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DNP Project: Implementation of Delirium Screening and Prevention Plan in a Rural Critical Access Hospital

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Delirium Screening and Prevention

This Doctor of Nursing Practice (DNP) Project is approved as a credible and independent investigation by a candidate for the DNP degree and is acceptable for meeting the project requirements for this degree. Acceptance of this DNP Project does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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Abstract

This project aimed to implement a nonpharmacologic delirium prevention protocol in a rural critical access hospital by increasing nursing confidence and knowledge with delirium. Research indicated delirium prevention was the cornerstone of management. The interventions proven beneficial in delirium prevention included: clinical staff education, bowel and bladder management, early removal of patient tethers, adequate nutrition and hydration, environmental cues and reorientation, sleep hygiene, music therapy, active family involvement, ensuring sensory aides were present in the hospital setting, and routine/interval screening for delirium using the Confusion Assessment Method (CAM) (National Institute for Health and Care Excellence, 2014; Siddiqi et al., 2016). This DNP Project included a nursing education session, routine delirium screening utilizing the CAM, and a nonpharmacologic prevention protocol implemented on all admitted patients age 65 years and older. The results demonstrated increased clinical awareness and earlier identification of delirium; however, no statistically significant decrease in delirium incidence rates was achieved. The nursing education did statistically improve nurses' confidence with delirium. Providing evidence-based nonpharmacologic delirium prevention techniques provided high quality healthcare, which, in time, has the potential to reduce delirium and its negative outcomes.

Keywords: *Confusion Assessment Method, delirium, delirium screening, delirium prevention, geriatric, nonpharmacologic delirium prevention*

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List of Abbreviations

1. Agency for Healthcare Research and Quality	AHRQ
2. American Geriatric Society	AGS
3. American Nurses Association	ANA
4. Confusion Assessment Method	CAM
5. Center for Institute of Nursing and Allied Health Learning	CINAHL
6. Certified Nursing Assistant	CNA
7. Delirium Elderly at Risk scale	DEAR
8. Doctorate of Nursing Practice	DNP
9. Electronic Medical Record	EMR
10. Health Insurance Privacy and Portability Act	HIPPA
11. Institutional Review Board	IRB
12. International Classification of Diseases	ICD
13. Johns Hopkins Nursing Evidence-Based Practice Model	JHNEBPM
14. Minnesota Hospital Association	MHA
15. Mini Mental Status Examination	MMSE
16. National Institute for Health and Care Excellence	NICE
17. Randomized control trial	RCT
18. Registered nurse	RN
19. Statistical Analysis Software	SAS
20. Short Portable Mental Status Questionnaire	SPMSQ

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Chapter 1

Introduction

Delirium is an acute and often preventable medical condition characterized by disturbed thought processes, shortened attention span, altered sleep-wake cycle, abrupt behavioral changes, and reduced environmental awareness. It begins abruptly and fluctuates over hours to days (American Delirium Society, 2015; American Nurses Association [ANA], 2017; Bull, 2015). Delirium can be caused by several factors including: infection, surgery, fever, electrolyte abnormalities, medications, lack of adequate sleep, and equipment such as urinary catheters and restraints (American Delirium Society, 2015).

Delirium affected more than seven million hospitalized patients of all ages in the United States in previous years (American Delirium Society, 2015). The geriatric population is at an increased risk for delirium; three to 61 percent of the hospitalized geriatric population experienced delirium (Kalish, Gillham, & Unwin, 2014). This increased risk is due to advanced age with hearing, visual, and urinary impairments, dementia, polypharmacy and medication side effects, and acute illness which affects electrolyte balance and mental status (Kalish et al., 2014).

Delirium may present in one of three ways: hyperactive, hypoactive, or mixed. Hyperactive delirium patients may be anxious, agitated, delusional, combative, or disoriented while hypoactive patients may be comatose, subdued, or lethargic. Often, hypoactive delirium goes unrecognized in the elderly due to the symptoms being attributed to illness. Mixed delirious patients will display symptoms from both types; it is the most common presentation. In all delirium, the patient will have altered awareness,

disorganized speech, and impaired cognition and emotions (Kalish et al., 2014). Kalish et al. (2014) highlighted a typical hyperactive delirium patient as an elderly female who was admitted for a chronic disease exacerbation, dehydrated from a poor appetite, started on a few new medications to treat her exacerbation, did not sleep well the first night in the hospital, and had incontinence issues requiring placement of a Foley catheter. The patient's family arrived in the morning to find the patient anxious, crawling out of bed, and questioning where she was and why people were "hurting her". This is a common scenario in units who care for ill geriatric patients.

Significance of the Problem

History. Delirium was derived from the Latin word "delirare" which means "to become crazy" (Adamis, Treloar, Martin, & Macdonald, 2007). It has been documented consistently in clinical features throughout medical literature dating back over 2,000 years ago (Adamis et al., 2007). The Diagnostic and Statistical Manual of Mental Disorders (DSM) Third Edition first standardized delirium as a clinical disorder in 1980 (Martins & Fernandes, 2012). The DSM Fifth Edition currently lists the delirium criteria as follows:

> disturbance in attention (reduced ability to direct, focus, sustain, and shift attention) and awareness; change in cognition (memory deficit, disorientation, language disturbance, perceptual disturbance) that is not better accounted for by a preexisting, established, or evolving dementia; the disturbance develops over a short period (usually hours to days) and tends to fluctuate during the course of the day; there is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by a direct physiologic consequence of a

> general medical condition, an intoxicating substance, medication use, or more than one cause (Alagiakrishnan, 2016, para. 3).

Overview. Delirium is a global phenomenon with patients throughout the world experiencing similar symptoms. Delirium can occur in any population, age group, and care setting such as emergency departments, nursing homes, and all hospital units (ANA, 2017). Geriatric patients with dementia had the highest likelihood of delirium with incidence rates up to 89 percent (Martins & Fernandes, 2012). Other high incidence diagnoses included geriatric patients with mechanical ventilation (up to 80 percent) and those experiencing hip fracture (up to 61 percent) (Kalish et al., 2014). Delirium differs from dementia in that it has an acute onset that fluctuates rapidly and will resolve in days to weeks once properly treated. Dementia has a gradual and progressive onset of permanent cognitive change. Having dementia will increase delirium rates in healthcare settings as removing the patient with dementia from their normal, daily routine will cause increased confusion (American Delirium Society, 2015).

Risk Factors. Predisposing risk factors for delirium included: age 65 years and older, male gender, comorbidities such as alcoholism, chronic pain, depression, multiple disease processes, dementia, polypharmacy, sensory impairment, poor functional status, and social isolation prior to hospital admission (Kalish et al., 2014; National Institute of Health and Care Excellence [NICE], 2014). Precipitating factors which may lead to increased incidence of delirium included: infection, hypoxia, dehydration, metabolic disturbances, shock, surgery, uncontrolled pain, sleep deprivation, and any kind of tether including urinary catheters and intravenous lines (Kalish et al., 2014). Many medications can also lead to delirium with the highest risk medications including anticholinergics,

benzodiazepines, Demerol (meperidine), and dopamine agonists. These drugs may alter the mental status causing sedation and confusion; they may not be cleared as quickly from a geriatric patient's body due to decreased kidney and liver function (Healthy Aging, 2015).

Moderate risk medications include: antibiotics, anti-emetics, corticosteroids, anticonvulsants, narcotics, sedatives, Reglan (metoclopramide), and antihistamines; these medications are used often throughout hospital stays, often in combination (American Geriatrics Society 2015 Beers Criteria Update Expert Panel, 2015; Kalish et al., 2014). These medications affect the geriatric population as often they have multiple comorbidities requiring various medications for chronic disease management, increasing the side effect profile and drug interactions. If the patient has kidney or liver disease, it affects how they metabolize the drugs as well. This can lead to inappropriate drug levels and increased side effects contributing to delirium (Healthy Aging, 2015).

Outcomes. Delirium was associated with significant increases in: length of hospital stay, nursing care, readmission, need for long-term care, morbidity and mortality, functional and cognitive decline, and family distress related to seeing their loved one in a delirious state (Grover & Kate, 2012; Kuczmarska et al., 2016). Despite these negative outcomes, delirium was often under recognized by hospital staff (Kuczmarska et al., 2016). Some providers viewed delirium as an unavoidable part of hospitalization for a geriatric patient, while others viewed delirium as a transient process with no long-term clinical sequelae. This lead to improper prevention, under diagnosis, and a lack of adequate management of this diagnosis (Leslie & Inouye, 2011).

Delirium was associated with higher financial costs for the patient and healthcare system including increased length of hospital stay, increased nursing care requirements, hospital readmission, and the need for long-term care after a patient's delirium diagnosis. In a study published in the *Archives of Internal Medicine*, total cost estimates for delirium ranged from $16,303 to $64,421 per patient (Leslie, Marcantonio, Zhang, Leo-Summers, & Inouye, 2008). This was comparable to delirium costing the United States healthcare system roughly between $38 billion to $152 billion annually (Leslie et al., 2008). This substantial economic impact displays just how large of a financial burden delirium can bring. In fact, delirium can be compared to the economic impact of diabetes on society (Leslie & Inouye, 2011).

The Centers for Medicare and Medicaid Services (CMS) (2017) tracks outcomes related to readmission rates and penalizes hospitals for readmissions within 30 days for the following diagnoses: pneumonia, heart failure, acute myocardial infarction, and hip/knee replacements. Often these readmissions were geriatric patients in which delirium was a contributing factor affecting the readmission outcome. Furthermore, hospitals reimbursed by insurance payment bundles or prospective payment systems that are based on a set length of stay, may not be compensated for the care provided when a patient stays longer than predicted (CMS, 2017).

Morbidity, having a disease and its associated symptoms, affects a patient's quality and quantity of life. Of patients admitted with delirium, approximately 10 to 26 percent died of complications related to delirium. The high rates of delirium, 10 to 56 percent of all hospital admissions, with up to 80 percent in the intensive care setting alone, greatly affected patients' overall outcomes related to length of life and functional

status at discharge (Alagiakrishnan, 2016; Kuczmarska et al., 2016). Due to the fluctuating changes in cognition and behavior, symptom and pain management were very difficult for those suffering from delirium as the clinical picture was distorted. This behavioral change lead to altered cognition, functional decline as the patient became disconnected from reality, and inability to follow recommendations from providers, nurses, therapists, and pharmacists. Often, for hyperactive or mixed delirium symptoms, providers gave sedating medications that only potentiated the issue even further in the long-term with ongoing confusion and disconnection from reality. Patients and family members struggled with the negative physical, mental, and behavioral symptoms associated with delirium, which led to stress and caregiver burnout (Phillips, 2013).

Delirium affected up to seven million hospitalized patients annually in the past with vast associated healthcare dollars (American Delirium Society, 2015). Because of the lack of widespread clinical awareness and education, overlap with dementia symptoms, and staff feeling delirium was “normal” for the elderly, delirium was often under recognized and treated by clinical staff in the hospital setting (Kalish et al., 2014). Due to the large number of patients affected and the under recognition, implementation of delirium screening tools and prevention techniques/protocols have become the forefront of quality improvement projects across the nation (Minnesota Hospital Association [MHA], 2015).

Evidence supported the use of screening tools for early delirium diagnosis and nonpharmacologic and pharmacologic interventions for the prevention and management of delirium. In fact, many facilities across the state have implemented protocols for the prevention and management of delirium (MHA, 2015). The goal was to decrease length

of hospital stays, increase the quality of patient care provided, and keep the patient functioning at their highest level to avoid significant morbidity or even death due to accidents, injuries, or unidentified medical illness during delirious episodes (Martinez, Tobar, & Hill, 2015).

Population of Interest

The population of interest for this project was the acute care nurses that provided care for medical surgical hospital patients. Frontline nurses provided direct patient care around the clock for all admitted patients and needed to be equipped with the knowledge and skills to appropriately screen and prevent delirium and its negative outcomes (ANA, 2017). Nurses were at the bedside providing direct care and continually assessing the patient making them ideal candidates to identify early changes in patient cognition and awareness. Due to their proximity to patients, nurses were the prime caregivers to implement delirium prevention techniques as well.

In the state in which this project took place, there were approximately 105,988 actively licensed registered nurses (RNs) (Minnesota Department of Health [MDH], 2017). Ninety two percent of the workforce was female, with the largest age group, 27 percent, comprised of ages 34 and younger; this was followed by 23 percent of the RN population being 55 to 64 years of age. Ninety one percent of the state's RNs are of Caucasian descent. Forty-seven percent of the RN population reported working in the hospital setting, followed by 13 percent in the ambulatory care setting, followed by a variety of other settings at small percentages (MDH, 2017). Sixty-four percent of nurses practiced in urban healthcare regions, with a ratio of one nurse to 60 patients. In contrast,

the rural regions had one nurse per 78 patients. The state was considered to have adequate nursing staff per the population (MDH, 2017).

The secondary population affected by this project was the patients, aged 65 and older, that were admitted to the rural medical surgical hospital unit. Geriatric patients have the highest risk of delirium. It was imperative to screen for, prevent, and recognize delirium in order provide safe, quality care for this cohort. According to the Agency for Healthcare Research and Quality (AHRQ) (2014), the most frequent inpatient diagnoses for those aged 65 and older included: sepsis, congestive heart failure, osteoarthritis, pneumonia, cardiac dysrhythmias, stroke, myocardial infarction, hip fracture, COPD, renal failure, and urinary tract infection. Those aged 65 and older also had a longer length of hospital stay than other age groups, with females having higher admission rates, though this was likely due to a higher female population living in this age group as well (AHRQ, 2016).

Clinical Question

The foundation of a clinical question was identified in the PICOT format, where P stood for population, I for intervention, C for comparison, O for outcome, and T for time frame (Roush, 2015). The guiding PICOT question for this project was: **(P**) In rural Midwest acute care nurses, how does the **(I)** implementation of a delirium prevention protocol and a validated screening tool for early identification of delirium **(C)** compared to usual care, **(O)** affect nurses' confidence and knowledge level as well as delirium incidence rates in geriatric patients over a **(T)** three-month time frame? This question provided the basis for clinical query throughout the literature review and project planning process.

Purpose of the Project

The purpose of this quality improvement project was to implement a nonpharmacologic prevention protocol comprised of various prevention techniques identified in the literature review for at risk patients identified as those age 65 years and older. Furthermore, a validated delirium-screening tool for early delirium identification was implemented. The aim of the project was to improve the knowledge and quality of the nursing assessment process to recognize patients at risk for/with delirium, institute a protocol of prevention interventions on every patient age 65 years and older, and complete routine delirium screenings for early delirium diagnosis and referral. The overarching goal was to improve the safety and quality of patient care while reducing morbidity and mortality for this population. The facility where this project was carried out previously did not provide any staff education on delirium, did not utilize any formal screening process, and had not implemented a prevention protocol for delirium. Thus, this project had the potential to positively impact the geriatric population it served in preventing delirium and its associated negative outcomes. In addition, routine delirium screening provided early identification for proper provider and pharmacist referral for possible pharmacologic intervention as well.

Definitions

Delirium: acute onset of fluctuating symptoms that include disturbance of consciousness, shortened attention span, change in cognition and/or language, and altered sleep-wake cycle (Trzepaez, Breitbart, Franklin, & Levenson, 1999).

Dementia: general term that encompasses a progressive decline in mental ability that interferes with daily living; includes memory loss, altered thought processes,

communication difficulties, and trouble with reasoning and judgment (Alzheimer's Association, 2017).

Geriatric: older adults, 65 years of age and older; a branch of medicine devoted to the needs of the older adult population (American Geriatric Society [AGS], 2017).

ICD-10 code: International Classification of Diseases version 10 which was updated in 2014; used for medical billing and coding (Center for Disease Control and Prevention, 2015).

Incidence rate: incidence rate is the number of new cases of a disease divided by the number of persons at risk for the disease (New York State Department of Health, 1999).

Medical-surgical: a hospital unit that cares for adults who are acutely ill with a variety of medical conditions or who are recovering from surgery (Academy of Medical Surgical Nurses, 2017).

Prevention protocol: a written set of instructions that help guide the provider in the care of the patient (Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, 2003); in this case a written set of instructions in how to help prevent a certain outcome (delirium).

Screening tool: "a simple test performed on a large number of people to identify those who have or are likely to develop a specified disease" (Collins English Dictionary, 2012, para. 1)

Usual care: "a term used to describe the full spectrum of patient care practices in which clinicians have the opportunity (which is not necessarily seized) to individualize care" (Thompson & Schoenfeld, 2007); in this case it refers to the daily routine patient care of this individual facility.

Summary

Delirium was a widespread, common phenomenon that occurred across all care settings in people of all ages. The geriatric population have comprised the majority who require hospitalization; thus, delirium has occurred at a higher rate in this age group (Leslie & Inouye, 2011). Research to date highlighted the economic, healthcare, and personal burden from delirium, which has had a significant impact on the patient's level of functioning as well as overall healthcare costs. The state hospital association had called for action to recognize, prevent, and adequately manage delirium to reduce its impact and improve quality of life for the older population and their families (MHA, 2015).

Chapter 2

Literature Review

Introduction

Delirium has been well described but it remains an under recognized clinical issue (Kalish et al., 2014). Delirium reduction techniques have included staff education, identification of risk factors through screening tools, nonpharmacologic prevention measures, and routine screening to identify early changes in the patient's awareness and cognition (Godfrey et al., 2013; Siddiqi et al., 2016). This chapter described the literature review process utilized to gather evidence encompassing delirium prevention methods. It further explored evidence findings to support a practice change utilizing the Johns Hopkins nursing evidence-based practice model (JHNEBP) for evidence evaluation, Virginia Henderson's concept of nursing as the theoretical framework, and John Kotter's theory of leading change that guided the overall Doctor of Nursing Practice (DNP) Project.

A literature review was conducted using the following databases: Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, Cochrane, and Science Direct. Search terms included: *delirium, prevention or prevent, nonpharmacological or nonpharmacologic interventions, elderly or geriatric or older adult, screening or tool, prevention protocol or bundle,* and *delirium in hospitalized patients*. A total of 543 articles were found through the initial search. Inclusion criteria encompassed full-text available/open access articles, publication years 2012 to 2017, and written in the English language. All articles that did not pertain to nonpharmacologic delirium prevention and/or delirium screening tools were excluded. Furthermore, any

delirium related to substance use withdrawal and in non-geriatric populations were also excluded. Many of the studies included in this search also focused on treatment options and pharmacologic measures for delirium and thus were excluded. Further excluded were studies from intensive care, perioperative, and out of hospital settings. A total of 17 articles were utilized for the literature review included below. Clinical practice guidelines were found utilizing Google Scholar and the search terms of *delirium and clinical practice guidelines*; a total of four guidelines were found that were relevant to delirium in the geriatric population, two were utilized for this review. The other two were excluded as one focused on pain, agitation, and delirium in the intensive care setting only and the other focused on the palliative care setting.

