act (PDSA) quality improvement framework to impact delirium incidences. Through the framework, the project achieved a 13% decline in delirium cases among patients admitted through the observation unit.

Interpretations

While the quality improvement project was successful in reducing the delirium incidence rate at the observation unit, it was impossible to achieve the long-term aim of reducing the delirium incidence to less than 2% due to limited time. The decreasing delirium rates on a weekly basis provides encouraging evidence that with continued support and implementation of the intervention, delirium rates will continue to decrease and be able to achieve the <2% goal.

Comparing the project's results to nationally reported data shows similarities in the occurrence of delirium among hospitalized patients. Based on the project findings, delirium occurred among 12% of hospitalized patients, which matches the nationally provided range, stating that delirium occurs in up to 25% of hospitalized patients (ANA, 2023). Similarly, the national data stated that delirium is higher among patients aged 70 and above (ANA, 2023). Moreover, Marquetand et al. (2021) acknowledged that older adults over the age of 65 years remain at a high risk of developing delirium. The project's results showcased 71.96 years as the average age of the patients at risk of delirium, demonstrating older patients are at risk of developing delirium.

The DNP project leader compared the means of delirium incidence before and after implementing the nurse-leader delirium prevention bundle at the observation unit. Following the statistical analysis, the project leader obtained a p-value of 0.005. The p-value was lower than the significance level of 0.05 (statistically significant). A t-test statistical analysis was also performed to compare the utilization of the delirium prevention bundle intervention components before and after the intervention implementation. Following the statistical analysis, the DNP project leader obtained a p-value of $p<0000000586$, statistically significant.

Similarly, a p-value of $p<0.002$ was obtained upon a comparison of the means of the length of hospital stay before and after the implementation of the nurse leader delirium prevention bundle. The statistical analysis demonstrated that the computed p values were lower than the significance level of 0.05, statistically significant, and that the implementation of the nurse leader directed delirium prevention bundle led to decline in delirium incidence rate, increased bundle utilization and reduced length of hospital stay.

Comparing the results to the articles identified during the systematic literature review demonstrated similarities in decreasing the delirium incidence rate after implementing the

delirium prevention bundle. However, the declining rate varied widely based on each articles findings (Alvarez et al., 2020; Blandford et al., 2019; Burton et al., 2021; Choi et al., 2019; Deeken et al., 2022; Faeder et al., 2023; Gembrowski, 2019; Kim et al., 2021; Kim et al., 2022; Ladak, 2020; LaHue et al., 2019; Lee et al., 2021; Leon-Salas et al., 2020; Ludolph et al., 2020; Mohammed, 2022; Roederer, 2020; Rohatgi et al., 2019; Unal et al., 2021; Versloot et al., 2022; You et al., 2022; Young et al., 2021). A quality improvement project by Ladak (2020) revealed that implementing a nurse-led delirium program reduced the delirium incidence rate from 16% to 14%. Rohatgi et al. (2019) recorded a 25.3% reduction in delirium odds yearly.

Further comparisons and analyses demonstrated similarities in reducing the length of hospital stay following the implementation of the delirium prevention intervention. This quality improvement results showcased a reduction in the length of hospital stay by nine days. While implementing the delirium prevention bundle, Rohatgi et al. (2019) decreased the length of hospital stay by a margin of 0.13 days annually. Meanwhile, during their implementation of the delirium prevention bundle, LaHue et al. (2019) reduced the length of hospital stay reduced by 9%.

The quality improvement project successfully increased the nurses' compliance with the CAM tool during delirium screening and assessment. The findings showed that the nurses' compliance with the CAM tool significantly rose to 89% (post-intervention) from 52% (pre-intervention). The increased training and education among the nursing staff on using the CAM tool remained the driving force behind the increased compliance. These findings agreed with the studies performed by Burton et al., (2021), Choi et al., (2019), Deeken et al., (2022), Gembrowski, (2019), Kim et al., (2022),and Leon-Salas et al., (2020) that acknowledged

training and education enhanced healthcare staff knowledge, skills, and experiences resulting to improved care outcomes.