Research Evidence Appraisal Tool

The research appraisal tool in the JHNEBP process provided an outline to determine the strength and quality of individual study design, methodology, and scientific evidence. Level I evidence comprised experimental evidence in randomized controlled trials (RCTs) and/or systematic reviews of RCTs with or without meta-analysis. Level II evidence consisted of quasi-experimental studies, systematic reviews of quasi-experimental and/or RCTs, with or without meta-analysis. Level III evidence was non-experimental or qualitative studies; systematic reviews of a combination of these types of studies fit into this category as well. Level IV evidence was from nationally recognized experts or specialists and may come in the form of clinical practice guidelines or consensus reports. Lastly, Level V evidence was obtained from quality improvement projects, program evaluations, literature reviews, or case reports (Dearholt & Dang, 2012).

The quality appraisal of these articles was rated on an A, B, and C quality scale. High quality (A) research evidence produced a comprehensive literature review of scientific evidence, consistent results and recommendations that were generalizable, satisfactory sample sizes, and adequate control. High quality (A) non-research evidence had documentation of a systematic literature review, was endorsed by a professional organization, had consistent results from well-designed studies or across multiple settings, clear expertise, criteria based evaluation of strength and quality of studies and conclusions, and had been created/revised within the past five years. Good quality (B) research evidence had a moderately comprehensive literature review with scientific evidence, sufficient sample size, and some control that brought consistent results and conclusions. Good quality (B) non-research evidence contained a reasonable amount of systematic literature review, consistent results, clear strengths and limitations, and had been developed within the past five years. Low quality (C) research evidence had inadequate sample sizes with inconsistent results. Low quality (C) non-research evidence had poorly defined, inconsistent results in which recommendations cannot be made (Dearholt & Dang, 2012).

For this project, two Level I articles were utilized, one of high quality from a Cochrane review and one of good quality. Nine Level II articles were utilized of both high and good quality. Four Level III articles of high and good quality were used along with one high quality Level IV article and one high quality Level V article. See Appendix C for the evidence table.

Clinical practice guidelines were analyzed utilizing the Appraisal of Guidelines for Research & Evaluation (AGREE II) instrument. This instrument was a framework to

describe the type of information required for clinical practice guidelines and was a method in which to assess the quality and methodology of a guideline. The AGREE II tool was a generic instrument comprised of six domains: scope and purpose, stakeholder involvement, rigor of development, clarity of presentation, applicability, and editorial independence. Each section had questions to answer and received a percentage score. The instrument was designed for use by guideline developers, healthcare workers, policy makers, and educators in which to ensure guidelines are sound and should be recommended/utilized (AGREE Next Steps Consortium, 2009). See Appendix C for compiled evidence appraisal.

Evidence Findings

Delirium risk factor identification. Evidence reported that delirium was fundamentally under-recognized and risk factor management was not part of routine clinical care (Kuczmarska et al., 2016; Wand et al., 2014). A large portion of the reviewed literature highlighted the importance of recognizing delirium risk factors when the patient presented to the hospital to prevent deleterious outcomes (Godfrey et al., 2013; Siddiqi et al., 2016). Both the Minnesota Hospital Association (MHA) (2014) and a clinical trial by Freter, Dunbar, MacKnight, and Rockwood (2016), supported the use of utilizing the Delirium Elderly At Risk (DEAR) Scale upon hospital admission to efficiently determine who was at risk and institute early prevention protocols. The DEAR criteria listed risk factors as having one of the following: 80 years of age and older, sensory impairment, functional dependence in one area or more including bathing, grooming, or eating, substance use defined as alcohol greater than 3 drinks per week or

benzodiazepine use greater than 3 times per week, and cognition issues identified as previous delirium or failed clock-draw test (MHA, 2014).

Another risk factor tool, described by the National Institute for Health and Care Excellence (NICE) (2014), stated adults at risk for delirium included anyone with at least one of the following: those aged 65 years and older, cognitive impairment and/or dementia confirmed by Mini Mental Status Examination (MMSE), current hip fracture, and/or severe illness who was at risk for clinical deterioration. Other risk factors included social isolation prior to hospital admission, multiple comorbidities, and polypharmacy, especially with high and moderate risk medications noted by the American Geriatrics Society BEERS Criteria (NICE, 2014). Further complicating these factors included illness, hypoxemia, dehydration, anesthesia, sleep deprivation, and an unfamiliar environment (Siddiqi et al., 2016). Clinical staff training and education related to these risk factors and appropriate use of screening tools were effective strategies to increase delirium awareness among those caring for patients (Freter et al., 2016; Godfrey et al., 2013; Wand et al., 2014).

Delirium education. Varying interventions existed for education related to delirium including didactic sessions, internet based learning, and written protocols (Wand et al., 2014). Didactic sessions ranged from one session to several focusing on definition and types of delirium, screening methods for delirium, and prevention and management methods of delirium (Chow, Mujahid, Butterfield, & McNioll, 2015; Wand et al., 2014). It was imperative to target nurses who were at the bedside with patients along with providers who may be assessing patients and ordering management therapies (Chow et al., 2015; Wand et al., 2014). Interactive, case based discussions helped make delirium

relevant to staff and helped create a change in practice. Having resource nurses to reinforce and enable bedside nurses was imperative to successful delirium education and prevention (Wand et al., 2014). It was vital that hospital units invested time and money to provide appropriate education to create awareness and recognition of delirium to prevent, screen, and reduce overall delirium incidence (Chow et al., 2015).

Delirium screening. Throughout the literature, there was a multitude of different delirium screening diagnostic tools employed by various healthcare members such as geriatricians, psychiatrists, family practice physicians, and nurses (De & Wand, 2015). These various screening tools have been validated in different patient settings ranging from long-term care, to surgery, to intensive care, to palliative care settings (De & Wand, 2015). Highlighted below are the most common tools employed for delirium screening.

The most frequent tool across all settings included the Confusion Assessment Method (CAM) (De & Wand, 2015; Mariz, Costa Castanho, Teixeira, Sousa, & Correia Santos, 2016; Rivosecchi, Smithburger, Svec, Campbell, Kane-Gill, 2015; Wand et al., 2014). The CAM was comprised of questions assessing four areas: acute onset and fluctuating course, inattention, disorganized thinking, and altered level of consciousness. The CAM was easy to use but required staff training; it was found to be over 90 percent sensitive and specific for delirium. It was the standardized tool most widely utilized due to the numerous studies validating its clinical usefulness for delirium identification/diagnosis (De & Wand, 2015). The CAM creators, along with the validation studies, recommended that a cognitive assessment tool such the Mini-Cog, digit span test, MMSE, or Short Portable Mental Status Questionnaire (SPMSQ) be utilized in conjunction with the CAM screen. This allowed for a brief, structured

interview that also assessed cognition to be able to identify a baseline and changes in this baseline that occurred with delirium (Adamis, 2016; De & Wand, 2015; Freter et al., 2016).

Another screening tool for the elderly population included the 4A's Test in which the "A" stands for alertness, age/date of birth/place/year, attention, and acute or fluctuating course. This was a four-question rapid delirium screening any care provider can administer in minutes; six validation studies occurred between the years of 2013 to 2017 (De & Wand, 2015). The timeframe in which to conduct these delirium screenings varied across the literature. Ranges of screening frequency included every eight hours to every 48 hours throughout hospitalization (Martinez et al., 2014). A single assessment was found to be ineffective for overall delirium care (De & Wand, 2015).

Delirium prevention nonpharmacologic interventions. There was strong evidence throughout the literature for the use of multi-component interventions for delirium prevention (AGS, 2014; Godfrey et al., 2013; Martinez et al., 2014; NICE, 2014; Siddiqi et al., 2016; Wand et al., 2014). Studies were heterogeneous in nature with interventions ranging from one to a combination of both pharmacologic and nonpharmacologic interventions (Siddiqi et al., 2016). Common themes identified throughout the systematic reviews and individual studies surrounding nonpharmacologic interventions focused on multiple interventions. Interventions included: staff education on risk factors, screening, and prevention, hydration and nutrition, early mobilization, environmental cues and reorientation, sleep promotion/hygiene techniques, music therapy, active family involvement, early removal of patient tethers, and ensuring the patient's sensory aides were present in the hospital (AGS, 2014; Godfrey et al., 2013;

Gorski et al., 2017; Martinez et al., 2014; NICE, 2014; Rivosecchi et al., 2015; Siddiqi et al., 2016).

Freter et al. (2016) utilized delirium friendly pre-printed order sets, identical in appearance to previous order sets, with a combination of both pharmacologic, scheduled Tylenol for pain and scheduled laxatives for stool, and nonpharmacologic orders, early catheter removal, lab work monitoring, and early ambulation programs, to significantly reduce postoperative delirium in the geriatric population. The importance of bowel and bladder management with regular stools and avoidance of incontinence and catheterization was also identified as important for delirium management among a few studies (Holt, Young, & Heseltine, 2013; Wand et al., 2014). Gorski et al. (2017) utilized hospital volunteers to decrease delirium incidence by daily visits for time/place reorientation, reading the newspaper/updating current events, assisting with food and fluids, and wheelchair rides around the facility and outside to further reduce delirium incidence.

The main nonpharmacologic interventions associated with delirium prevention across the literature included focusing on: nursing education, early mobility and/or physical therapy, reorientation and cognitive stimulation throughout the day, proper hydration and nutrition, sleep hygiene techniques, and use of patient's own sensory aids and assistive devices (AGS, 2014; Siddiqi et al., 2016). The Cochrane Database of Systemic Reviews further identified bowel and bladder management, minimization of patient tethers, and non-opioid pain management as further interventions to help prevent delirium (Siddiqi et al., 2016). Many of these interventions are considered quality nursing

care, and evidence supported the use of facility-based protocols which clinical staff can implement for optimal delirium prevention (Siddiqi et al., 2016).

Delirium prevention program related outcomes. A multitude of studies further explored delirium prevention programs and their effect on delirium incidence, delirium duration, length of hospital stay, and number of falls. Across all studies, a decrease in delirium incidence was noted, whether statistically or clinically significant (Freter et al, 2016; Martinez et al., 2014; Siddiqi et al., 2016; Wand et al., 2014). While Martinez et al. (2014) found a nonsignificant reduction in length of hospital stay and delirium duration, Gorski et al. (2017) found a statistically significant reduction in length of stay and duration of symptoms with nonpharmacologic intervention use. A decrease in number of in-hospital falls was also found through delirium prevention techniques (Martinez et al., 2014). A study by Bull, Boaz, and Jerme (2016), further found that providing family education about delirium not only increased the family's knowledge, but decreased the distress associated with seeing their family member experience delirium. It was also noted that family knowledge decreased the overall delirium incidence rate.

Barriers to delirium prevention. Identifying barriers and implementing evidence-based strategies to overcome barriers was key to successful delirium identification and prevention (Siddiqi et al., 2016). One large barrier to successful delirium prevention had been the lack of awareness as delirium has not been fully understood or perceived as meaningful. There was significant disconnect between awareness and the overall impact of the issue (Godfrey et al., 2013). Further complicating delirium was the diagnosis of dementia, as often these lines were blurred, leaving a patient's behavior attributed to dementia with no further exploration (Godfrey et al.,

2013). At times, if an elderly patient was acting different or inappropriately, a nurse may attribute the behavior to dementia or “sun downing” and no further explanation was sought such as fever, possible infection, dehydration, or exhaustion.

Another large barrier was the lack of specific information or a set protocol on how to implement a bundle of nonpharmacologic interventions for delirium prevention (Martinez et al., 2014). The multifactorial nature of the interventions had made it difficult to determine which specific interventions were responsible for successful outcomes in delirium prevention (AGS, 2014). In fact, the studies ranged from a combination of two to 13 different interventions utilized together (Siddiqi et al., 2016). Due to the heterogeneity of research studies found in delirium prevention, healthcare facilities must commit to the financial requirements needed to build a facility specific delirium prevention protocol. The time required, multi-disciplinary nature, amount of education needed, familiarity and confidence in use of screening tools, and change in clinical practice were also potential barriers (Wand et al., 2014).

Recommendations for Practice

Delirium had been well described throughout the scientific literature across disciplines; however, it remained largely under recognized by clinical staff and hospital administration (Kalish et al., 2014). The most effective strategy to reduce delirium was prevention measures, including staff education, identification of risk factors, and implementation of regular, systematic screening that identified the earliest change in the patient’s status (Godfrey et al., 2013; Siddiqi et al., 2016). With identified at risk patients, the implementation of a bundle of nonpharmacologic measures was instituted to help

prevent or minimize the negative consequences associated with delirium (AGS, 2014; NICE, 2014).

A prevention protocol should begin with awareness and education for clinical staff that provide bedside care around the clock. This could occur in multiple educational formats, but must encompass risk factors, screening tools, and prevention techniques. Adherence to the planned prevention protocol would be imperative for success (AGS, 2014; Godfrey et al, 2013; NICE, 2014). All older adult patients should initially be assessed upon hospital admission for delirium with the evidence-based risk factors identified above (AGS, 2014; MHA, 2014; NICE, 2014). Upon identification of potential risk, a multi-component nonpharmacologic intervention protocol should be put into place (AGS, 2014; Godfrey et al., 2013; Martinez et al., 2014; NICE, 2014; Siddiqi et al., 2016; Wand et al., 2014). It is then important to do routine screening at specified intervals for ongoing early identification of delirium (De & Wand, 2015; Martinez et al., 2014). This DNP Project encompassed an educational session for nurses, a protocol of nonpharmacologic prevention interventions for those 65 years of age and older, and a delirium screening tool identified in chapter three.

Gaps in the Evidence

The literature review did not produce any specific set protocol of nonpharmacologic interventions with implementation instructions for delirium prevention. Instead, it highlighted various interventions that have shown promise whether alone or in random groupings. In the RCTs, heterogeneity was apparent and no specified set of interventions and implementation steps were found. While the literature supports the use of both nonpharmacologic and pharmacologic measures, only a small amount of

studies had a reproducible set protocol (most gave examples of various interventions used). Another gap identified was the lack of current economic figures relating to the cost of delirium to the healthcare system.

Evidence-Based Practice Model

The JHNEBP Model served as the template to guide this literature review. The model depicted three cornerstones for the basis of nursing: practice as knowledge into action, education as nursing knowledge and skills, and research as generation of new knowledge; see *Figure 2.1* below. At the center of this model was the evidence, both research and non-research, that informed the practice, education, and further research. Internal factors, including an organization's culture, beliefs, values, leadership, technology, and equipment, along with external factors including the accrediting bodies, regulations, and standards, also influenced the JHNEBP model. The JHNEBP process occurred in three phases: practice question, evidence, and translation, with 18 steps comprising these three phases (Dearholt & Dang, 2012).

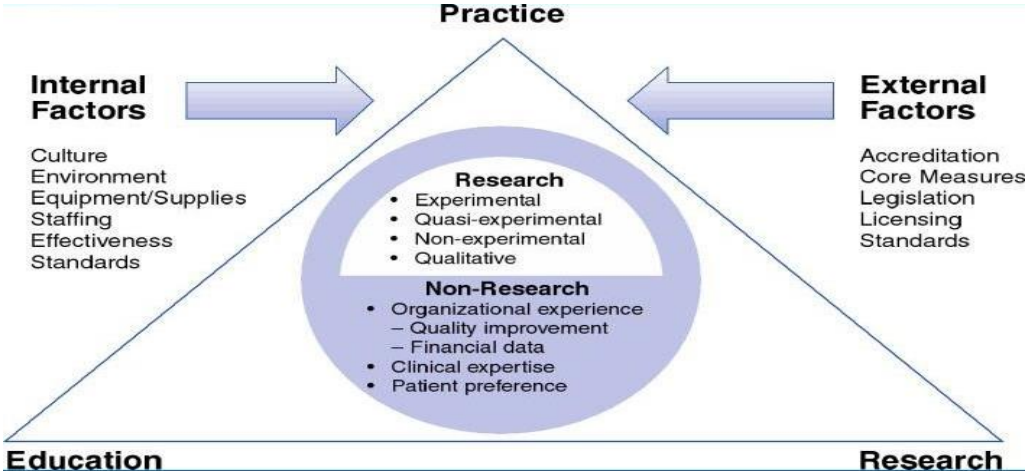

Figure 2.1. Johns Hopkins nursing evidence-based practice model. Adapted from Dearholt, S. L., & Dang, D. (2012). *Johns Hopkins nursing evidence-based practice: Model and guidelines* (2nd ed.) (p. 34). Indianapolis, IN: Sigma Theta Tau International.

Practice question. The first part of the process, the practice question, included steps one through five. Step one was to recruit an inter-professional team to address a practice concern (Dearholt, 2012). Consultation with the acute care manager about current quality improvement initiatives and unit needs provided the basis for this project. Step two was to develop and perfect the evidence-based practice question utilizing the PICOT format identified above (Dearholt, 2012). Identifying the current lack of delirium education, screening tools, and prevention methods, led to the development of this DNP Project. The identified issue was a current process did not exist in the rural community hospital and the state hospital association had prioritized this as a patient safety and quality initiative. Step three included defining the scope of the question and identifying stakeholders (Dearholt, 2012). The specific populations identified included the geriatric population at higher risk for delirium as well as the acute care nurses who provided around the clock care for patients. Steps four and five consisted of determining responsibility for the project leadership and scheduling team meetings (Dearholt, 2012). The acute care manager agreed to this project and supported the DNP Project through staff education, training, implementation of the screening tool and prevention protocol, and data collection.

Evidence. The second phase, evidence, was comprised of steps six through 10 with a goal to find, appraise, and synthesize the best evidence. Step six included conducting both internal and external searches for evidence (Dearholt, 2012). The process was highlighted in the literature review introduction. Steps seven and eight consisted of appraising the level and quality of evidence and summarizing each of the individual pieces of evidence utilizing the Research Evidence Appraisal Tool from the

JHNEBP textbook (Dearholt, 2012). A summary of evidence was created and displayed in the evidence table in Appendix C. Steps nine and 10 consisted of synthesizing the overall strength and quality of evidence and making recommendations for change based on the evidence synthesis (Dearholt, 2012). This was highlighted in the evidence paragraphs of this chapter.

Translation. The third phase, steps 11 through 18, determined if the practice changes were practical, realistic, and a proper fit for the given setting. Step 11 included determining the fit and appropriateness of the recommendation for practice change. Consideration of risks, benefits, and resources needed to accomplish a practice change were done by the organization and stakeholders (nurses and providers). Steps 12 through 14 encompassed creating, securing, and implementing the action plan. Developing a timeline, updating the protocol/guideline, securing needed resources, and implementing the action plan with all affected staff were critical in these steps.