This quality project impacted the nursing staff in meeting their obligation of protecting, promoting, and optimizing the health and safety of patients against illness. Most patients suffering from delirium remain at significant risk of developing adverse effects, including increased mortality, falls, functional decline, and cognitive decline and impairment (ANA, 2023). The nurse-leader-directed delirium prevention bundle impacted the observation unit healthcare staff in implementing preventive measures that limit patients from developing delirium and maintaining healthy functioning. The quality improvement project also impacted the healthcare systems due to its potential to reduce unit congestion. The reduction of hospital stays among delirium patients after implementing the delirium prevention bundle ensured that the hospital had free beds to care for other patients needing close monitoring healthcare services. The quality improvement project has significantly contributed to improving the overall wellness of patient outcomes and health. By reducing the length of hospital stay among patients, the delirium prevention bundle has effectively mitigated the risk of acquiring hospital-acquired infections, including pressure injuries, central line-associated bloodstream infections, and ventilator-associated pneumonia, among others (Monegro et al., 2023). This positive outcome signifies a step towards a healthier lifestyle for our patients, instilling hope and optimism in our collective efforts.

The nurse-leader-directed delirium prevention bundle has not only had a significant impact on patient health but also the healthcare costs associated with delirium treatment. The American Nurses Association (2023) revealed that delirium is a major medical service in the United States of America, and treatment costs range from $ 38 to $152 billion annually. Our

project results show that the healthcare system can expect a return on investment savings from delirium patient treatment and hospitalization costs due to reduced delirium incidence. This reduction in budgetary allocations for delirium treatment reassures us of the value and impact of our project and signifies that the national and state governments can channel income generated through return on investment in meeting other economic needs or other healthcare challenges. The reduction in delirium incidences will also alleviate the patient family the distress associated with high delirium care costs following a member's diagnosis as delirious.

Limitations

This quality improvement project faced a series of limitations. One of the main limitations is the failure of the quality improvement project to realize the long-term aim of reducing the delirium incidence at the observation unit to less than 2%. The six-week project implementation time limitation was the main barrier to the project's failure to meet this aim. Since implementing the nurse-leader delirium prevention bundle demonstrated effectiveness in reducing delirium by a 13% margin, continuous implementation of the delirium prevention intervention using the PDSA cycle remained ideal in realizing the long-term goal.

Secondly, this quality improvement project relied on a small sample and only took place in a single hospital's observation unit, which would undermine the internal and external validity of the findings. Including a wider sample population and rolling out the quality improvement project in various hospital observation units remains effective in generalizing the conclusions as relevant. The nurses' turnover was also a fundamental limitation for this quality improvement project. Several observation unit nurses trained on the nurse-leader-directed delirium prevention bundle left the role during the implementation period due to exhaustion. These actions led to the recruiting of new nurses who lacked knowledge of bundle implementation at the observation

unit. To maintain efficiency in the bundle implementation, the project leader formulated educational materials to equip the newly recruited observation nurses with the delirium prevention bundle knowledge and expected roles.

Implications for Advanced Nursing Practice

This quality improvement project has various implications for advanced nursing practice. Advanced practice nurses can, therefore, apply the delirium prevention bundle due to its effectiveness in reducing delirium incidences at the observation unit. Implementing delirium education among the nursing staff is also vital since it led to increased reliance on the nurse-leader delirium prevention bundle for delirium assessment and treatment. Similarly, nurses improved in applying the delirium bundle components during care provision. Likewise, nurses gained significant skills and competency in using the CAM tool for delirium assessment following training. Therefore, the quality improvement project recommended continuous educational training programs on delirium prevention bundles among the nurses to harness their skills and knowledge in applying the bundle to prevent delirium.

The findings of this quality improvement project have promising implications for future delirium prevention mechanisms being implemented by healthcare facilities. Most healthcare facilities, previously mired by high delirium incidence, would now implement the delirium prevention bundle. This is due to its proven effectiveness in significantly reducing delirium rates. Upon implementing the bundle and recording its success, most healthcare institutions are more likely to formulate policies integrating the bundle as the key guideline for delirium prevention, paving the way for a brighter future in healthcare quality improvement.

Plan for sustainability

Several mechanisms existed on sustaining this quality improvement project. The project leader planned to sustain this quality improvement project through formulation of a policy that required observation unit staff utilize the nurse leader directed delirium prevention bundle during delirium prevention and treatment. The project leader also planned to sustain the project by implementing the bundle intervention into the hospital other units such as medical-surgical nursing, and intensive care units and satellite hospitals. However, the sustainability of the quality improvement project is dependent on the hospital leadership commitment in providing the necessary resources for its implementation. Sustainability is also subject to the hospital's unit staff's motivation and commitment to utilizing the delirium prevention bundle to achieve success. Thus, the hospital leadership bears the responsibility of motivating the nursing staff on the need to continuously utilize the delirium prevention bundle due to its effectiveness in preventing delirium. The hospital, in its commitment to support the staff, should ensure educational materials concerning the bundle are readily available among nurses seeking to refine their knowledge concerning its components and implementation mechanism, instilling confidence in their ability to implement the project effectively.

Application of the AACN DNP Essentials

The American Association of Colleges of Nursing (AACN) designed the DNP Essentials that define the curriculum elements in a doctor of nursing practice program. The DNP Essentials aim to enhance quality care and patient safety accountability by examining ethical issues (AACN, 2006). The essentials are further aimed at ensuring healthcare facilities implement new practices based on scientific or evidence-based practice evidence to improve the quality of care. This section demonstrated how the DNP student utilized and integrated all the Essentials throughout this quality improvement project.

Essential I: Scientific Underpinnings for Practice

Under this essential, the DNP project leader met with the observational unit charge nurse and assessed the existing principles, laws, and regulations applied in determining the capacity of patients deemed delirious. The project leader also met with the observational unit nursing staff and reviewed the rules governing the well-being of delirium patients admitted through the observational unit. The project leader met with the project mentor and utilized the scientific underpinnings to establish the patterns of human behavior and their interactions with the observational unit environment to determine whether they have recovered from being delirious.

Essential II: Organization and Systems Leadership for Quality Improvement and System Thinking

The project leader applied essential to and met with a multidisciplinary team comprising a nurse practitioner, a registered nurse, and a physician and developed an effective strategy that would resolve an arising error during the implementation of the delirium prevention bundle without blaming or shaming the responsible staff. The project leader also met with the observational unit nursing staff and held discussions on creating supporting environments that promoted open discussions around errors and key aspects of patient safety to enhance the successful implementation of the quality improvement project. Further, the project leader interacted with the observational unit nursing staff and discussed at-risk behaviors, including reckless ignorance of safety behaviors, to enhance improved healthcare outcomes once the quality improvement project is implemented.

Essential III: Clinical Scholarships and Analytical Methods for Evidence-Based Practice

This quality improvement utilized essential three as the project leader met with the information system technologists at the hospital and extracted significant data about the delirium

reports recorded at the observation unit within the six-week project period from the healthcare information system. The project leader also interacted with a scientific data analyst and organized and analyzed the patient data extracted from the hospital's information system concerning delirium following the implementation of the delirium prevention bundle. Besides, the project leader met with the hospital leadership and disseminated the findings on implementing a delirium prevention bundle at the observation unit and its impact on reducing delirium incidences.

Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Healthcare

Under this essential, the project leader met with the health information system expert at the hospital and gained knowledge and skills concerning the quantitative modeling applied in extracting data concerning delirium incidences in the observation unit from the information system and databases. The project leader also interacted with the health information system expert at the hospital and gained domain and data preprocessing knowledge to enhance the extraction of information on the effectiveness of the delirium prevention bundle following its implementation in the observation unit. Besides, the project leader led the observation unit nursing staff through effective strategies to maintain consistent care for patients at risk of delirium. This consistency ensured patients received high-quality and standardized care, eliminating the ethical issues attributed to the fear of negative consequences due to the administration of specific medical actions.

Essential V: Healthcare Policy for Advocacy in Healthcare

In conformance with essential five, the project leader met with the nurse charge at the observation unit and identified healthcare policy alternatives that, upon being adopted, will

support the implementation of a delirium prevention bundle as a mechanism of preventing delirium cases in the unit. The project leader also met with the healthcare policy expert and selected the most effective healthcare policy that supported the full implementation of the delirium prevention bundle in the observation unit. Ultimately, the project leader met with the hospital leadership and designed the delirium prevention bundle policy's time frame and implementation criteria at the observation unit.

Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes

This quality improvement project utilized this essential and established communication with the health care team at the observation unit, broke down the hierarchical limitations, and promoted mutual respect among each other to enhance continuous learning and successful implementation of the delirium prevention bundle. The project leader maintained effective teamwork with all interprofessionals at the observation unit to improve the timely diagnosis of delirium and appropriately implement the delirium prevention bundle interventions to facilitate adequate care provision. The project leader led an interprofessional team at the observation unit, rigorously assessed the implementation of the delirium prevention bundle, and established new bundle components for inclusion to enhance delirium prevention efforts.

Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health

The project leader met with the observation unit nursing staff and assessed how the ethnicity and gender of the patients affected the implementation and evaluation of the delirium prevention bundle to aid in improving the healthcare patterns. The project leader also met with the observation unit nursing staff and assessed how the cultural diversity concepts of sexual

orientation, religious belief, and disability impacted the implementation and evaluation of the delirium prevention bundle to promote the delirium disease prevention efforts. The project leader interacted with a biostatistician and applied statistics techniques to study delirium episodes caused by severe illness, imbalance in the body, alcohol or drug use or withdrawal, infections, and surgical procedures.

Essential VIII: Advanced Nursing Practice

The project leader met with the hospital leadership and the observation unit charge nurse and conducted a comprehensive assessment of the effectiveness of the delirium prevention bundle in preventing delirium incidences among patients admitted through the observation unit. The project leader guided and mentored newly recruited nurses at the observation unit on achieving excellence in preventing delirium by effectively implementing the delirium prevention bundle. The project leader developed communication and sustained relationships with various scientific societies to enhance the provision of optimal care to patients and minimize delirium incidences.

Conclusions

Delirium remains a complex health condition affecting the elderly population. Delirium patients remain at a higher risk of health deterioration since it affects their physical and mental health and the quality of life. Healthcare facilities also remain at a high risk of incurring substantial medical expenditures attributed to delirium treatment due to extended hospitalization. As demonstrated throughout this quality improvement project, implementing a nurse-leader-directed delirium prevention bundle is the most successful approach to minimizing delirium incidence in the observation setting. Nursing education on using the CAM delirium screening tool and the delirium prevention bundle components increased nurses' awareness of delirium

screening, prevention, and treatment, resulting in a decline in delirium incidence. Despite encountering various limitations, the outcomes of this quality improvement project are promising, creating the necessity for implementing sustainability efforts. Hospitals should also consider implementing quality improvement projects to continue reporting improvements in delirium prevention.