Steps 15 and 16 included evaluating and reporting the outcomes, both favorable and unfavorable, to the stakeholders; a part of the quality improvement process. Step 17, identify next steps, involved reviewing the overall process and outcomes and determining if new issues arose or parts of the process required refining. The final step, 18, required dissemination of the findings to the organization to support the implementation of this project or to identify further issues or gaps recognized through the process (Dearholt, 2012). This occurred after the three-month implementation period as clinical staff input was collected throughout implementation. Modifications and/or additions will be added to the process as ongoing quality improvement. Statistical and clinical findings were shared to all clinical staff once obtained from the DNP Project.

Theoretical Approach

Virginia Henderson's definition and concept of nursing served as the theoretical foundation for this DNP Project. Henderson's definition of nursing included:

> Nursing is primarily assisting the individual (sick or well) in the performance of those activities contributing to health or its recovery (or to a peaceful death), that he would perform unaided if he had the necessary strength, will, or knowledge. It is likewise the unique contribution of nursing to help people be independent of such assistance as soon as possible (Harmer & Henderson, 1955, p. 4).

This view of nursing aligned closely with the care of the geriatric population. Nursing's goal was to assist the patient in regaining the most independence as possible. Through Henderson's experience, she expanded her nursing definition by identifying 14 basic nursing care components: breathing normally, eating and drinking effectively, eliminating bodily wastes, moving and maintaining desirable body positions, sleeping, selecting suitable clothing, maintaining normal body temperature through clothing and the environment, keeping the body clean to protect the skin, avoiding dangers in the environment, communicating with others to express emotions, worshiping according to one's faith, working toward accomplishment, participating in recreation, and learning normal development and available health facilities (Henderson, 1966).

These 14 components aligned with the nonpharmacologic interventions to help prevent delirium. See *Figure 2.2* for a visual depiction of these components. Evidence-based interventions included oxygenation assessment, adequate hydration and nutrition, bowel and bladder management, early mobilization, sleep hygiene, adherence to the patient's normal routine, environmental cues and reorientation, and nurse education to

help carry out these important interventions as basic nursing care components. The evidence illustrated that keeping the patient as oriented and functional as possible would help prevent delirium. Ensuring the patient maintained adequate hydration and nutrition, used the bathroom regularly, had his or her own mobility and hearing/vision devices, adhered to a normal daily schedule with appropriate wake and sleep times, and had frequent nursing assessment to recognize signs of illness deterioration, gave the patient the best potential outcome just as Henderson identified.

Henderson believed that nurses initiated and controlled nursing care and used their independent judgment to assess nursing needs and care requirements for the individual patient. It was then nursing's duty to help individuals meet their healthcare needs as well as provide a safe environment for which patients could function at their highest potential level (Gordon, Touhey, Geese, Dombro, & Birnbach, 2010). In order for nurses to successfully complete these interventions and fulfill their role, it was imperative they were properly educated in the best ways to provide care for the patient.

This view supported the DNP Project as nurses initiated the nonpharmacologic prevention protocol individualized to the patient with a goal for optimal functioning and safety as well as used their nursing judgment to complete the screening tool every 12 hours. Overall, this aligned with the goal of the DNP Project which was to educate nursing staff about delirium, institute nonpharmacologic prevention interventions, and implement assessment tools to assist nurses in identifying delirium and individual patient needs. Like the 14 nursing care components, the DNP Project goal was to help patients maintain and/or regain their highest level of independent functioning.

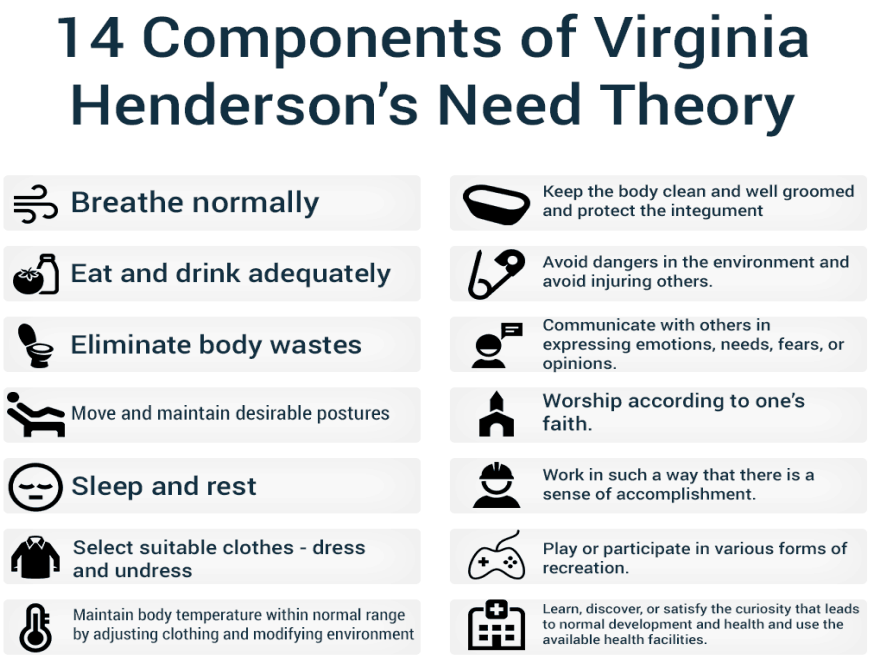

Figure 2.2. Virginia Henderson's nursing need theory. Adapted from Vera, M. (2014). *Virginia Henderson's nursing need theory*. Retrieved from https://nurseslabs.com/virginia-hendersons-need-theory/

Change Theory

John Kotter described the theory of leading change, a purposeful decision to affect improvements in a system. The eight stages identified in his original 1996 theory included: (1) create a sense of urgency (2) build a guiding coalition (3) create a vision (4) communicate the vision (5) empower others to act on the vision (6) create short term wins (7) build on the change and (8) institutionalize the change (Kotter, 1996). To translate this theory into the DNP Project, one systematically worked through the steps. See *Figure 2.3* for visual depiction of the steps.

Step one included identification of the issue through staff report/frustration, administrative recognition, and safety risks. Illustrating the patient safety and quality issues surrounding a DNP Project such as this created urgency. Due to the population

served at this rural critical access hospital, along with the lack of any delirium education, screening, or prevention, this DNP Project filled a gap and an issue identified for the organization. This process strengthened the nursing care provided through education and prevention techniques in order to provide the best patient care for the geriatric population. Step two consisted of building the guiding coalition (Kotter, 1996). The facility committed to the needed resources and agreed to the student-facility relationship for this quality improvement project.

Steps three and four involved creating and communicating the vision (Kotter, 1996). Driving forces for change included the current lack of any initiatives related to delirium and the state hospital association's stated goal for a patient safety and quality improvement project. Limiting forces included resistance to change, amount of time required for successful change, and potential lack of buy-in from staff. Rewards such as paid education time and snacks/treats provided helped buy-in from nurses. Step five entailed empowering others to act on the vision (Kotter, 1996). It was imperative that successful presentation of the evidence and motivation for staff occurred, such as why it benefitted them and their patients. Including case-based interactive patient scenarios that the staff related to was vital. The didactic learning portion encompassed delirium data and prevention importance, along with potential outcomes such as increased safety and decreased length of stay.

Step six involved creating quick wins (Kotter, 1996). After education for nursing staff, a quick win included a nurse recognizing a patient with early delirium signs by successfully completing a delirium screen. Step seven included building the change; this entailed reinforcement of the change, potential refiguring of certain aspects, and feedback

from frontline staff for continued support of the practice change (Kotter, 1996). Nursing staff input was sought throughout the implementation phase, with ongoing modifications and additions to occur after the project timeline. The bedside nurses who completed the screening and implemented the interventions have provided the best feedback and ideas for improvement.

The final step eight was solidifying the change so the vision becomes the norm; this included the practice change becoming the new foundation of nursing care (Kotter, 1996). This was an evolving process as the nurses were educated, began screening and implementing, and refigured the time layout of their shift in order to accomplish the needed tasks. Hopefully, the positive impact the delirium prevention process has will continue to reinforce the nursing care behaviors.

Figure 2.3. Theory of leading change. Adapted from Richman, R. (2015). *Everything you know about change management is wrong*. Retrieved from http://www.robertrichman.com/everything-you-know-about-change-management-is-wrong/

Summary

Chapter two provided a summary of the current evidence available surrounding delirium screening and prevention. Due to the impact on the patient and healthcare system, organizations should make delirium prevention a priority. Strong evidence supported routine delirium screening and implementation of nonpharmacologic measures to help decrease delirium incidence (AGS, 2014; Godfrey et al., 2013; Martinez et al., 2014; NICE, 2014; Siddiqi et al., 2016; Wand et al., 2014). The utilization of the JHNEBP Model to grade the above evidence, along with Kotter's change theory and Henderson's nursing theory, provided a strong foundation for which to guide this DNP Project.

Chapter 3

Method and Procedures

This quality improvement project examined a relationship between the implementation of delirium education, a prevention protocol, and a screening tool with confidence and knowledge level of rural nurses in recognition of delirium in geriatric patients. This chapter delineated the project design, setting, sample, tools employed, ethical considerations, stakeholders, anticipated barriers, and overall impact on the organization. This chapter also summarized intended and actual statistical tests utilized for analysis of the data collected during the project.

Design/Approach

This project aligned with a quality improvement design. Quality improvement projects are defined as a process where individuals work together to improve a practice or system, based off current evidence, with the intention to improve overall outcomes for a target population (Newhouse, Pettit, Poe, & Rocco, 2006). Engagement in the quality improvement process required a design plan that respected the individuals and confidentiality of patient data with a goal to improve the patient experience. Because quality improvement methods and research were similar in nature, ethical considerations and approval from an institutional review board were imperative for a sound project (Newhouse et al., 2006).

The results of this project were analyzed with a pre-test, post-test design. It included a retrospective chart review from three months of the previous year to assess the number of geriatric delirium patients based on ICD-10 codes, medications ordered, and nursing/provider notes. The ICD-10 codes utilized for chart reviews included F05, F10,

F29, and R41 codes encompassing delirium, acute confusion, sundowning, acute brain syndrome, acute confusional state, acute infective psychosis, Alzheimer's with delirium, dementia with delirium, and delirium secondary to (variety of diagnoses). Education for all nursing staff then occurred addressing delirium, risk factors for delirium, the screening tool to be implemented, and the nonpharmacologic prevention protocol that was added to all geriatric patients' care plans. A pre-and post-test knowledge and confidence questionnaire was completed by the acute care nursing staff prior to the education and at the end of the three-month implementation process (see Appendix F for questionnaire). A retrospective chart review following the three-month implementation was done to assess delirium incidence rates with statistical analyses.

Setting

The setting for this DNP Project was a 25-bed critical access hospital in the rural Midwest that served all ages from birth to over 100 years of age. The facility was the largest in a 45-mile radius; the surrounding communities were rural with a large agriculture industry. Approximately 20 percent of the county was 65 years of age and older (United States Census Bureau, 2010). The population served included approximately 5,500 urban residents and 15,000 rural residents (United States Census Bureau, 2016). The primary ethnicity cared for was Caucasian with the second ethnicity being Native American. These were followed by small numbers of Hispanic and Hmong cultures (K. Garman, personal communication, July 7, 2017). Middle to low socioeconomic class comprised most patients in this area (United States Census Bureau, 2016).

The not-for-profit critical access hospital provided care to those with private insurance, Medicare, Medicaid, and self-pay. The hospital provided acute care services with a medical surgical unit, emergency department, obstetrics department, surgical services, and infusion therapy. The hospital also had inpatient and outpatient physical, occupational, speech, and respiratory therapy services, radiology, laboratory, wound care, and cardiac rehabilitation.

The providers for the medical surgical unit included six family practice physicians that staff the local clinic along with emergency physicians who functioned as a hospitalist on nights and weekends. There were visiting surgical specialists who performed routine surgical procedures including eye, ear, nose, throat, breast, abdominal, and orthopedic surgeries. The average daily acute care census was eight patients with the majority of hospitalized patients age 55 years and older (K. Garman, personal communication, July 7, 2017).

Sample

The sample for this project was the RNs who provided around the clock care for the medical surgical/acute care patients. The nursing staff was comprised of 37 RNs who worked full-time, part-time, or on an as needed basis rotating days and nights. The RNs held associate, bachelor, and graduate degrees. The nurses ranged in age from 21 to 65 years and had varying years of experience. All the RNs employed at this facility were of Caucasian ethnicity, lived in the rural setting, and were licensed by the state board of nursing.

The nurses were trained in the medical surgical unit, and some cross trained to other nursing departments as well. The nurses held a variety of certifications to work on

the acute care floor, including Basic Life Support, Advanced Cardiac Life Support, Neonatal Resuscitation Program, and Pediatric Emergency Assessment, Recognition, and Stabilization. Nurses completed annual online learning modules about a variety of topics including infection control, blood borne pathogens, abuse, ethics, fire safety, sudden infant death syndrome, tuberculosis, stroke, and department specific education; delirium related education had not previously occurred at the facility. The sample size was 32 RNs who worked full or part-time; the as needed staff were excluded due to not finishing the education prior to project implementation.

Development of Intervention/Tools

Education. The educational intervention of this project (see Appendix G) was created with use of information from the state hospital association website which provided free access and right of use to any of the listed resources under the delirium quality initiative. There were PowerPoints on the website on different screening tools such as the DEAR and CAM as well as general educational information on risk factors and signs/symptoms of delirium for clinical staff education. There were resources listed on the AHRQ website that also were utilized to build the educational component. These resources consisted of various hospital's delirium toolkits, the AHRQ fall reduction toolkit, family support services, and links to the Hospital Elder Life Program (HELP) website as well as the CAM.

An educational program consisted of a PowerPoint presentation and patient case studies in which to practice the screening tools. The Portal of Online Geriatric Education has a *First Think Delirium* program consisting of three 20-minute standardized patient encounters to practice the CAM screen, two of which were utilized as part of the nursing

education session. The pre- and post-questionnaire utilized for nursing staff was also taken from the *First Think Delirium* online curriculum.

This curriculum was created by the University of North Carolina at Chapel Hill School of Medicine as a means to educate residents about delirium. The initial workshop was created and validated with the education component and pre- and post-questionnaires delivered to 34 residents. Individual responses to the confidence items as well as the knowledge questions were summed to produce a total confidence and a total knowledge score. The confidence scores increased from 11.41 to 16.22 (p=0.002) and the knowledge scores increased from 4.58 to 5.78 (p<0.001) after the workshop (Wilson et al., 2013).

Nurse questionnaire. The knowledge and confidence questionnaire that was used pre- and post-project implementation (Appendix F) utilized a multiple choice and Likert scale response system assessing basic delirium knowledge as well as nurse confidence in delirium recognition and use of the CAM tool. This tool was obtained from the *First Think Delirium* workshop on the Portal of Online Geriatric Education; this was a free government website that gives access and right of use to any user. Basic demographic information including age, education level, and years of service data was collected on the pre-test questionnaire. The post-test questionnaire asked the same questions without the demographic information. Nurses were randomly assigned a number on the pre-questionnaire which they used as the same number for the post-questionnaire.

Risk identification. The risk screening guidelines for this project were adapted from the NICE guidelines (2014) which reported the following risk factors for delirium: age 65 years and older, cognitive impairment and/or dementia, current hip fracture, or severe illness. The more confounding factors present, the higher the risk. Due to these

guidelines, all patients age 65 and older had the nonpharmacologic prevention protocol instituted on hospital admission. Furthermore, the CAM screening with the SPMSQ, as part of the electronic medical record, was performed every 12 hours on all patients 65 years of age and older due to their potential delirium risk. This ensured the earliest identification of delirium if it occurred despite the prevention techniques.

Delirium assessment. The short CAM (see Appendix D) was created in 1990 by an expert panel consensus to allow non-psychiatrists to detect delirium in a five-minute screening, however it required user training. The CAM was based off the DSM – III criteria and highlighted four cardinal features of delirium: acute onset and fluctuating course, disorganized thinking, inattention, and altered level of consciousness. A diagnosis of delirium from the CAM required the presence of acute onset and fluctuating course and inattention and then either positive disorganized thinking or altered level of consciousness (Inouye, Van Dyck, Alessi, Balkin, Seigal, & Horwitz, 1990). In a systematic review of CAM use, it revealed overall sensitivity of 94 percent and specificity of 89 percent with a 95 percent confidence interval. Positive predictive accuracy was also high at 91 to 94 percent, with negative predictive accuracy of 90 to 100 percent. Interrater reliability ranged from .81 to 1.00, and it has been validated with other mental status tests such as the MMSE and SPMSQ (Wei, Fearing, Sternberg, & Inouye, 2008). The CAM had multiple versions; the short CAM consisted of four questions and is the most widely used tool for both clinical and research use as it can be completed in five minutes. The long CAM, consisting of 10 questions, was the gold standard in research settings and allowed for diagnosis severity and behavioral subtype identification (Hospital Elder Life Program, 2017).

Inouye, the creator of the CAM, recommended utilization of a quick cognitive exam to help structure the interview with the patient to look for changes from his or her baseline. Most validation studies utilized some cognitive assessment as part of the study including the SPMSQ. The SPMSQ is available for free/universal use from the Stanford School of Medicine website as well as part of the Short CAM training manual for use along with the CAM. For this project, the SPMSQ was utilized along with the CAM upon admission and every 12 hours. This cognitive assessment was validated back in the 1970s and has been successfully used for years as a brief cognitive assessment to help identify cognitive impairment. It was a 10-question examination with greater than two errors suggesting cognitive impairment (Inouye, 2014; Pfeiffer, 1975). See Appendix D for the tool.

Prevention protocol. The nonpharmacologic prevention protocol was a combination of nonpharmacologic measures that were feasible in the facility. The protocol included the evidence-based interventions highlighted in the literature review. This multi-intervention protocol included the key elements of: hydration, nutrition, mobilization, environmental cueing, reorientation, aromatherapy, sleep promotion, music therapy, active family involvement, early removal of tubes, and use of patient's own sensory aides (AGS, 2014; Godfrey et al., 2013; Gorski et al., 2017; Martinez et al., 2014; NICE, 2014; Rivosecchi et al., 2015; Siddiqi et al., 2016). See Appendix E for the protocol.

Project Procedure

The first step of the DNP Project consisted of a retrospective chart review completed by the project coordinator to look at the corresponding three months of 2017

to determine delirium incidence in those 65 years of age and older. The coordinator looked for the ICD codes described above, nursing notes, and/or provider documentation that reported delirium and/or acute confusion. The addition of medications for patient behavior/confusion was also utilized as the basis for delirium diagnosis. The nurses were paid by the facility for their mandatory attendance for a one-hour education session with snacks and refreshments offered during the education. Prior to the session, the pre-test questionnaire was conducted with the nursing staff to assess knowledge and confidence level related to delirium. Nurses then received the educational component, practiced utilization of the CAM and SPMSQ tools, and learned about the nonpharmacologic prevention protocol and ways to implement the interventions in this facility. Nurses that could not attend the training then watched a video recorded version on the facility's online education database with the pre-questionnaire being placed in their mailbox.

Implementation of the nonpharmacologic prevention protocol upon admission for those 65 years of age and older was instituted due to their increased delirium risk per the NICE guidelines. The SPMSQ and CAM screening was implemented every 12 hours for all admissions age 65 years and older. A positive screening prompted nursing to notify the provider via telephone as well as order a pharmacy referral for medication review through the electronic medical record (EMR). The SPMSQ and CAM screen were combined as one assessment in the EMR to record every 12 hours. The non-pharmacologic interventions were part of the EMR and flagged nursing staff with clock reminders each shift as well. The facility's clinical analyst built this into the EMR after the project coordinator's university human subjects and institutional review board (IRB)

approval and graduate faculty approval. Reminders and encouragement about the project were included in the nursing weekly updates dispersed via email.

After the three-month project completion, the post-test questionnaire for the nurses to again assess knowledge and confidence level associated to delirium was administered. It was compared to the first set of questionnaires to assess statistical significance. A retrospective chart review looking at the three months of project implementation in 2018 to assess delirium incidence was also conducted and compared for statistical significance.

Ethical Considerations

This DNP Project underwent review and approval from the project coordinator's university IRB. The project required expedited review as medical records were accessed for analysis. The facility itself did not have an IRB, but conducted numerous interdisciplinary quality improvement projects annually in which data was protected under state statute. The statute protected records, data, and knowledge, including minutes collected for and by individuals or committees, or committees assigned peer review and quality improvement functions (K. Garman, personal communication, July 7, 2017). This project is one that the facility will continue, adapt, and grow as time continues with quarterly data reporting as part of the acute care committee meetings.

For this project, no names or patient identifiers were used. Nursing pre-test questionnaires were identified by a number; the nurse found her specific number for post-test data collection as well. The electronic medical record data collected included a medical record number, patient age, and sex. However, this record was locked in a cabinet in the acute care manager's office with only herself and the project coordinator

having access to this which followed the current process for the facility's peer review and quality improvement data. The project coordinator completed the facility's annual Health Insurance Portability and Accountability Act (HIPPA) and patient privacy training and maintained the utmost respect and confidentiality of the data.

Anticipated Analysis

Projected statistical analysis for this DNP Project encompassed different data sets. Demographic information, including age, race, sex, years of service, and education level, was collected from the nurses on the pre-test questionnaire. The nurses were randomly assigned a number in which to remember for the post-test questionnaire. Descriptive statistical analyses of these nominal variables were anticipated to be utilized to determine central tendencies and look for any patterns.

For the data related to nursing knowledge and comfort level, comparing the data pre- and post-intervention could have utilized the paired t-test. However, if there was not a large enough sample size or not a normal distribution, then the nonparametric Wilcoxon signed rank test would be used. Upon gathering the data, a goodness-of-fit test would need to be completed to observe the data's distribution in relation to the normal distribution. This could also be accomplished by placing the sample into a histogram to look for outliers (Grove, Burns, & Gray, 2013). Likely, the nonparametric statistical tests would be utilized as the knowledge and confidence questionnaire had multiple choice and Likert scale questions requiring nonparametric analysis. For the data related to delirium incidence rates, a rate ratio or independent samples t-test could be used to determine statistical significance. Data would be compared from three-month implementation to the

corresponding three months in the previous year to identify patients with delirium (Grove, Burns, & Gray, 2013).

Actual Analysis

Once all the data collection was complete, statistical analysis began with the assistance of a professional statistician. The projected statistical analysis aligned with the actual statistics used for data interpretation. Demographic data was analyzed utilizing descriptive statistics in Microsoft Excel to find the mean age and years of service of the nurses responding.

Nonparametric testing was utilized to compare pre- and post-questionnaire data due to the small sample size and both multiple choice and Likert response answers on the questionnaires. Unfortunately, only 10 out of 32 nurses returned both their pre- and post-questionnaires to statistically analyze for differences; this was only a 31 percent response rate. Due to the small sample size and the matched samples, the Wilcoxon signed rank test was most appropriate to determine the difference in means between the pre- and post-test questionnaires. The signed rank test utilizing Statistical Analysis Software (SAS) 9.3 determined the change in nurse confidence level with delirium based on four Likert scale questions as well as delirium knowledge based on six multiple choice questions prior to the project implementation and results obtained three months post project implementation. For the delirium incidence rates, a two-sample test for equality of proportions was utilized due to the two independent samples between 2017 and 2018.

Environmental and Organizational Context

The mission of the facility was “strong healthcare, strong community” with a focus on bringing a variety of exceptional healthcare services close to home (K. Garman,

personal communication, July 7, 2017). The overarching themes in accomplishing their mission included excellent service, attentive listening, compassionate response, respect, and treating with expertise (K. Garman, personal communication, July 7, 2017). The hospital participated in several state based quality initiatives to provide the best care possible. The DNP Project aligned with quality initiatives focused on delirium education and recognition with a goal to decrease delirium incidence and keep the geriatric population functioning at their highest independence level. Furthermore, to provide excellent service and expert treatment, it was imperative that clinical staff were aware of this common medical issue, screened appropriately, and proactively prevented the negative effects delirium could bring.

Strengths of the organization included the variety of services offered as the largest facility in the area, strong financial standing, adequate nursing staff, and a commitment to patient-centered quality care. Weaknesses of the organization included the shortage of physicians providing medical care for the facility and the current lack of any delirium related education or prevention, despite the geriatric population comprising the largest population served at the facility. With the current state initiative and resources available, along with the DNP Project opportunity, this was an optimal time to begin this quality improvement project with minor financial commitments from the facility. With proper education and evidence-based knowledge sharing, the hope was that no barriers or threats impeded on this quality improvement initiative.

Stakeholders/Facilitators

The primary facilitators for this project were the RNs who provided around the clock care for the patients. They were the frontline staff who received the education,

implemented the interventions, and conducted the screening. The medical staff were also aware of the quality improvement project and received the notification if the patient screened positive. The geriatric patient population age 65 years and older were also impacted by this DNP Project as they were the recipients of the screenings and prevention interventions. The main stakeholder of this project was the acute care manager who organized and facilitated the education and supported and promoted use of the tools. The acute care manager was responsible for the whole department: budget, education, staffing, policies, and quality improvement initiatives carried out by the acute care department; her involvement was imperative to overall success.

Anticipated Barriers

Barriers to implementation of this DNP Project included time, increased workload for nurses, resources required, and methodology. This project required buy-in from the facilitators and required a time investment for education and training. The education session focused on the benefit to the patients and the evidence behind the "why" to this project, which helped staff buy-in. Nurses were paid by the facility for their attendance to overcome this barrier.

The addition of a screening assessment, along with a nonpharmacologic intervention protocol which took time and effort to successfully complete, increased the workload for the nursing staff. The acute care manager provided education and training for the certified nursing assistants (CNAs) to assist in carrying out the nonpharmacologic interventions, such as reorientation and frequent ambulation, to help offload the burden on the RNs. The project coordinator provided treats as incentives for nursing to complete the screenings and the interventions.

Quality improvement initiatives could also face barriers related to methodology. Bias, confounding variables, and statistical analyses could all present challenges to proving generalizable, improved outcomes (Institute of Medicine, 2007). It was imperative that the project coordinator conducted the project exactly as planned, kept meticulous data records, and requested assistance from a statistician for the final data interpretation.

The goal was that all part-time and full-time staff attended the mandatory education session for proper training on the new protocol and screening tool. For staff who missed the training and/or as needed staff, the plan was to watch a video recorded session on the online education portal. With staff turnover between pre- and post-implementation, the pre-test questionnaires were discarded and not utilized as part of the data for statistical analysis.

Anticipated Impact

Quality improvement projects are systematic processes in which to improve healthcare services. There is a strong association between improved healthcare services and preferred health outcomes of populations. For quality improvement to be effective, facilities must understand their delivery system, its resources, processes, and outcomes. Utilization of data and current evidence then helps to formulate the team-based approach to focus on patients and overall impact on quality care. Quality improvement is essential to healthcare today as not only does it impact patient health outcomes and satisfaction, but impacts the organization and its finances, policy decisions, and quality of healthcare in the rural and urban settings (United States Department of Health and Human Services Health Resources and Services Administration, 2011).

Organization. The anticipated impact this DNP Project may have had on the organization's culture supported the mission of providing exceptional, quality healthcare to patients close to home. Furthermore, the state hospital association had identified this as a patient safety and quality initiative for all hospitals to reduce adverse health events (MHA, 2014). The AHRQ (2013) had a delirium evaluation bundle as a hospital resource in an effort to help reduce falls in the hospital, also identifying this as a top patient safety priority. This project supported quality measures and the potential for a reduction in delirium incidence and length of stay, with potential for increased patient and family satisfaction with care. The current quality initiatives that the facility participated in were displayed on banners in the acute care hallways. The potential for an additional banner showcasing the commitment to quality improvement and safe patient care practices demonstrated ongoing dedication to the patients and community.

Finances. Financial effects of this DNP Project were projected to be low overall. The mandatory education session would pay approximately 30 to 40 RNs' wages for one hours' time, however likely it would be bundled with other mandatory education that the department had scheduled. The CAM and SPMSQ screening tools were available free online from the HELP as well as the MHA websites. The clinical analyst who works on the EMR would be paid time to build the screening tool and prevention protocol into the EMR; however, these were within normal job duties. The CAM and prevention intervention protocol required nursing time and effort; though it was included as part of the shift tasks with no further financial requirements needed unless patient acuity warranted extra staff.

There was potential for cost savings with this quality improvement project. The streamlining of processes for screening and prevention interventions had the potential to make overall care more efficient once it became routine nursing care. If delirium was properly prevented or caught early, the patient's length of stay could be less and require less resources. There was also potential to prevent adverse health outcomes such as in hospital falls and hospital readmission if patients were ideally kept at their optimal level of functioning while hospitalized. The facility had committed to this state-wide quality initiative and plans to submit data quarterly to stay committed to their mission and values.

Policy decisions. The implementation of a project like this had the potential to have an impact on the organization's policy related to care of geriatric patients. The delirium prevention project required development of the tools into the EMR as well as a nonpharmacologic intervention protocol that would likely grow into a multidisciplinary plan in the future. Due to this, the acute care department could implement a policy related to frequency of screening and the standard of care for delirium prevention. This project impacted current nursing procedure by adding additional nursing responsibilities and putting frontline nursing staff in charge of delirium prevention and recognition. Physician and pharmacist involvement was also part of the new facility policy for positive CAM screens.

Quality of health care. The ANA, American Delirium Society, AHRQ, and the MHA all identified delirium prevention, identification, and treatment as a top priority for patient care due to the high number of geriatric patients experiencing delirium symptoms. Furthermore, the detrimental effects delirium had on length of stay, cost of care, hospital

readmissions, and need for long-term care, further made this an important quality health initiative (Grover & Kate, 2012; Kuczmarska et al., 2016). The facility committed to improving the quality of healthcare provided in this rural area by adopting this evidence-based delirium project. Through the literature review, research had proven the positive impact various prevention interventions had in delirium reduction (Freter et al., 2016; Martinez et al., 2014; Siddiqi et al., 2016; Wand et al., 2014). Prevention of delirium all together saved money on cost of care as well as increased patient satisfaction and functional status. Early identification of delirium through routine screening could lead to more individualized care, closer provider review for underlying illness, quicker pharmacist review for potential medication interactions/side effects, and intensified nursing care to help prevent further deterioration of symptoms (Freter et al., 2016; Martinez et al., 2014; Siddiqi et al., 2016; Wand et al., 2014).

Rural or underserved populations. The organization where this DNP Project was conducted was a rural critical access facility. The county was a medically underserved area according to the Health Resources and Services Administration (United States Department of Health and Human Services, 2017). The facility also served a majority of patients' age 55 years and older, making this an ideal population to focus on delirium prevention. Approximately 20 percent of the county population was 65 years and older, with roughly $9,400 of Medicare reimbursements per enrollee in the county (Data USA, 2014). As stated above, risk factors for delirium included advanced age, social isolation, and multiple comorbidities, which all were prevalent in this rural community setting (Kalish et al., 2014). Preventing delirium was ideal to keep the patient at his or her highest level of functioning as many older adults continued to reside in their

own homes due to lack of other affordable housing options in the rural area (K. Garman, personal communication, July 7, 2017).

Summary

This DNP Project aspired to improve the knowledge and comfort level of RNs in screening and preventing delirium by identifying risk factors, screening every shift, and instituting a nonpharmacologic prevention protocol for the geriatric population. Statistical analysis of demographic variables, pre-and post-test questionnaires, and delirium incidence rates helped to determine if this quality improvement project had indeed increased nurse comfort level, knowledge, and compliance with the delirium intervention in older adults. Barriers and potential impacts have been addressed and identified, with minimal risk to the patient. The overall goal was to improve the quality and safety of this geriatric population by equipping rural nurses with the knowledge and skill to appropriately prevent and screen for delirium.

Chapter 4

Findings

The results of the project were important to statistically and clinically analyze the data obtained to provide conclusions and recommendations for practice. Statistical significance is the likelihood that the results of the intervention were true rather than obtained by chance (Sainani, 2012). Statistical significance could be affected by sample size, power, and effect size. Clinical significance is a subjective interpretation of the research related to practicality and impact on the patient and provider. An intervention could be statistically significant, however, may have no practical indication (Sainani, 2012). Thus, looking at this project's statistical and clinical results were imperative for gathering conclusions; the results are highlighted throughout this chapter.

Demographics

The project yielded two groups of demographic information. The first group was the nursing staff who completed the pre- and post-questionnaires related to knowledge and confidence level with delirium. Demographic information was obtained from those nurses who turned in their pre-questionnaires. A total of 18 nurses completed the pre-questionnaire. The nurses were 100% Caucasian and female. Ages ranged from 25 to 62 and years of experience ranged from two to 34. Educational background of the nurses included associate and bachelor degrees. Eighteen (56%) out of 32 pre-questionnaires were returned to the project coordinator, and 10 (31%) out of 32 returned both the pre- and post-questionnaires.

Descriptive statistics including the mean years of service and age were calculated in Microsoft Excel from the 10 nurses who returned both the pre- and post-

questionnaires. The average age of respondents was 36.7 years old with a range from 25 to 62 and the mean years of service was 13.8 with a range from two to 34. See *Figure 4.1* for the demographic information obtained for the 10 respondents. Despite the low questionnaire return rate, all full time and part time nursing staff (32 nurses) did complete the mandatory delirium education and were required to document on the CAM/SPMSQ and prevention protocol for all admissions age 65 years and older. Staff turnover also occurred during this time with the loss of two nurses prior to the post-questionnaire.

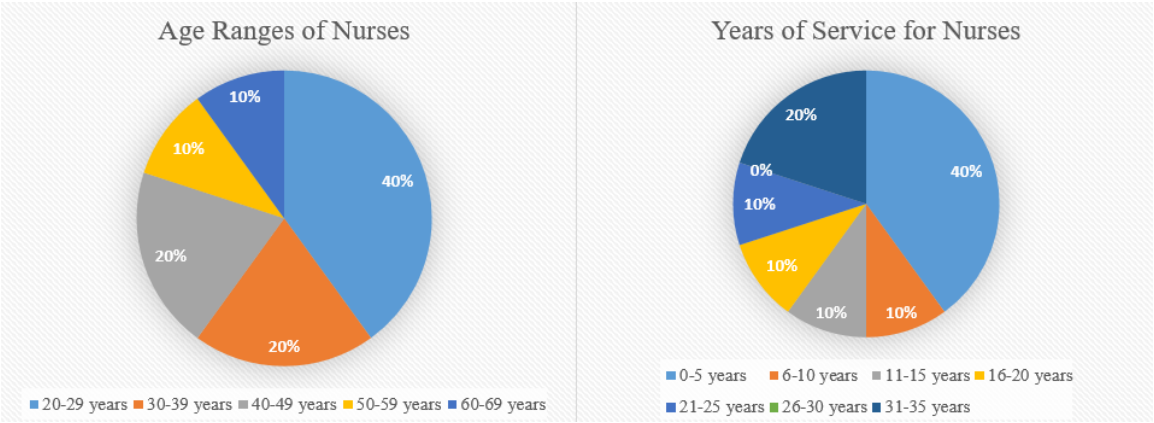

Figure 4.1. Demographics of nurses completing questionnaires including ages and years of service based on ranges and percentages per group.

The geriatric population admitted to the facility from February 15, 2017 to May 15, 2017, included 75 admissions with 39 females (52%) and 36 males (48%). Seventy-four (99%) patients were Caucasian and one (1%) was of Native American descent. Six patients (8%) were found to have delirium. Of these patients, two patients (33%) had appropriate ICD-10 codes and four patients (66%) were identified through chart reviews completed by the project coordinator looking at provider documentation. This was compared to February 15, 2018 to May 15, 2018. During this time, 77 geriatric admissions occurred, which included 43 females (56%) and 34 males (44%). Forty one

patients were Caucasian (93%) and 3 patients were Native American (7%). There were nine patients (11.7%) with delirium during the 2018 time period. Eight (89%) were identified through nursing CAM screens in addition to ICD-10 codes and one (11%) had an ICD-10 code with a negative CAM screen by nursing. Delirium incidence is displayed pictorially below in *Figure 4.2*.

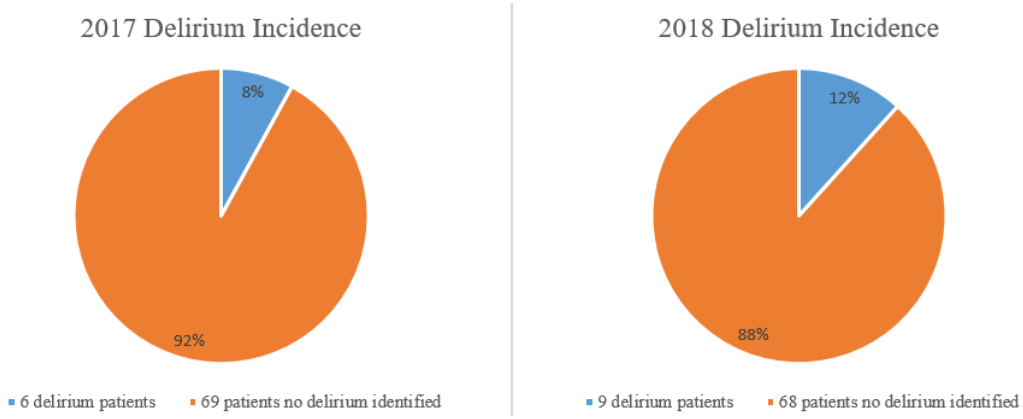

Figure 4.2. Delirium incidence between 2017 and 2018.