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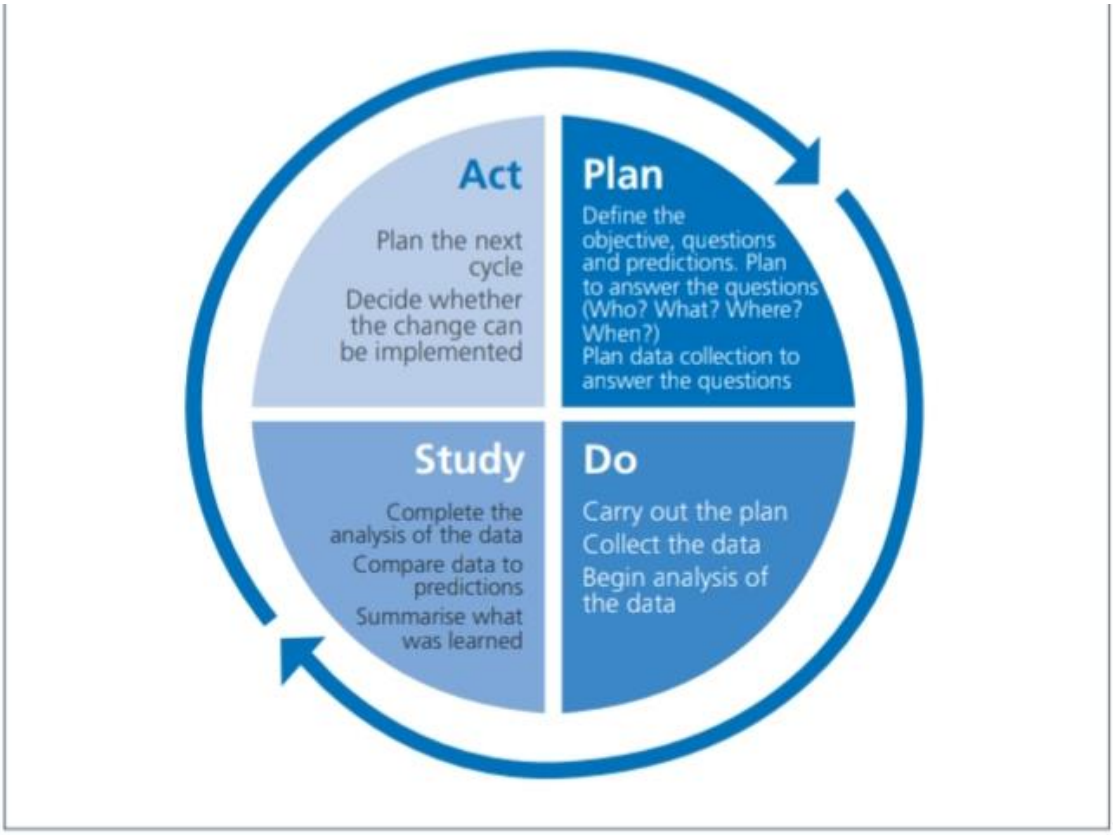
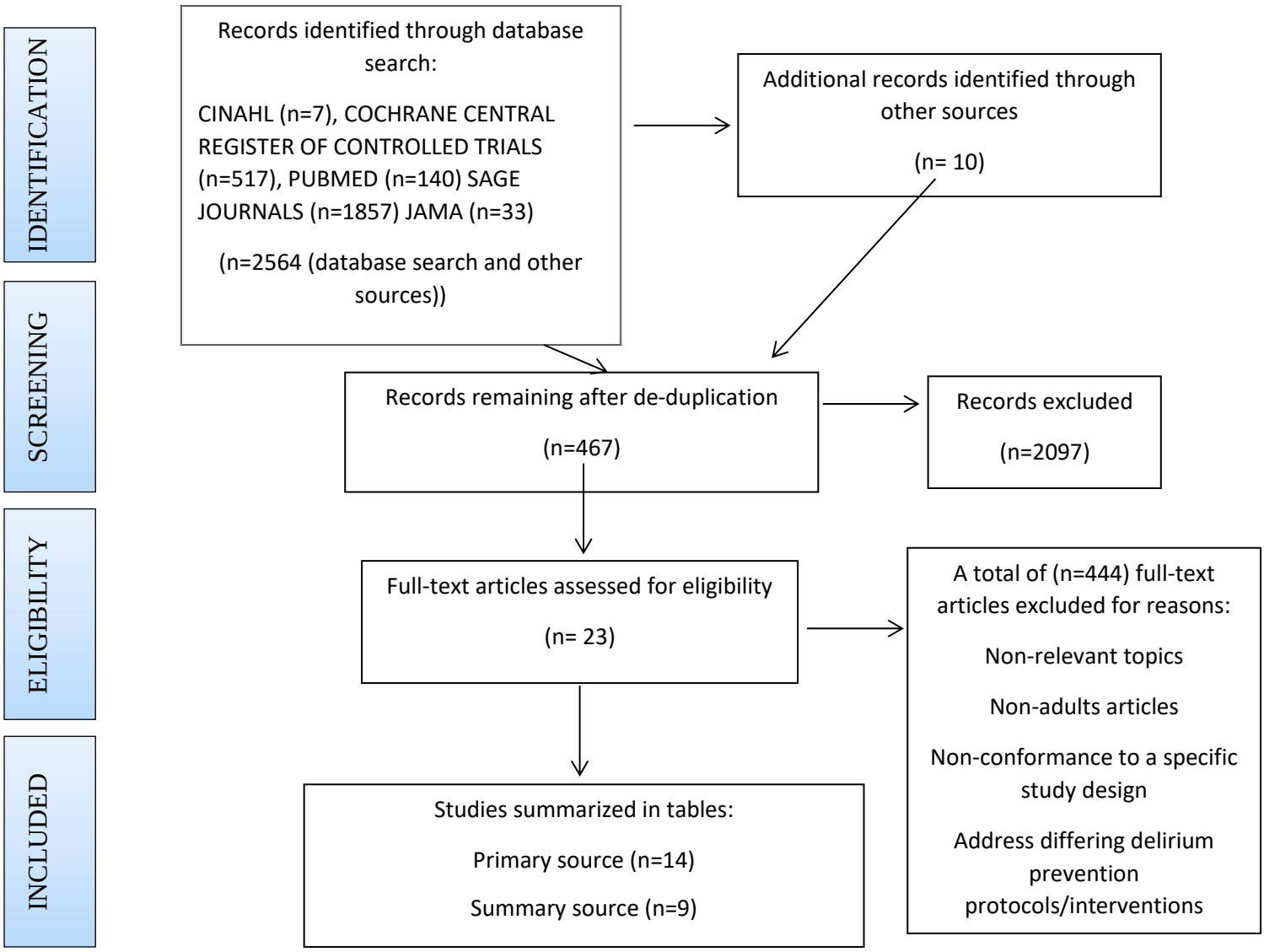
Appendices