Results

This project was completed as planned for all geriatric patient admissions in the three month timeframe. Though a majority of nursing staff did not return both of the questionnaires, all 32 full and part-time staff did either attend the education or complete the online recorded education; the remaining five nurses had not completed the education by project start. Nursing staff identified eight of the nine (89%) delirium diagnosed patients with use of the CAM screening. Physicians documented the presence of delirium, likely contributing factors, and management techniques in their documentation indicating an improvement from 2017 chart reviews. A professional statistician was utilized to determine the difference between pre- and post-nurse questionnaires and delirium incidence rates described below.

Statistical significance. The level of significance was set at 0.05 for this project. The pre- and post-questionnaire asked four confidence questions relating to diagnosing delirium, evaluating delirium, managing delirium, and discussing delirium with the patient/family. The response was a Likert scale from one (not confident at all) to five (completely confident). Each of these four questions were combined for a total confidence score (max score = 20). Per SAS, a Wilcoxon signed rank test indicated that the total post-test confidence scores were significantly higher than the pre-test scores with p=0.0156. This p-value indicated that the project components likely attributed to this change. See *Table 4.1* below for pre and post confidence data obtained from the 10 respondents. See Appendix I for the SAS output calculations. Diagnosing and evaluating delirium showed the greatest improvement in post versus pre-confidence scores with statistically significant change between the data (p=0.0078 for diagnosing; p=0.0313 for evaluating); see Appendix I for SAS output data. The significance showed that the education session likely positively impacted these two areas the greatest.

Table 4.1. Confidence questions pre and post data.

Level of Confidence Questions:											
PRE	Diagnose	Evaluate	Manage	Discuss	**Total Pre**	**POST**	Diagnose	Evaluate	Manage	Discuss	**Total Post**
Nurse 1	2	2	2	2	**8**		3	4	3	4	**14**
Nurse 2	2	1	2	4	**9**		3	4	3	4	**14**
Nurse 3	3	3	3	3	**12**		3	2	1	2	**8**
Nurse 4	2	2	1	2	**7**		3	3	3	2	**11**
Nurse 5	4	4	4	4	**16**		4	4	4	4	**16**
Nurse 6	2	1	2	1	**6**		4	3	2	2	**11**
Nurse 7	2	4	3	5	**14**		5	5	5	5	**20**
Nurse 8	2	3	3	3	**11**		4	5	5	4	**18**
Nurse 9	2	3	3	3	**11**		3	3	3	3	**12**
Nurse 10	2	2	3	3	**10**		4	4	4	4	**16**

There were six knowledge questions with multiple choice answers (four potential answers with one correct one) that were grouped for the total number of correct answers to compare pre- and post-questionnaires. A Wilcoxon signed rank test indicated no statistically significant difference between the pre- and post-scores with a *p* value of 0.3281. This value suggested that the results may be attributed to chance rather than the intervention. See *Table 4.2* below for responses of knowledge questions pre versus post. See Appendix I for SAS output for the total knowledge questions. Due to the very small sample size (n = 10) for this project, results may not have been an accurate representation of the nurses' confidence and knowledge overall.

Table 4.2. Knowledge questions pre and post data.

Knowledge Questions:															
PRE	Q1	Q2	Q3	Q4	Q5	Q6	Total Pre	POST	Q1	Q2	Q3	Q4	Q5	Q6	Total Post
Nurse 1	correct	correct	incorrect	incorrect	incorrect	incorrect	2		correct	correct	incorrect	correct	correct	correct	5
Nurse 2	correct	correct	correct	correct	correct	incorrect	5		correct	correct	correct	correct	correct	incorrect	5
Nurse 3	incorrect	correct	correct	correct	correct	correct	5		incorrect	correct	correct	correct	correct	incorrect	4
Nurse 4	correct	correct	correct	correct	correct	correct	6		correct	correct	correct	correct	incorrect	incorrect	4
Nurse 5	correct	correct	incorrect	correct	correct	correct	5		incorrect	correct	correct	correct	correct	correct	5
Nurse 6	correct	correct	correct	correct	incorrect	correct	5		correct	correct	correct	correct	correct	correct	6
Nurse 7	correct	correct	correct	correct	correct	correct	6		correct	correct	correct	correct	incorrect	correct	5
Nurse 8	correct	correct	incorrect	correct	incorrect	incorrect	3		correct	correct	correct	correct	correct	correct	6
Nurse 9	correct	correct	correct	incorrect	incorrect	incorrect	3		correct	correct	correct	correct	correct	correct	6
Nurse 10	incorrect	correct	correct	correct	correct	incorrect	4		correct	correct	correct	correct	correct	incorrect	5

For delirium incidence, there were 75 geriatric admissions with six delirium patients in 2017, accounting for eight percent of this population experiencing delirium. In 2018, there were 77 geriatric admissions with nine identified delirium patients; this was 11.7 percent of the population. Statistical analysis was done using a two-sample test for equality of proportions with continuity correction which yielded a *p* value of 0.6239 and 95 percent confidence interval of [-0.1444857, 0.0707195] displaying no statistically significant difference between the proportions of delirium incidence. Due to the *p* value being greater than 0.05 (alpha) and the confidence interval including zero, no statistical significance was found; the results could be due to chance and not the project.

In all, this DNP project did statistically improve nurse confidence level with delirium, proving that the change was likely attributable to the intervention/staff education. No statistically significant change was noted in nursing knowledge level or delirium incidence rates between 2017 and 2018, which could mean that the results could occur by chance and not necessarily as a result of the intervention. The education component was beneficial in increasing staff confidence and awareness of delirium with increased clinical knowledge though no change in delirium incidence was found.

Clinical significance. Clinical significance of the project included providing the most up-to-date evidence-based nursing care for delirium prevention and management for the geriatric population. Nursing staff were educated and improved their clinical knowledge and assessment skills of delirium. This was evidenced by the increased confidence in delirium noted between the pre- and post-questionnaires. Comfort with delirium is an important aspect as the literature review identified a lack of delirium awareness and understanding as a key contributor to the issue (Wand et al., 2014). Confidence was also evidenced by the positive nursing CAM screens that aligned with ICD-10 codes completed by the physician in 2018. Even though it was not statistically significant, the average number of correct answers on the post-test knowledge questions was higher than the pre-test questionnaire (nine total wrong on the post versus 13 wrong on the pre), showing the nurses had gained clinical knowledge. The delirium prevention protocol encompassed practical and quality nursing interventions that were not difficult to incorporate into routine shift care.

One verbalized difficulty from nursing staff was use of the SPMSQ with each CAM assessment. Nursing staff stated the assessment was long and time consuming.

Some of the questions they would not know if the patient was giving the proper answers or not (such as mother's maiden name and phone number). As an acute care committee, the discussion has been had about utilizing the SPMSQ upon admission, and then, only if a change was noted in patient behavior to decrease nurse fatigue with the assessment now that they have become more familiar with the CAM screening and signs/symptoms of delirium. During implementation months, the screening was required along with the CAM so nurses did complete it every 12 hours. Nursing staff did state that the CAM assessment was easy to use and did identify patients with delirium. Staff also felt this was an important clinical topic that focused on quality nursing care.

Summary

Overall, the findings supported the purpose of the DNP Project. While the pre-and post-questionnaires may have had a poor return rate leading to a very small sample size, the data collected from the nurses who turned in both questionnaires showed a positive increase, in confidence and knowledge related to delirium. As evidence has proven, clinical staff education strengthened knowledge, leading to better quality nursing care (Chow et al., 2015). The delirium prevention protocol encompassed basic, quality nursing care measures that all patients received benefit from, such as reorientation, ambulation, proper nutrition and hydration, and use of the patient's own sensory aides.

Chapter 5

Conclusions

A comprehensive review of the outcomes, clinical implications, barriers, limitations, and impact of the project was imperative for project synthesis. A review of the PICOT question to determine if the question was adequately answered, along with identifying positives and negatives that lead to project completion, was an important step in finalizing conclusions. From this, recommendations and new evidence for practice were identified and reviewed in this chapter.

Discussion of Outcomes

The outcomes identified in the PICOT question included improved nurse confidence and knowledge level along with reduced delirium incidence with the implementation of the education, delirium prevention protocol, and routine CAM screening. Overall, the outcomes were addressed and answered adequately by this quality improvement project. Despite the low questionnaire response rate, the results were both statistically and clinically significant in improvement of nurse confidence with delirium. This was important as research had proven a lack of clinical awareness with delirium as a contributing factor to the problem (Kuczmarska et al., 2016). Clinician education and knowledge were identified as key pieces of a delirium prevention protocol through the literature review (Chow et al., 2015; Wand et al., 2014). While increased delirium knowledge was noted, it was not statistically significant based on the 10 nurse responses obtained. This may not be representative of the overall project due to the low response rate. This may also be a result of the educational format as many nurses watched a video recording of the session only. These nurses may not have been as engaged in the learning.

Delirium incidence did increase in 2018 from 2017; however, this was not a statistically significant difference. This likely was due to a few factors including the implementation of a screening tool that specifically looked for delirium, increased staff awareness of the signs/symptoms of delirium, and a set protocol for which to notify the physician and pharmacist. These factors led to better recognition and reporting, which likely affected the incidence rate during this time. Thus, the project did not reduce overall delirium incidence rate as asked by the PICOT question. The literature review had identified nonpharmacologic interventions, which did decrease the likelihood of delirium in the research, so the hope would be that as the project continues and grows, long-term delirium incidence would be reduced. The overall results of the project displayed increased confidence and knowledge related to delirium; awareness is an important first step in delirium prevention.

Clinical Implications

This DNP Project strengthened the overall nursing care provided to the geriatric population by educating nurses on the evidence-based interventions proven to prevent and decrease overall delirium. The protocol was facility based and thus, was feasible to implement in the setting. The protocol, nursing awareness, and assessments also made providers and pharmacists more cognizant of delirium, recognizing potential causes/contributors to the problem. This allowed earlier action and more focused nursing care to help prevent worsening of the problem. The physician documentation was much improved surrounding delirium and the patient's management plan. Even though no significant change was found in delirium incidence rates, the overall awareness and recognition did improve as evidenced by the nursing comfort and knowledge

questionnaire responses as well as the chart documentation surrounding delirium and its management.

Staff overall had positive comments regarding this project. They felt it was an important clinical topic and that many of the prevention interventions were basic quality nursing care items. However, the length and responses of the SPMSQ were seen as barriers. Nurses suggested having a delirium order set which included the evidence-based pharmacologic options for when they called to notify the physician of a positive CAM screen for patient safety and consistency. The hope would be that with ongoing delirium prevention per the protocol, along with expansion of this project to include a pharmacologic component, delirium incidence over time would decrease. Due to the negative outcomes associated with delirium identified previously in the paper, along with the current patient safety and quality state initiatives, this project was an important step to provide the best, up-to-date care for the geriatric population.

Identified Barriers and How Barriers Were Overcome

Barriers identified during this project implementation included variation in physician knowledge and management of delirium, time required for full implementation of the prevention protocol, chart reviews in 2017, and difficulty in scheduling education time for all nursing staff due to the around the clock nature of the hospital. First, the variation among local and locum physicians varied widely around delirium. Chart reviews showed providers were ordering medications such as benzodiazepines for behavior control, which have been proven to worsen delirium. It was recognized that the facility would benefit from a delirium order set that encompassed the evidence-based medications for best delirium management. This is one of the next steps between the

project coordinator, acute care manager, and clinical leaders in the delirium prevention process for the facility.

A second barrier identified throughout the process was the time required for the nonpharmacologic intervention implementation, especially if census was high. This was identified as an anticipated barrier prior to project implementation. It was expressed by nursing staff and noted in their documentation in the EMR that short cuts would be taken in regard to certain items of the prevention protocol such as not ambulating/wheelchair rides outside of the room three times daily, not always introducing oneself and the time of day (reorientation), and not always opening blinds. Reminders were included monthly in the nursing weekly updates and staff encouragement given.

A third difficulty noted was the chart review process for 2017 delirium incidence rates. There were a variety of ICD-10 codes relating to delirium, and four of the noted delirium patients (identified through provider or nursing documentation) had no ICD-10 code associated to the patient account. Initially, the project coordinator had the health information department run a report during the specified timeframe for all admissions aged 65 years and older with the ICD-10 codes relating to delirium, and only two patients were identified in the report. Thus, the project coordinator had to manually review every patient account meeting the criteria during the 2017 timeframe. This could have potentially led to errors.

A final barrier noted earlier in the process was the scheduling of the delirium education for staff. Due to the nature of the hospital, not many staff could make it to one specific educational meeting due to work schedules and the need for patient care. Thus, several staff members were required to watch the recording of the project coordinator’s

education with the pre-questionnaires being placed in the nurses' mailboxes. This likely contributed to the low return rate of surveys. Anticipated barriers identified prior to project implementation included the amount of time needed for education, implementation, and data collection. This did prove to be somewhat of a barrier and likely led to the small sample size and no change in delirium incidence rates. The methodology was also identified as a potential barrier and again this did prove to be true with the small sample size and nonparametric testing.

Limitations

A limitation of the DNP Project included a small sample size for statistical analysis. In addition, receiving 31 percent of the questionnaires (pre and post) may not give a true reflection of all nursing staff's knowledge and confidence surrounding delirium. Using nonparametric statistical tests due to small sample size also was a limitation because it is not as powerful and has a lower degree of confidence (G. Djira, personal communication, June 16, 2018).

Another limitation identified as a barrier were the chart reviews investigating delirium incidence from 2017 as the process was difficult and time consuming due to varied documentation. Thus, the project coordinator did have the potential to miss patients due to the documentation variation or lack of documentation. The short length of implementation phase of the project with which to collect data was another constraint. If the education ideally could have been spaced out and encompass in-class sessions for all nurses followed by project implementation with data collection for even a six month time period, the results obtained may have been different or more significant. The loss of two staff nurses also was a limitation as it decreased the sample size as well. Staff turnover,

unfortunately, happens regularly for this facility so encompassing the education session for all new hires will be imperative to ongoing project success.

Sustainability

This project will be continued as it aligns with one of the state hospital association's quality and safety initiatives. The plan for sustainability includes annual online education related to delirium as well as the delirium prevention protocol added to the training process for new hires. Involvement of the acute care manager and clinical leaders from the beginning of the project has helped to ensure the ongoing nature of the change in clinical practice. Including frontline staff in the education, obtaining their feedback, and having the acute care committee (made up of nurses and other disciplines) provide input for ongoing improvement will help to ensure sustainability. The facility has historically prided itself on being fully engaged in evidence-based practice and continually improving processes and care patients receive.

Actual Impact

The actual impact this DNP Project had on the facility was important to re-evaluate after project implementation. Most of the anticipated impact was verified through this process and proved beneficial for the facility. Quality improvement projects are important to healthcare organizations to continually update processes based on outcomes to improve the quality of patient care and patient satisfaction (United States Department of Health and Human Services Health Resources and Services Administration, 2011).

Organization. This project was one the facility planned to implement to align with the state hospital association's quality and safety initiative to provide safe patient

care. The hospital has the potential to obtain recognition from the state hospital association with banners for the facility and website recognition available for the community to see once they submit state data. The plan is to begin submitting quarterly data for the latter portion of 2018 and moving forward. The rural critical access facility prides itself on staying up to date with current evidence and providing quality care close to home. This project and the delirium prevention protocol was one way the organization has committed to their mission.

Finances. The cost of this project included paying one hour's wage for all nursing staff to attend the education. The average hourly wage was approximated at $35 for 32 full-time and part-time nurses, so the cost of education was roughly $1,120. The clinical analyst who built the EMR documentation was paid for her time meeting with the project coordinator and completing the computer build; this was calculated at $35 an hour for eight hours for a total cost of $280. The rest of the delirium project became part of routine shift care. However, this project did require more of a time commitment providing patient care from nursing staff. While delirium incidence did not improve during this three-month timeframe, the goal would be that as the protocol continues and grows, a reduced delirium incidence would be noted with potential for decreased length of stay and cost savings.

Policy decisions. This project overall did not change any major policies that the facility had in place. However, the CAM screening and delirium prevention protocol have become part of routine shift care and EMR documentation. In addition, annual education about delirium will occur for nursing staff and this project education has become part of the training process for new staff. With this being a state quality initiative and hospital

commitment, it was expected that all nursing staff comply with the protocol and do their part in delirium prevention. As the project grows from here, a multidisciplinary team will draft an order set and/or policy and continue ongoing quality improvement data collection to submit to the state hospital association.

Quality of health care. This project aligned with the ANA, American Delirium Society, MHA, and AHRQ initiatives in implementing a facility-based protocol with an overall goal to prevent delirium and reduce its negative outcomes. The facility was committed to the state quality health initiative and put forth financial resources and staff support in designing and implementing this quality improvement project. Through this process, a handout about delirium was added to the educational packet each patient received upon admission, thus making the community more aware of this prevalent medical condition as well. The data related to increased confidence with delirium among nurses improved the quality of care they provided to the geriatric population. Identification of even one delirium patient provided the opportunity to implement proper prevention techniques, adjust medications that could be contributing, identify early signs of infection, and potentially help decrease the overall length of hospital stay. This would have the potential to decrease cost of care.

Rural or underserved populations. The rural critical access facility where this project took place largely served patients age 55 years and older, making delirium prevention a key aspect of quality care due to the increased delirium incidence in the elderly. Through prevention and early recognition of delirium, it allowed more focused care and provider and pharmacist review of all potential causes of delirium to help decrease the overall length of delirium symptoms. As stated above, the rural nature of the

community with a lack of abundant senior housing, created even more of a need to keep the geriatric population functioning at their highest potential. Focusing on proper nutrition and hydration, early ambulation, reorientation, and keeping the patient's routine, all led to delivering the proper, needed care to this rural setting where many patients return home after hospitalization.

New Evidence Generated for Practice

This project provided a set protocol and algorithm for delirium prevention that may be adapted and/or utilized at other rural critical access facilities. Even though there was no statistically significant improvement in delirium incidence rates during this short period of time, nursing knowledge and confidence related to delirium did improve. Clinical awareness of the problem was the first step. Delirium was better recognized and documented on the patients as evidenced by positive CAM screens, nursing notes, and physician documentation about the delirium. It would be the hope that as the process continually adapts and refines, that a statistically significant change in delirium incidence rates would occur once the process becomes even more of a routine.

Recommendations for Future Projects

The data obtained from this DNP Project supported the current evidence that a combination of nonpharmacologic interventions identified in the literature review are the foundation of delirium prevention and management. It also highlighted the use of the CAM screen as a quick bedside measure in which to assess geriatric patients for delirium. Utilizing evidence-based measures to include both pharmacologic and nonpharmacologic measures for prevention and management would be ideal. It was recognized that there is a wide variation in physician knowledge regarding delirium and thus including providers

in education, with a medication management plan in addition to the nonpharmacologic interventions, may best serve the geriatric patient population.

Another potential project could be to utilize different screening tools or validating a shorter cognitive assessment with the CAM to prevent nurse fatigue related to the SPMSQ assessment. In order to increase sample size and make this project or future projects more generalizable, implementing in a group of hospitals or a geographic region may help increase sample size and diversify sample statistics. This also would allow for more feedback to refine the nonpharmacologic prevention protocol and assess if the project affects delirium incidence rates on a larger scale. Another project, with a qualitative focus, could concentrate on the patient and/or caregiver experience related to this delirium prevention protocol utilizing patient and caregiver feedback to either support and/or guide changes in the delirium prevention process. A final idea includes looking at the number of patients discharged home versus a skilled nursing facility prior to and after a delirium prevention process being implemented. In addition to discharge disposition, a future project could focus on length of hospital stay between a positive and a negative CAM screen for a specific diagnosis, looking specifically at costs related to delirium.

Summary

In summary, the development and implementation of a delirium prevention protocol created a new standard of care for the geriatric population served in this rural critical access facility. By utilizing the most up-to-date evidence, the project coordinator was able to synthesize and create a delirium prevention protocol consisting of nonpharmacologic interventions that were feasible for the facility to implement. The

project has the potential to decrease delirium incidence in the future despite no significant change noted during this project timeframe. The education session surrounding the delirium prevention protocol and delirium screening tools did in fact increase nurse knowledge and confidence level with delirium overall.

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Appendix A

University IRB Approval

South Dakota State University
SDSU

Office of Research Assurance
and Sponsored Programs

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Dianne.Nagy@sdstate.edu

To: Marley Braun, Department of Graduate Nursing

Date: January 9, 2018

Project Title: Implementation of a Delirium Screening and Prevention Plan in a Rural Critical Access Hospital

Approval #: IRB-1801003-EXP

SDSU's Human Subjects Committee approved your project using expedited procedures as described in 45 CFR 46.110. The research activity was deemed to be no greater than minimal risk, and the following expedited categories from 63 FR 60364-60367 were found applicable:

(5) Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis).

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

One-year approval of your project will be dated starting 1/09/18. If you require additional time to complete your project, please submit a request for extension before 1/08/19. If there are any unanticipated problems involving risks to subjects or others, or changes in the procedures during the study, contact the SDSU Research Compliance Coordinator. Protocol changes must be approved by the Committee prior to implementation. Forms may be found on the Human Subjects web page. Please inform the committee when your project is complete.

If I can be of any assistance, don't hesitate to let me know.

Sincerely,

Dianne Nagy
Acting IRB Coordinator

Appendix B

Organizational Approval

DNP Project Site Agreement

Date: 7/22/17

This letter is in support of Marley Braun, RN, DNP student and the DNP Project *Implementation of Delirium Screening and Prevention Plan in a Rural Critical Access Facility* at Redwood Area Hospital in Redwood Falls, Minnesota. This project will meet the quality and safety initiative brought forth by the Minnesota Hospital Association to implement a delirium screening and prevention protocol to help provide the best evidence-based patient care.

We look forward to the results of the project and hope this quality improvement project has a positive impact on our patients.

(Signature of Manager or Director)

(Name of Manager or Director)

Appendix C

Evidence Table

Citation	Level of Evidence	Sample/ Setting	Participant (n)	Study Design/ Purpose	Intervention	Results	Comments; Strengths and Limitations
Martinez, Tobar, & Hill, 2014	1B	3 trials including hip fracture patients (orthopedic unit), 2 trials on acute medical surgical units, 1 trial in coronary care unit, and 1 trial in intensive care unit	1691 participants in 7 randomized trials	Meta-analysis to investigate the effectiveness of multicomponent interventions for the prevention of incidence delirium; looked at the rate of delirium during hospitalization after multi-component	Studies used a variety of multicomponent interventions which had to include at least 2 of the following: hydration, electrolyte and nutrition, safe environment directives, drug reviews, cognitive stimulation programs, daily reorientation activities,	Multicomponent interventions significantly reduced incidence delirium (RR 0.73, 95% CI 0.63-0.85, $p < 0.001$) and accidental falls (RR 0.39, 95% CI 0.21-0.72, $p = 0.003$). Nonsignificant reductions were found in length of hospital stay and delirium	6 trials conducted by trained healthcare team, 1 trial by family members after a brief training session. Low to moderate risk of bias. Strengths: sample size, systematic review of randomized trials Limitations: periodicity of examinations was not consistent across

				interventions in use	educational interventions for staff and family members, family involvement in patient care and physical or occupational therapy during hospital stay.	duration. The Confusion Assessment Method (CAM) was the most frequently used diagnostic technique.	trials, heterogeneity due to differences in interventions utilized and hospital units implemented, limited information available regarding specific implementation strategies and adherence rates
Siddiqi, Harrison, Clegg, Teale, Young, Taylor, & Simpkins, 2016	1A	32 trials in surgical patients (most orthopedic), 7 studies in medical surgical units	16,082 participants in 39 different randomized trials assessing 22 different interventions or comparisons: 14 placebo-controlled,	Systematic review and meta-analysis of randomized control trials on interventions to prevent delirium in hospital (non-ICU) settings	Trials used a combination of interventions including: multi-component interventions, cholinesterase inhibitors, typical antipsychotics (Haldol) and atypical antipsychotics	Moderate quality evidence to support the use of multi-component interventions to prevent delirium (incidence delirium reduction compared to usual care, RR	Cochrane database review Strengths: sample size, systematic review Limitations: heterogeneity of interventions, many interventions not reviewed due to small number of trials and variable

			15 prevention intervention vs. usual care, 10 compared 2 different interventions		(Olanzapine), Melatonin, Bispectral Index-guided anesthesia	0.69, 95% CI 0.59-0.81); no evidence that cholinesterase inhibitors Melatonin, and Haldol are effective in preventing delirium (low quality evidence); moderate quality evidence for the use of Olanzapine (incidence reduction, RR 0.36, 95% CI 0.24-0.51) and Bispectral-index guided anesthesia (RR 0.71, 95% CI 0.60-0.85) in	methodological quality

						the decrease of delirium incidence	
Rivosecchi, Smithburger, Svec, Campbell, Kane-Gill, 2015	IIIB	17 studies included; 13 prospective studies and 4 randomized controlled trials	7 studies in critical care units, 3 in post-operative patients, 5 in geriatric medical surgical units, 2 in hip fracture patients	Systematic review of 17 studies (both prospective and randomized trials) to determine effectiveness of non-pharmacologic interventions in the reduction of delirium incidence	A total of 28 non-pharmacological interventions were used in the studies. The most common interventions associated with clinical benefit were early mobilization, reorientation, education of nurses, and music therapy. A single non-pharmacological intervention was examined in 5 studies, and multiple non-pharmacologica	Confusion Assessment Method (CAM) and CAM-ICU were most frequently used tools daily to 3 times/day (10/17 studies); All studies that included either mobilization or noise-reduction or sleep protocols indicated a statistically significant benefit in at least 1 delirium related outcome; the	States statistically significant results/incidence delirium decreased however doesn't include statistical results in article. Strengths: thorough review of the literature, conclusions match guidelines from American College of Critical Care Medicine Limitations: the inability to determine if certain aspects of a newly implemented protocol were

					l interventions were examined in 12 studies.	multi-interventional protocols resulted in a 15.9% mean reduction in delirium, whereas those with 2 or fewer interventions showed an 11% reduction; early mobilization, education of nurses, and cognitive stimulation with reorientation are 3 most important interventions	already routine nursing practice before the protocols were implemented (i.e. catheter removal, early mobilization); variety of screening tools used across the 17 studies (CAM, DSM-IV criteria, Delirium Rating Scale, Intensive Care Delirium Screening Checklist); does not list number of participants
Mariz, Costa Castanho,	IIIB	Patients aged 65 and older with a	52 qualitative studies, 30	Meta-analysis of current literature to	Reviewed a variety of studies that	A total of 7 tools were utilized	CAM and CAM-ICU most widely used and accepted

Teixeira, Sousa, & Correia Santos, 2016		delirium screening or diagnostic tool utilized	quantitative studies (prospective) in emergency room or acute care units; 9,248 total participants	find what screening/ diagnostic tools are most effective to screen for delirium in the emergency room/acute patient setting	utilized different tools for delirium screening and diagnosis to see which would be most important for the emergency room setting	CAM 94-100% sensitive, 90-95% specific CAM-ICU 68-72% sensitive, 98.6% specific	for use across settings (best reliability and validity) Strengths: multiple studies reviewed Limitations: every scale has pros and cons and most studies are single center studies
Freter, Koller, Dunbar, MacKnight, & Rockwood, 2016	IIA	Patients 65 and older admitted to 1 of 2 orthopedic wards for hip fracture repair (1 unit was control group; 1 unit was intervention group; admitted by	283 older adults	Controlled, single-blind quality improvement study with regular orthopedic floor nurses administering the intervention (delirium friendly	Study comparing delirium-friendly pre-printed orders with usual care pre-printed orders (same format), and the effect the delirium friendly orders had on delirium	More dementia patients in intervention group, otherwise no differences in age, sex, MMSE, or Delirium Risk Scale pre-op; 42% of participants had	Delirium Elderly at Risk Scale and MMSE pre-operatively; CAM & MMSE done on POD 1, 3, 5 Strengths: Unlike most previous trials, individuals with preoperative cognitive impairment, dementia, and

		chance allocation)		orders) to reduce delirium in post-operative patients	incidence and length of stay. Assessed nurse adherence to pre-printed orders by chart reviews (meds, treatments, timing)	postoperative delirium. Delirium was most prevalent on postoperative day (POD) 1 and least on POD 5 (intervention 7%, control 30%); intervention participants were significantly less likely to have postoperative delirium (33%) than controls (51%) (P = .001); individuals with pre-existing	delirium were included, making this a more-representative hip fracture population; statistically significant data Limitations: admitted patients to whatever floor had openings so assumed randomization as both units busy and all surgeons admitted to both units

						dementia had stronger intervention effect (intervention group 60%, control group 97%, P < 0.001)	
Holt, Young, & Heseltine, 2013	IIB	3 specialist elderly general care wards in United Kingdom	436 patients, 249 in 'before' group, 187 in 'after' group	Quasi-experimental multi-component delirium prevention intervention targeting delirium risk factors was completed by clinical staff (delirium risk factors targeted were: disorientation,	The educational materials included a 30-min interactive lecture with a handout, a delirium quiz, a poster, reference material and case vignettes for clinical staff. The practice change materials comprised a delirium risk	Incident delirium was significantly reduced ('before'=13.3 %; 'after'=4.6%; P=0.006). Delirium severity and duration were significantly reduced in the 'after' group. Mortality, length of stay, activities of	CAM and DRS-R-98 scales done daily for 7 days Strengths: study size, carried out by bedside clinical staff, standardized care by utilizing valid, reliable assessment tools Limitations: more men and fewer patients in the after group; no change in mortality, length of

				dehydration, visual impairment, hearing impairment, constipation, pain and immobility)	factor modification care plan placed at the end of the patient's bed and required signed actions three times each day, a delirium assessment protocol for ward doctors and an escalation flowchart for suspected delirium for nurses.	daily living score at discharge and new discharge to residential or nursing home rates were similar for both groups.	stay, and discharge status between 'before' and 'after' groups (may be due to frailty of older adults); 'before' and 'after' groups occurred during different calendar months (may have been different admission diagnoses at different times of the year)
Adamis, Meagher, Murray, O-Neill, O'Mahoney, Mulligan, &	IIA	Patients aged 70 and older admitted to a general medical floor in a university teaching hospital	200 participants age 70 and older within 3 days of hospital admission (mean age	Prospective study of older adults admitted to a general hospital to assess discriminating	A total of 34 (17%) were identified with delirium (positive CAM) Study highlights how delirium is	The five approaches (four + CAM) to assessing attention had statistically significant correlations	The Local Research Ethics Committee approved the study. SPSS 19 utilized for statistical analysis Strengths: Statistical data analysis all

McCarthy, 2016			81.1 ± 6.5 years; 50% women; pre-existing cognitive impairment in 63% [126])	properties for patients with delirium versus those with dementia and/or no cognitive disorder with the use of four objective tests of attention: digit span, vigilance "A" test, serial 7s subtraction and months of the year backwards	characterized by a global deficit in attention	($P < 0.05$). Discriminant analysis showed that clinical subjective rating of attention in conjunction with the months of the year backwards had the best discriminatory ability to identify CAM defined delirium, and to delineate patients with delirium from those with dementia or normal cognition	displayed in tables and thoroughly explained. Limitations: These four objective tests lack specificity for delirium but are good predictors for non-delirium. Post-hoc analysis of data collected from an observational study - research questions regarding this analysis were not pre-planned

Bull, Boaz, & Jerme, 2016	IIIB	Seven studies met criteria	2,204 total participants between intervention and control groups	Systematic review/literature search following inclusion criteria: (a) primary focus on educating family caregivers for older adults about delirium (b) use of experimental, quasi-experimental, or comparative design (c) measured family outcomes of delirium knowledge, emotional states,	To see if providing education on delirium to family caregivers improved their knowledge, emotional state, and/or response in reducing the incidence of delirium in older adults	Four studies found that family caregivers' delirium knowledge increased; two noted that delirium incidence in older adults (declined 5.6% vs. 13.3%, p=.027); and one study reported less distress following receipt of education	No randomized control trials in the studies included Strengths: acute care, palliative care, and community settings (more global phenomenon) Limitations: limited to English language, limited research in this area

				response in reducing delirium incidence for older adults and(d) published in the English language			
De & Wand, 2015	IIA	31 studies describing 21 delirium screening tools (11 tools were single studies only) were included in the systematic review; units included: general medical, surgical, rehabilitation, emergency	Elderly inpatients with or without dementia (20/31 studies included dementia patients). Eleven studies were conducted in the United States; four	To evaluate validation studies of delirium screening tools in non–critically ill hospital inpatients and provide guidance on the choice of screening tool	Systemic review of 31 studies utilizing different delirium tools to assess their sensitivity and specificity for which is the best option for a variety of settings (ER, palliative care, ICU, so forth)	CAM tool reported 95% and greater sensitivity and specificity and most utilized tool (9/31 studies)	Most studies (25/31, 83%) had a high-quality data reporting rating, that is, STARD Score greater than 20 Strengths: all tools listed with sensitivity, specificity, and STARD score in table format Limitations: the wide variety of tools

		department, oncology, and palliative care	in Canada; three each in the United Kingdom and Australia; two each in Germany and Holland; and one each in Finland, Hong Kong, Italy, Poland, and Spain.				leads to the complexity of delirium screening
Godfrey, Smith, Green, Cheater, Inouye, & Young, 2013	IIIA	Staff, volunteers, and patients in three northern England hospitals	1530 total hospital beds in the three hospitals recruited; 4 workshops	Participatory action research (qualitative) approach involving staff,	Utilized the Hospital Elder Life Program (HELP) guidelines and the National Institute for	Delirium prevention is not well understood by hospital bedside staff; routine	Theory based approach (Normalization Theory) Strengths: promising results,

			with the three development teams occurred over 14 months (to build prevention program toolkit)	volunteers, and patients; conducted qualitative interviews with staff and development teams (quotes listed throughout)	Health and Care Excellence (NICE) guidelines to formulate the prevention program toolkit	delirium prevention techniques are not being consistently carried out in routine care delivery; multicomponent interventions treats the patient holistically; use of volunteers also helps caregiver burden	being piloted in four further hospitals Limitations: no randomized, control type methods utilized
National Institute for Health and Care Excellence (NICE), 2014	VA	Adults age 18 and older	N/A; England clinical guidelines	Quality standard covers the prevention, diagnosis and management of delirium in adults (aged 18 and over)	Risk factors for delirium and need for routine screening; tailored interventions (16 listed) for delirium prevention;	Quality standards listed under intervention	No statistical analysis listed or articles/evidence used for forming clinical guidelines Strengths: Consistent with United States

				in hospital or long-term care settings	avoidance of antipsychotic medications unless patient unsafe, de-escalation techniques; provide education/information for families and patients; share delirium diagnosis with PCP		literature and evidence Limitations: No review of literature listed
Wand, Thoo, Sciuriaga, Ting, Baker, & Hunt, 2013	IIA	Patients aged 65 years and older and not delirious upon admission.	Of 568 eligible patients, 129 were recruited pre-intervention (3 withdrew initial consent) and 129	Before and after study (pre- and post-intervention testing)	Prior to interventions, patients were assessed at admission and discharge to establish baseline (MMSE, Blessed Dementia Scale,	The mean age of patients was 81. The pre- and post-intervention groups were comparable, aside from greater co-morbidity in the pre-	SPSS version 18 utilized. Descriptive analyses, chi square analysis, and ANOVA utilized. Strengths: involvement of family/caretakers; low cost intervention

			patients' post-intervention ; 77 staff members participated in the intervention (39 doctors, 38 nurses)		Clock-draw Test, Barthel ADL's Index) . After intervention education, same data collected in the current patients. Intervention consisted of a one hour education session for medical and nursing staff, followed by weekly interactive tutorials. Pre- and post-intervention tests were done with staff to see change in staff practice, along	intervention group (F (1, 253) = 9.20, p= 0.003). Post-intervention there was a significant reduction in delirium incidence (19% vs. 10.1%, X2 =4.14, p=0.042), and improved function on discharge (mean improvement 5.3 points, p<0.001, SD 13.31, 95% CI -7.61 to -2.97). Staff objective knowledge of delirium	Limitations: pre- and post- design so two different patient populations; small general hospital; nurses only attended the weekly interactive tutorials

					with delirium incidence in patients pre-and post-education. Confusion Assessment Method utilized to detect delirium.	improved post-intervention and their confidence assessing and managing delirious patients (p=0.004). Staff addressed more risk factors for delirium post intervention (8.1 vs. 9.8, F(1, 253) = 73.44, p<0.001)	
American Geriatric Society, 2014	IVA	Post-operative delirium in older adults	Utilized a multitude of articles through a comprehensive literature search as	The Institute of Medicine's reports on Systematic Reviews and Trustworthy Clinical Guidelines	Interdisciplinary expert panel creation, extensive literature review and evaluation of evidence by the panel,	Eight strong recommendations: multicomponent nonpharmacologic interventions	Well done clinical guideline, good overall AGREE II score Strengths: extensive literature review highlighted, multi-