Appendix A: PDSA Cycle



Appendix B:

Search Strategy



Appendix C

Project Budget

Income		2023 (10patients)	2024 (23 patients)	2025 (23 patients)
Item	Per Unit			
Anticipated savings from delirium treatment cost	$ 44 291 per patient per year	$442,910	$1,018,693	$1,018,693
Reduced length of stay savings	$ 850 per patient	$2,550	$20,400	$20,400
Total Income		**$445,460**	**$1,039,093**	**$1,039,093**
Expenses				
Nursing staff in kind donations				
Nurse practitioner (NP) 40 hours	$54.97/hr	$2,198.80	$2,198.80	$2,198.80
Nurse-in-charge (2 charge nurses) 4hours	$42.15/hr	$337.20	$337.20	$337.20
Registered nurse RN (10 RNs) 4 hours	$37.52/hr	$1,500.80	$1,500.80	$1,500.80
Certified nurse assistant (4 CNAs) 4 hours	$14.76/hr	$236.16	$236.16	$236.16
Projector hiring (1 unit)		$79.00	$79.00	$79.00
Telephone billing		$120.00	$120.00	$120.00
Presentation materials		$40.00	$40.00	$40.00
Total expenses		**$4,511.96**	**$4,511.96**	**$4,511.96**
Total Profit		**$440,948.04**	**$1,034,581.04**	**$1,034,581.04**

Appendix D

CITI Training Certificate

CITI PROGRAM

Completion Date 20-Aug-2023
Expiration Date 20-Aug-2026
Record ID 57590044

This is to certify that:

Alice Nalondo

Not valid for renewal of certification through CME.

Has completed the following CITI Program course:

Human Subjects Research
(Curriculum Group)
Health Professions - Human Subjects Research
(Course Learner Group)
1 - Basic
(Stage)

Under requirements set by:

Wilmington University

CITI
Collaborative Institutional Training Initiative

101 NE 3rd Avenue, Suite 320
Fort Lauderdale, FL 33301 US
www.citiprogram.org

Verify at www.citiprogram.org/verify/?w53910f11-9b2c-4b7c-afd9-61512fa772c5-57590044

Appendix E

Organizational Approval

EXHIBIT A

[redacted]

Student/Intern/Resident/Fellow Confidentiality Agreement

IMPORTANT: Please read all sections. If you have any questions, please ask before signing.

1. Confidentiality of Patient Information. I understand and acknowledge that: (i) services provided to patients are private and confidential; (ii) to enable such services to be performed, patients provide personal information with the expectation that it will be kept confidential and used only by authorized persons as necessary; (iii) all personally identifiable information provided by patients or regarding medical services provided to patients, in whatever form such information may exist, including oral, written, printed, photographic and electronic formats (collectively, the "Confidential Information") is strictly confidential and is protected by federal and state laws and regulations that prohibit its unauthorized use or disclosure; and (iv) in the course of my association with [redacted], I may be given access to certain Confidential Information.

2. Disclosure, Use and Access. I agree that, except as authorized in connection with my assigned duties, I will not at any time use, access or disclose any Confidential Information to any person (including but not limited to co-workers, friends and family members). I understand that this obligation remains in full force during the entire term of my rotation and continues in effect after such association terminates.

3. Confidential Policy. I agree that I will comply with confidentiality policies that apply to me as a result of my association.

4. Return of Confidential Information. Upon the termination of my association for any reason, or at any other time upon request, I agree to promptly re[redacted]m all copies of Confidential Information then in my possession or control (including all printed and electronic copies).

5. Periodic Certification. I understand that I am required to certify each year that I have complied in all respects with this Agreement.

6. Remedies. I understand and acknowledge that: (i) the restrictions and obligations I have accepted under this Agreement are reasonable and necessary in order to protect the interests of patients [redacted] [redacted]efore understand [redacted]may prevent me from violating this Agreement by any legal means available, in addition to corrective measures, which may result in accordance with applicable policies and collective bargaining agreements.

By: [signature]
Print Name: ALICE NALDOO
Date: 09/29/2023