			well as a 23 member expert panel	provided the standards followed throughout the process and guided the framework	guideline written and revised through panel and then external peer review and public comment sessions	should be delivered by an interdisciplinary team, ongoing educational programs should be in place for clinical staff, a medical evaluation should be done to identify risk factors and manage delirium, pain management should be optimized preferably with non-opioid medications, cholinesterase inhibitors should not be	disciplinary expert panel with external peer review as well Limitations: No set protocol of multimodal nonpharmacologic interventions; just provided ideas of/examples of interventions

						prescribed, benzodiazepines should not be first line treatment for agitation or anxiety, antipsychotics should be avoided for first line treatment of delirium 3 weak recommendations: use of nonpharmacologic interventions once delirium has set in, use of regional anesthetic to help with post-op pain at the time of	

						surgery, use of Seroquel, Haldol, and Zyprexa at the lowest possible dose for short term delirium treatment if the patient is severely agitated or safety risk	
Kuczmarska, Ngo, Guess, O'Connor, Branford-White, Palihnich, Gallagher, & Marcantonio, 2015	IIB	Hospitalized general medicine patients aged ≥75 years in two non-ICU general wards in a single academic medical center	201 participants	Cross-sectional comparative effectiveness study of the Confusion Assessment Method for the ICU (CAM-ICU) and the newly developed 3-minute diagnostic	Reference standard assessment done on admission (face to face interview, reason for admission, family/social/functional history, Montreal Cognitive Assessment	101 participants (mean age 84± 5.5 years, 61 % women, 25 % with dementia), 19 % were classified as delirious based on the reference standard. Evaluation	Evaluated diagnostic accuracy of CAM-ICU and 3D CAM Strengths: design in which all delirium assessments were administered closely in time, while the results of each test were blinded from the other assessors

				assessment for delirium using the Confusion Assessment Method (3D-CAM) in general medicine inpatients	(Alzheimer's Disease if identified dementia, Geriatric Depression Scale, medication review). 3D CAM and CAM-ICU administered by research assistants	times for the 3D-CAM and CAM-ICU were similar. The sensitivity [95 % confidence interval (CI)] of delirium detection for the 3D-CAM was 95 % [74 %, 100 %] and for the CAM-ICU was 53% [29%, 76 %], while specificity was >90 % for both instruments. Subgroup analyses showed that the CAM-ICU had sensitivity of 30 % in	Limitations: due to cross-sectional design, does not have repeated test administrations, interrater reliability not tested, single academic center

						patients with mild delirium vs. 100 % for the 3D-CAM	
Gorski, Piotrowicz, Rewiuk, Halicka, Kalwak, Rybak, & Grodzicki, 2017	IIB	Participants were recruited to intervention and control groups at the internal medicine ward (inclusion criteria: age ≥ 75, acute medical condition, basic orientation, and logical contact on admission; exclusion criteria: life expectancy < 24 hours, surgical	130 patients (38.4% males) participated in the study, with 65 in the intervention group; 18 volunteers recruited from university, participated in 12-hour training session	A pilot study which looked at effectiveness of non-pharmacologic multicomponent prevention delivered by trained volunteers (medical and psychology students), targeted at delirium risk factors in geriatric inpatients, was assessed at an internal	The patients meeting criteria were included in a standardized multicomponent intervention. The intervention was delivered daily for 5 initial days of the hospitalization, beginning within the first 48 hours from admission, by trained volunteers (2 volunteers assigned to 1	Antipsychotic medications were initiated less frequently in the intervention group compared to the control group (p=0.04). There was a trend towards a shorter hospitalization time (p=0.05) and a not statistically significant decrease in deaths in the	Statistica 10 utilized for analysis. A p value < 0.05 was considered significant. No adverse effects to patients or volunteers. Strengths: results consistent with previous studies Limitations: no formal delirium diagnosis given, searched for likely delirium patients retrospectively, may be difficult to institute as volunteers can be

		hospitalization, isolation due to infectious disease, and discharge to other medical wards). Every day trained volunteers delivered a multicomponent standardized intervention targeted at risk factors of in-hospital complications to the intervention group. The control group, selected using a retrospective individual matching		medicine ward in Poland	patient). Controls were matched to intervention regarding age, gender, and hospitalization (as well as inclusion/exclusion criteria)	intervention group (p=0.14)	hard to come by (specially to follow set protocols)

		strategy (1 : 1 ratio, regarding age, gender, and time of hospitalization), received standard care					
Wand, Thoo, Sciuriaga, Ting, Baker, & Hunt, 2014	IIB	22 bed general medical ward in Sydney, Australia	126 patients pre-intervention and 129 patients post-intervention aged 65 years and older; 77 staff members participated (39 doctors, 38 nurses)	Before and after study to evaluate the effectiveness of a multifaceted educational program in preventing delirium in hospitalized older patients and improving staff practice, knowledge and confidence	The intervention was a one-hour lecture on delirium focusing on prevention for medical and nursing staff followed by weekly interactive tutorials with delirium resource staff and ward modifications	The pre and post-intervention groups were comparable, aside from greater co morbidity in the pre-intervention group ($F(1, 253)=9.20$, $p=0.003$). Post-intervention there was a significant reduction in incident	SPSS version 18 used for analysis Strengths: Consistent with other/prior studies, included non-English speaking patients Limitations: Small unit and sample size so may not be generalizable, two different patient populations with the before and after

						delirium (19% vs. 10.1%, X(2)=4.14, p=0.042), and improved function on discharge (mean improvement 5.3 points, p<0.001, SD 13.31, 95% CI -7.61 to -2.97). Staff objective knowledge of delirium improved post-intervention and their confidence assessing and managing delirious patients. Staff addressed more risk factors for	design, no control group

						delirium post-intervention (8.1 vs. 9.8, F(1, 253)=73.44, p<0.001).	
Chow, Mujahid, Butterfield, &McNicoll, 2015	IIA	Orthopedic surgical inpatient unit at one hospital	26 registered nurses participated	Prospective cohort study to determine the effect of an educational intervention on nurse's knowledge, self-confidence, and documentation on delirium	Each nurse received two geriatrician-guided 45-minute didactic sessions on delirium causes, screening, and prevention using the Confusion Assessment Method (CAM). Pre-and post-intervention surveys were given to the nurses for knowledge and comfort as well	Patients with CAM documentation increased post-intervention from 13 to 91% (p<0.001). Rate of nursing CAM documentation per shift increased from 5.5 to 70.8%, (p<0.001). Post-interventional nursing knowledge scores	Test questions identical pre- and post but ordered differently; given three months apart so less recall bias. Utilized a Likert rating scale for confidence levels. Strengths: findings consistent with prior studies Limitations: small sample size, single unit in one hospital – may not be representative of larger

					as chart reviews to determine documentation before and after intervention.	improved from 44 to 73% correct ($p<0.001$). As compared to pre-intervention, nurses scored higher on number of delirium risk factors from 32 to 71% ($p<0.001$), medications to avoid in the elderly from 20 to 70% ($p<0.001$), and correct management strategies for patients with delirium from 52 to 84% ($p<0.001$).	population/units, no control group

						Nurses' confidence in detecting delirium increased post-intervention from 7.8 to 8.6 points out of a 10-point scale (p=0.021).	

Appendix D

Short Confusion Assessment Method (CAM) and Short Portable Mental Status Questionnaire (SPMSQ)

Short CAM

Acute Onset

1. Is there evidence of an acute change in mental status from the patient's baseline?

YES NO UNCERTAIN NOT APPLICABLE

Inattention

(The questions listed under this topic are repeated for each topic where applicable.)

2A. Did the patient have difficulty focusing attention (for example, being easily distractible or having difficulty keeping track of what was being said)?

Not present at any time during interview
Present at some time during interview, but in mild form
Present at some time during interview, in marked form
Uncertain

2B. (If present or abnormal) Did this behavior fluctuate during the interview (that is, tend to come and go or increase and decrease in severity)?

YES NO UNCERTAIN NOT APPLICABLE

Disorganized Thinking

3. Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable, switching from subject to subject?

YES NO UNCERTAIN NOT APPLICABLE

Altered Level of Consciousness

4. Overall, how would you rate this patient's level of consciousness?

Alert (normal)
Vigilant (hyperalert, overly sensitive to environmental stimuli, startled very easily)
Lethargic (drowsy, easily aroused)
Stupor (difficult to arouse)
Coma (unarousable)
Uncertain

Scoring: For a diagnosis of delirium by CAM, the patient must display: 1. Presence of acute onset and fluctuating discourse AND 2. Inattention AND EITHER 3. Disorganized thinking OR 4. Altered level of consciousness

Confusion Assessment Method (CAM) Diagnostic Algorithm

Feature 1: *Acute Onset and Fluctuating Course* This feature is usually obtained from a family member or nurse and is shown by positive responses to the following questions: Is there evidence of an acute change in mental status from the patient's baseline? Did the (abnormal) behavior fluctuate during the day; that is, did it tend to come and go, or increase and decrease in severity?

Feature 2: *Inattention* This feature is shown by a positive response to the following question: Did the patient have difficulty focusing attention; for example, being easily distractible, or having difficulty keeping track of what was being said?

Feature 3: *Disorganized Thinking* This feature is shown by a positive response to the following question: Was the patient's thinking disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?

Feature 4: *Altered Level of Consciousness* This feature is shown by any answer other than "alert" to the following question: Overall, how would you rate this patient's level of consciousness? (alert [normal], vigilant [hyperalert], lethargic [drowsy, easily aroused], stupor [difficult to arouse], or coma [unarousable])

Source: Inouye, S. K., Van Dyck, C. H., Alessi, C. A., Siegal, A. P., & Horwitz, R. I. (1990). Clarifying confusion: the confusion assessment method. A new method for detection of delirium. *Annals of Internal Medicine, 113*(12), 941-948.

Copyright:

Short Portable Mental Status Questionnaire

1. What is the date today?
2. What day of the week is it?
3. What is the name of this place?
4. What is your telephone number? OR What is your street address? (If patient doesn't have a phone)
5. How old are you?
6. When were you born?
7. Who is the president of the United States now?
8. Who was the president just before him?
9. What was your mother's maiden name?
10. Subtract 3 from 20 and keep subtracting 3 from each new number all the way down.

Scoring:

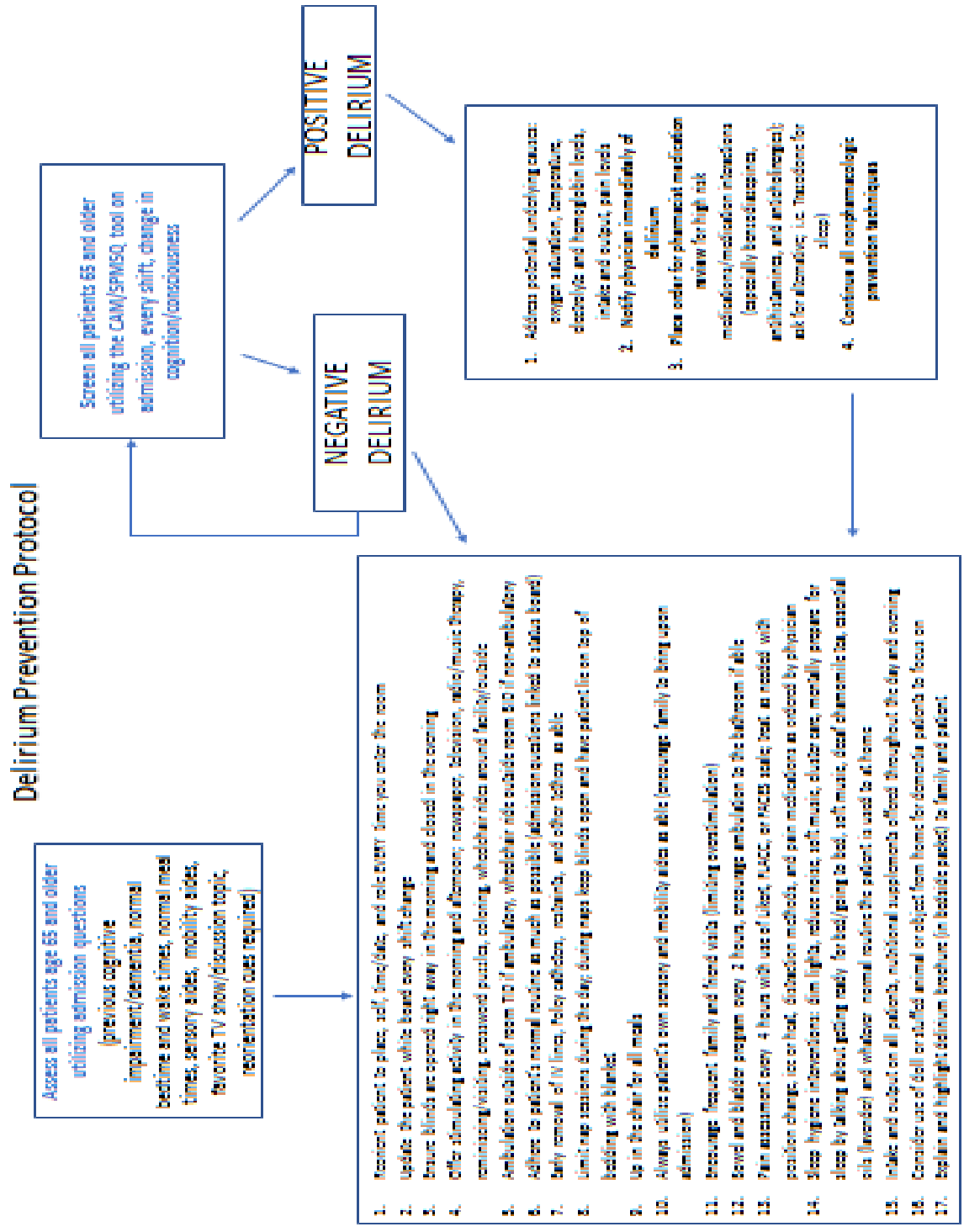
Greater than two errors suggest cognitive impairment
0-2 No cognitive impairment
3-4 Mild cognitive impairment
5-7 Moderate cognitive impairment
8 + Severe cognitive impairment

Source: Pfeiffer, E. (1975). A short portable mental status questionnaire for assessment of organic brain deficit in elderly patients. *Journal of American Geriatric Society, 23*(10), 433-441.

Available for use from Stanford School of Medicine Ethnogeriatrics: https://geriatrics.stanford.edu/culturemed/overview/assessment/assessment_toolkit/spms.html

Appendix E

Delirium Prevention Protocol



Appendix F

Delirium Pre-test Questionnaire

Delirium Workshop Survey PRE

Please fill in this section requesting some demographic information, thank you.

1. ID #: _____

2. For NURSES, What is your status?

    1. Registered Nurse
    2. Bachelor of Science in Nursing
    3. Associate Degree in Nursing
    4. Nursing Assistant
    5. Nursing Assistant Student
    6. Advance Practice Nurse
    7. APN Student
    8. RN or BSN Student
    6. Other (write in):_____

3. For GRADUATE NURSING STUDENTS, what is your post-graduate year?

    1. First year
    2. Second year
    3. Third year
    4. Fourth year
    5. Fifth year
    6. Sixth year or higher

4. If PRACTICING RN, how many years have you been practicing? _____

5. What is your gender?
    1. Female
    2. Male

6. What is your race?
    1. American Indian/Native Alaskan
    2. Asian

3. Asian (underrepresented)*
4. Black or African American
5. Native Hawaiian or Pacific Islander
6. White/Caucasian
7. Other/mixed (write in: _____)

* *Any Asian other than Chinese, Filipino, Japanese, Korean, Asian Indian or Thai

7. What is your ethnicity?

1. Hispanic or Latino
2. Not Hispanic or Latino
3. Unknown/Choose not to answer

8. What is your age? (Please write in) _____

Please review the following skills in caring for patients older than 65 years of age and rate your level of confidence/comfort in your ability to successfully perform each of them:

9. Diagnosing Delirium:

1. Not confident
2. A little confident
3. Moderately confident
4. Very confident
5. Completely confident

10. Evaluating Delirium:

1. Not confident
2. A little confident
3. Moderately confident
4. Very confident
5. Completely confident

11. Managing Delirium:

1. Not confident
2. A little confident
3. Moderately confident
4. Very confident
5. Completely confident

12. Discussing goals of care with patients or surrogates:

1. Not confident
2. A little confident
3. Moderately confident
4. Very confident
5. Completely confident

Please review the following skills in caring for patients older than 65 years of age and indicate the frequency in which you perform them (on average over the last one year).

13. Diagnosing Delirium:

1. Never
2. Rarely (about once every 2-12 months)
3. Sometimes (about once a month)
4. Often (about once a week)
5. Frequently (about once a day)

14. Evaluating Delirium:

1. Never
2. Rarely (about once every 2-12 months)

3. Sometimes (about once a month)
4. Often (about once a week)
5. Frequently (about once a day)

15. Managing Delirium:

1. Never
2. Rarely (about once every 2-12 months)
3. Sometimes (about once a month)
4. Often (about once a week)
5. Frequently (about once a day)

This next section has knowledge-based, multiple choice questions. Please select the one best answer.

16. Which of the following is most suggestive of delirium?

1. Emotional lability (ex. frequent crying spells)
2. Inability to focus on questions
3. Pacing the hallways
4. Refusal to cooperate in using the bedpan

17. You are worried a patient has delirium. In order to diagnose it, you:

1. Complete a mini-mental status exam (MMSE) with the patient
2. Order a head CT
3. Request a psychiatric consult
4. Use the Confusion Assessment Method (CAM) at the bedside

18. You diagnose an agitated patient with delirium. What do you do next?

1. Do a pain assessment
2. Give 2 mg IV Haldol stat
3. Give 5 mg IV Haldol and 2 mg IV Ativan stat
4. Order a Posey vest and soft hand restraints

19. Which of the following is true about a patient with delirium?

1. The patient's delirium, once treated, should clear up immediately
2. The patient is at an increased risk of death
3. The patient should be restrained if no sitter is available
4. The patient will have a better outcome if treated with low dose Haldol

20. Based on the Confusion Assessment Method, a patient must have which of the following to be diagnosed with delirium:

1. Acute onset
2. Altered level of consciousness
3. Altered sleep wake cycle
4. Disorganized thinking

21. Which of the following is NOT associated with delirium?

1. Catatonia
2. Decreased motor activity
3. Fluctuating course
4. Hallucinations

Appendix G

Education PowerPoint

Delirium Prevention, Assessment, and Management

Marley R. Braun, RN
DNP Student – South Dakota State University

Objectives

By the end of the presentation, participants will be able to:

- Define delirium
- Recognize differences in clinical presentation of delirium versus underlying dementia
- Identify factors contributing to the development of delirium
- Understand and explain how to perform the Confusion Assessment Method (CAM) and the Short Portable Mental Status Questionnaire (SPMSQ)
- Discuss appropriate interventions to prevent or shorten the course of delirium
- Understand and be able to carry out the facility's delirium prevention protocol

What is delirium?

Delirium is an **acute** and often preventable medical condition characterized by **disturbed thought processes, shortened attention span, altered sleep-wake cycle, abrupt behavioral changes**, and **reduced environmental awareness**. It **begins abruptly and fluctuates** over hours to days.

(American Delirium Society, 2015; American Nurses Association (ANA), 2017; Bull., 2015)

Changes Observed in Delirium

- Level of consciousness
- Attention
- Perception
- Memory
- Thinking
- Orientation
- Psychomotor behavior (agitation)

(American Delirium Society, 2015; ANA, 2017; Bull, 2015)

How Common is Delirium?

- Complicates hospital stay for more than 7 million hospitalized persons annually of all ages (American Delirium Society, 2015)
- Geriatric population is at an increased risk, 3-61% of this population experiences (Saleh, Gilhen, & Inouye, 2014)
- Occurs in up to 61% of orthopedic patients, especially those with hip fractures (Saleh et al., 2014)
- Up to 89% of patients with underlying dementia will experience delirium (Martins & Fernandes, 2013)
- Prevalence in patients receiving mechanical ventilation is as high as 80% (Saleh et al., 2014)

Outcomes Related to Delirium

- Longer length of hospital stay
- Increased healthcare costs (LOS, intense nursing care)
- Higher level of care at discharge (NH placement)
- Increased mortality after discharge
- Increased risk of adverse events (falls)
- Family and patient distress
- Increased healthcare costs overall

(Inouye & Kiely, 2013; Guaramaka et al., 2014)

Why is this so important?

1) Due to the outcomes listed above
2) Patient and family distress
3) Increased healthcare costs
4) Think of the patients we all have taken care of
5) Minnesota Hospital Association Patient Quality and Safety Initiative
   1) Roadmap to Delirium Prevention utilized as guide for project

Future Goals:

1) Plan to expand this program into Delirium Medication Order Set as well
2) Plan to expand into multidisciplinary approach to delirium prevention

Dementia

- Delirium differs from dementia in that it is an acute onset that fluctuates rapidly and will resolve in days to weeks once properly treated.
- Dementia has a gradual and progressive onset of permanent cognitive change.
- Having dementia will increase delirium rates in healthcare settings as removing the patient with dementia from their normal, daily routine will cause increased confusion.

Differentiating Delirium and Dementia

	Delirium	Dementia
Onset	Acute, abrupt	Insidious
Duration	Hours to days, may last months	Months to years
Course	Fluctuating course which tends to be worse at night	Steady decline; can be stepwise decline with vascular dementia.
Attention	Inattention present	No change

	Delirium	Dementia
Consciousness	Changes- vigilant to lethargic	No change until late in the illness
Hallucinations/Delusions	Visual and auditory hallucinations and delusions	Delusions Visual hallucinations with Lewy body dementia
Sleep/wake cycle	Impaired, sleep schedule can become reversed	Fragmented; may awoken frequently
Mood/Affect	Rapid swings; paranoid	Apathetic, depressed
Psychomotor behavior	Hypoactive, hyperactive or mixed	No change

Types of Delirium

- **Hyperactive**: anxious, agitated, delusional, combative, or disoriented
- **Hypoactive**: comatose, subdued, or lethargic
- **Mixed**: symptoms from both and it is the most common presentation

Will see hallmark symptoms of altered awareness, impaired cognition, disorganized thought processes

Factors leading to Delirium

- Underlying risk factors: Factors impacting delirium that cannot be changed
- Precipitating factors: Factors contributing to development of delirium which can be changed

Underlying Risk Factors

- Age 65 and older
- Male
- Dementia
- Comorbidities such as alcoholism, chronic pain, depression, and multiple diseases
- Polypharmacy
- Sensory impairment
- Poor functional status
- Social isolation prior to hospital admission
- Substance abuse
- Parkinson's disease
- Traumatic brain injury

Precipitating Risk Factors

- Hypoxia
- Infections
- Electrolyte imbalances
- Anemia
- Uncontrolled pain
- Constipation or incontinence
- Tethers (catheters)
- Sleep deprivation
- Medications:
  - Anticholinergics, benzodiazepines, Demerol, dopamine agonists = highest risk
  - Moderate risk medications (used often throughout hospital stays) = antibiotics, anti-emetics, corticosteroids, anticonvulsants, narcotics, sedatives, Reglan, and antihistamines

Delirium Prevention

- Cornerstone of delirium prevention = multi-component interventions
- Interventions include: staff education on risk factors, screening, and prevention; hydration and nutrition; early mobilization; environmental cues and reorientation; sleep promotion/hygiene techniques; music therapy; active family involvement; early removal of patient tethers; bowel and bladder management; and ensuring the patient's sensory aides are present in the hospital

Delirium Prevention at Our Facility

Admission Assessment

Additional questions added to admission assessment that will flow to status board for all staff awareness:

1) Previous history of dementia or delirium? Y or N _____
2) Normal wake time _____ Normal bedtime _____
3) Normal meal times and food preferences _____
4) Favorite hobbies/past-times _____
5) Favorite activities to do _____
6) Sensory and mobility aides utilized _____

Present in hospital? Asked family member to bring? Y/N

What is the Short Portable Mental Status Questionnaire (SPMSQ)?

- This is a quick, easy cognitive assessment to establish patient baseline upon admission and to help score the CAM screen every 12 hours.
- Reliable and valid screening that has been utilized since the 1970s.

(Inouye, 2014; Pfeiffer, 1975)

Scoring for SPMSQ

Score:

0-2 No cognitive impairment

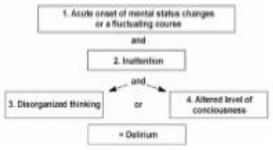
3-4 Mild cognitive impairment

5-7 Moderate cognitive impairment

8+ Severe cognitive impairment

What is Confusion Assessment Method(CAM)?

- Diagnostic assessment tool for delirium developed by Sharon Inouye (Yale)
- Assesses 4 features of delirium:
  - Acute onset and fluctuating course
  - Inattention
  - Disorganized thinking
  - Altered level of consciousness



Completion of CAM & SPMSQ

- On admission for all patients 65 years and older
- Every shift for all patients 65 years and older
- Supportive information:
  - Hours of sleep
  - Behaviors
  - Nursing interventions and outcomes
  - Medications patient takes
  - Normal routine/habits

Confusion Assessment Method (CAM)

Criteria 1: Acute onset and Fluctuating Course:

Has patient changed from their baseline cognitive status?

Does the behavior fluctuate during the day, such as worse in the evening or night?

Is there evidence of an *acute change* in mental status?

- Worsening memory, language impairments, disorientation, perceptual disturbances – usually over hours to days?
  - May require information from family member, caretaker, or nurse who is familiar with patient's baseline.

Did the abnormal behavior come and go or increase or decrease in severity?

Example #1 - Criteria 1

- An 88 yr old woman is admitted with an intracranial bleed and has underlying mild cognitive impairment. She has been alert and oriented to person, place and time. She is cooperative with cares but has a difficult time remembering to use the call light. At 3am, she wakes up and cries out for help, pulls out her IV line, tries to push nursing staff away, and is paranoid about what the staff are trying to do with her.
- Notice:
  1) Change from baseline of A&Ox3
  2) 3 am behavior change – likely from change in routine and lack of sleep
  3) Disorientation
- Likely delirium; would want to rule out worsening head bleed first

Example #2 - Criteria 1

- A 79 yr old man admitted for total hip is POD #3. He has underlying dementia (mild), CAD, Type II diabetes, and osteoarthritis. Patient's bed alarm is going off 2-3 times/ shift as he tries to get out of bed to use bathroom and forgets to use the call light; this has occurred since hospital admission. He is alert and oriented to person and place, slept well during the night, and cooperates with nursing cares. He asks the staff about calling his wife several times every shift.
- Notice:
  1) No change from his baseline dementia
  2) Has forgotten to use call light *since* admission
  3) Slept well, cooperative, A&Ox2 despite forgetfulness
- Likely NOT delirium

Example - Criteria 2

- Talking with a patient about his hospital stay, the patient gives eye contact to the nurse initially. When an x-ray machine moves past his door, his focus shifts to the hallway. Also, the patient is unable to follow the directions the nurse has provided about using call light when needing assistance.
- Notice:
  1) Shifting attention
  2) Inability to follow directions

  (Must be paired with acute change or fluctuating course)

Example – Criteria 3

- You ask the patient if he is having any pain, and the patient states that he needs to go to the mailbox to pick up his mail. You try again by asking "do you hurt anywhere?" and the patient states "hand me those stamps over there for these envelopes to mail because I have to get out to the barn, I hear the cows bellering". Previous to this, the patient had been able to answer questions appropriately.
- Notice:
  1) Irrelevant conversation
  2) Illogical flow of ideas/random switching of subjects/inability to follow conversation
- Likely delirium

Example – Criteria 4

- Mrs. Duncan is an 83 year old lady with hypertension, hypothyroidism, GERD, and osteoarthritis. She slipped on the ice taking out the garbage, and broke her hip. She underwent hip surgery successfully. On the doctors' rounds she is quiet and appears to be sleeping. This is the routine for the first days postoperatively, and the doctor assumes that everything is on track for her recovery. No complaints or problems are brought to the doctor's attention. However, a closer look shows that Mrs. Duncan is drowsy most of the day, everyday. She occasionally wakes up and cries out, and her nurses have been assuming that she is having pain so are medicating her with opioids from the standing orders. At night, they note restlessness and agitation and also medicate her.
- Notice:
  1) Stuporous during the day (hypoactive delirium)
  2) Restless/agitated/hyperalert during the night (hyperactive symptoms)
  3) CHANGE from her "normal" behavior
- Overmedicated versus delirium

Confusion Assessment Method (CAM)

Criteria 2-Inattention:

Does the patient have difficulty focusing attention, for example, being easily distractible, or having difficulty keeping track of what was being said?

Symptoms of Inattention:

- Must frequently repeat questions because attention wanders- not due to hearing/sensory loss.
- Unable to gain patient attention or make prolonged eye contact.
- Patient may look at you for a moment and stare off into space; does not respond to your questions.

Confusion Assessment Method (CAM)

Criteria 3: Disorganized Thinking:

Is the patient's speech disorganized or incoherent, such as rambling or irrelevant conversation, unclear or illogical flow of ideas, or unpredictable switching from subject to subject?

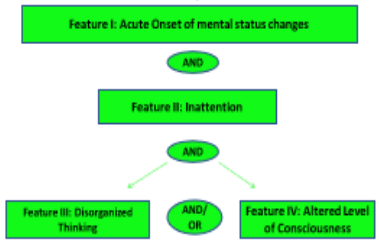
Confusion Assessment Method (CAM)

Criteria 4: Level of Consciousness:

Overall, how would you rate this patient's level of consciousness?

- Alert (normal)
- *Vigilant (hyperalert)*
- *Lethargic (drowsy, easily aroused)*
- *Stupor (difficult to arouse)*
- *Coma (unarousable)*

What makes a positive CAM?



ONE abnormal finding for each feature = a positive result for that feature

Let's Practice!

Case #1 Mr. Wright

Case #2 Mrs. Jones

- Get into groups of 2-3, one will be the patient, one will be the interviewer, the other may help facilitate the interaction or be the family member
- Interview patient, complete SPMSQ and CAM, discuss what interventions would be most helpful for these patients
- We will then discuss findings as a large group
- We will review our facility's protocol, discuss how to implement changes, and documentation changes in EMR

(Wilson et al., 2016)

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Appendix H

Copyright Clearance

H. COPYRIGHT CLEARANCE

The CAM is a copyrighted instrument. You are welcome to use the CAM instrument and criteria for nonprofit clinical or research purposes provided that you include the acknowledgment listed below. However, if you need to publish or reproduce the CAM for a paper, book chapter, article, presentation, website posting, electronic medical record, for translation, or for any industry or for-profit use you must obtain copyright clearance from our office. In order to do this, please contact our office as indicated below. You will be asked for information on how you will use the instrument, where it will be published, etc.

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Any replication of the CAM or publication must include the following copyright acknowledgment. *This exact statement must be clearly visible for copyright clearance to be granted:*

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Appendix I

SAS output for total difference in confidence between pre- and post-questionnaires. The signed rank test displays statistical significance. Key: pre = pre-questionnaire, pos = post-questionnaire, diag = diagnosing, eval = evaluating, mana = managing, disc = discussing, diff = difference between post and pre, DEMD = comfort questions as a whole, tot_DEMD_ diff = total difference in comfort from pre to post.

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
Pre_Diag	20	2.4500000	0.8255779	1.0000000	4.0000000
Pre_Eval	20	2.4000000	0.9403247	1.0000000	4.0000000
Pre_Mana	20	2.5000000	0.8885233	1.0000000	4.0000000
Pre_Disc	20	3.0500000	0.8870412	1.0000000	5.0000000
Pos_Diag	14	3.6428571	0.6333237	3.0000000	5.0000000
Pos_Eval	14	3.7857143	0.8017837	2.0000000	5.0000000
Pos_Mana	14	3.5000000	1.1602387	1.0000000	5.0000000
Pos_Disc	14	3.5714286	1.0163499	2.0000000	5.0000000
Diag_diff	10	1.3000000	0.9486833	0	3.0000000
Eval_diff	10	1.2000000	1.2292726	-1.0000000	3.0000000
Mana_diff	10	0.7000000	1.2516656	-2.0000000	2.0000000
Disc_diff	10	0.4000000	0.8432740	-1.0000000	2.0000000
Pre_Tot_DEMD	20	10.4000000	2.8910024	6.0000000	16.0000000
Pos_Tot_DEMD	14	14.5000000	3.2757853	8.0000000	20.0000000
Tot_DEMD_diff	10	3.6000000	3.5023801	-4.0000000	7.0000000

The UNIVARIATE Procedure
Variable: Tot_DEMD_diff

Moments			
N	10	Sum Weights	10
Mean	3.6	Sum Observations	36
Std Deviation	3.50238014	Variance	12.2666667
Skewness	-1.347686	Kurtosis	1.15908976
Uncorrected SS	240	Corrected SS	110.4
Coeff Variation	97.2883373	Std Error Mean	1.10754985

Basic Statistical Measures			
Location		Variability	
Mean	3.600000	Std Deviation	3.50238
Median	5.000000	Variance	12.26667
Mode	6.000000	Range	11.00000
		Interquartile Range	5.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	3.250418	Pr > |t|	0.0100
Sign	M	3.5	Pr >= |M|	0.0391
Signed Rank	S	20	Pr >= |S|	0.0156

SAS output for diagnosing delirium and evaluating delirium. It displays statistical significance with the signed rank test. Key: diag_diff = difference between post and pre in comfort with diagnosing delirium, eval_diff = difference between post and pre in evaluating delirium.

The UNIVARIATE Procedure
Variable: Diag_diff

Moments			
N	10	Sum Weights	10
Mean	1.3	Sum Observations	13
Std Deviation	0.9486833	Variance	0.9
Skewness	0.23424279	Kurtosis	-0.3468548
Uncorrected SS	25	Corrected SS	8.1
Coeff Variation	72.9756383	Std Error Mean	0.3

Basic Statistical Measures			
Location		Variability	
Mean	1.300000	Std Deviation	0.94868
Median	1.000000	Variance	0.90000
Mode	1.000000	Range	3.00000
		Interquartile Range	1.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	4.333333	Pr > |t|	0.0019
Sign	M	4	Pr >= |M|	0.0078
Signed Rank	S	18	Pr >= |S|	0.0078

The UNIVARIATE Procedure
Variable: Eval_diff

Moments			
N	10	Sum Weights	10
Mean	1.2	Sum Observations	12
Std Deviation	1.22927259	Variance	1.51111111
Skewness	-0.46656	Kurtosis	-0.5435924
Uncorrected SS	28	Corrected SS	13.6
Coeff Variation	102.439383	Std Error Mean	0.38873013

Basic Statistical Measures			
Location		Variability	
Mean	1.200000	Std Deviation	1.22927
Median	1.500000	Variance	1.51111
Mode	2.000000	Range	4.00000
		Interquartile Range	2.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	3.086975	Pr > |t|	0.0130
Sign	M	3	Pr >= |M|	0.0703
Signed Rank	S	16	Pr >= |S|	0.0313

SAS output for total knowledge questions. The signed rank test shows no statistical significant difference between pre- and post-questionnaires. Key: pre = pre-questionnaire, pos = post-questionnaire, Q1-Q6 = knowledge questions 1 through 6, total_diff = total knowledge score with the difference between post and pre.

The MEANS Procedure

Variable	N	Mean	Std Dev	Minimum	Maximum
Pre_Q1	20	0.8000000	0.4103913	0	1.0000000
Pre_Q2	20	0.9500000	0.2236068	0	1.0000000
Pre_Q3	20	0.8000000	0.4103913	0	1.0000000
Pre_Q4	20	0.7500000	0.4442617	0	1.0000000
Pre_Q5	20	0.4500000	0.5104178	0	1.0000000
Pre_Q6	20	0.6000000	0.5026247	0	1.0000000
Pos_Q1	14	0.8571429	0.3631365	0	1.0000000
Pos_Q2	14	1.0000000	0	1.0000000	1.0000000
Pos_Q3	14	0.9285714	0.2672612	0	1.0000000
Pos_Q4	14	0.9285714	0.2672612	0	1.0000000
Pos_Q5	14	0.8571429	0.3631365	0	1.0000000
Pos_Q6	14	0.5714286	0.5135526	0	1.0000000
Pre_TOTAL	20	4.3500000	1.1821034	2.0000000	6.0000000
Pos_TOTAL	14	5.1428571	0.7703289	4.0000000	6.0000000
TOTAL_diff	10	0.7000000	1.8287822	-2.0000000	3.0000000

The UNIVARIATE Procedure
Variable: TOTAL_diff

Moments			
N	10	Sum Weights	10
Mean	0.7	Sum Observations	7
Std Deviation	1.82878223	Variance	3.34444444
Skewness	0.14442376	Kurtosis	-1.3285568
Uncorrected SS	35	Corrected SS	30.1
Coeff Variation	261.254604	Std Error Mean	0.57831172

Basic Statistical Measures			
Location		Variability	
Mean	0.700000	Std Deviation	1.82878
Median	0.500000	Variance	3.34444
Mode	3.000000	Range	5.00000
		Interquartile Range	4.00000

Tests for Location: Mu0=0				
Test	Statistic		p Value	
Student's t	t	1.21042	Pr > |t|	0.2569
Sign	M	1	Pr >= |M|	0.7266
Signed Rank	S	8	Pr >= |S|	0.3281